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Subcommittee on Space and Aeronautics
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Chairman Babin, Ranking Member Sorensen, and distinguished Members of the Committee:
Thank you for inviting me to testify on behalf of the Commercial Spaceflight Federation (CSF). I am honored to share our members' experiences and concerns with the Federal Aviation Administration's (FAA) implementation of its Part 450 launch and reentry regulations, which, without changes, could substantially reduce the pace of innovation and progress within the domestic space sector and impede national competitiveness with China. Industry shares FAA's absolute commitment to protecting public safety and is proud of its perfect public safety record. However, FAA's ability to license launch and reentry operations in a timely manner continues to rapidly degrade, contrary to federal policy requirements and pressing national need. The U.S. launch and reentry licensing process, managed by the Office of Commercial Space Transportation (AST) within FAA, can and must be better, while maintaining public safety as paramount. CSF greatly appreciates the Committee's bipartisan and timely attention to this important matter, and it is our hope for legislative action to immediately assist AST in remedying this untenable situation.

Founded in 2006, CSF is the leading national trade association for the commercial spaceflight industry, with approximately 90 member companies and organizations across the United States. CSF and its members are focused on expanding America's leadership in space, laying the foundation for a sustainable space economy, and democratizing access to space for scientists, students, civilians, and businesses. But it's not just success in orbit and beyond; we are seeing these benefits here at home. CSF members have created tens of thousands of high-paying engineering and manufacturing jobs and have invested billions of dollars across the country, revitalizing a domestic aerospace supply chain that had been in decline and unlocking new potential in space that we can bring home.

Launch and reentry operations underpin all space sectors. Nothing goes into orbit or returns to Earth without safe, reliable, and affordable access to space. That includes national security payloads, science experiments, Earth observation sensors, Global Positioning System (GPS) satellites, hypersonics, spaceport-to-spaceport transportation, and government and private astronauts. All of these space applications *depend* on commercial space transportation. These capabilities are critical to national and economic security and are the foundation for many aspects of everyday life. As launch and reentry operations increase in both cadence and diversity, we are also inaugurating new spaceports, which enhance launch infrastructure resiliency and directly benefit civil, commercial, and national security users.

After years in which the total number of American launches to space precipitously dropped—including years where the U.S. had no share of the global commercial launch market—CSF members have returned the U.S. launch and reentry sector to a dominant position. In the first quarter of this year, American companies launched more orbital rockets than all other nations *combined*.[1] But this leadership is in serious jeopardy as a direct result of AST's continued challenges implementing Part 450. International competitors will quickly outpace American capability if these critical flaws are not meaningfully and urgently addressed. As National Aeronautics and Space Administration (NASA) Administrator Bill Nelson has noted, "It is a fact: we're in a space race."[2]

Congress and the White House have made clear on a bipartisan basis that it is a national priority to preserve our critical advantages in this domain against geopolitical rivals. But this sense of urgency must extend beyond NASA and the Department of Defense (DoD) to regulatory agencies like FAA. To be very clear, this is not a choice between maintaining public safety—which must remain paramount—and facilitating this important activity, nor is CSF advocating for any regulatory rollbacks; rather, AST must foster an appropriately structured and managed regulatory regime that can ensure both vital goals are met, consistent with the very intent of the Part 450 regulations and the Commercial Space Launch Act itself.

This Committee has played an important role contributing to the success of this industry and America's national space enterprise as a whole by conducting oversight and shepherding legislation designed to enable the future of commercial spaceflight. But the future has caught up to us quickly, with American commercial space launches now occurring on average every 2.5 days, and with new and transformative capabilities from multiple American companies in final stages of development. We greatly appreciate the hard work of the many dedicated AST licensing staff who are doing their best day-in and day-out to keep today's licensing system semi-functional. However, they are not being given an opportunity to succeed as a direct result of the issues inherent within the existing implementation of Part 450, the agency's unwillingness to act with urgency to correct those issues, and ongoing staffing challenges.

CSF maintains a close dialogue with AST and regularly provides direct, actionable feedback. While AST has acknowledged that "licensing remains a 'gate' to space for…national priorities" and that it "has already recognized some shortcomings in the part 450 rule, as well as gaps in standards and guidance," the office has not yet meaningfully acted to address these issues.[3] Until Congress can pass legislation to resolve some of the most significant structural challenges, we continue to *strongly* encourage AST to begin acting with urgency and implement short-term stopgaps within its authority to prevent further breakdown of the licensing process. These agency actions include expediting hiring for additional technical licensing staff; revising and updating its approach to Part 450 implementation immediately; and contemplating regulatory solutions *now* through updated internal guidance, waivers, policies, and additional Advisory Circulars (ACs) as a bridge to enhance flexibility, reduce timelines, and eliminate uncertainty until Part 450 can

[1] Kuhr, Jack. "2024 Q1 Orbital Launches by Country." Payload, (May 9, 2024). https://payloadspace.com/2024-q1-orbital-launches-by-country/.
[2] Bryan Bender. "'We Better Watch out': NASA Boss Sounds Alarm on Chinese Moon Ambitions - Politico." POLITICO, (January 1, 2023). https://www.politico.com/news/2023/01/01/we-better-watch-out-nasa-boss-sounds-alarm-on-chinese-moon-ambitions-00075803.
[3] "Budget Estimates Fiscal Year 2025." Federal Aviation Administration, pg. 25. (2024). https://www.transportation.gov/sites/dot.gov/files/2024-03/FAA_FY_2025_Budget_Budget_Request.pdf.

undergo a significant overhaul. In all cases, industry stands ready to collaborate with our regulator to identify consensus alternatives to the status quo.

My testimony will provide a brief overview of the history of Part 450, discuss issues that must be addressed with the regulation, and propose solutions. I strongly and respectfully ask that the Congress act with all due speed in implementing these critical reforms.

PART 450 OVERVIEW

AST created Part 450 in 2020 by consolidating four legacy launch and reentry regulation sets (Parts 415, 417, 431, and 435) into one. This effort was intended to streamline the launch and reentry licensing process, provide a performance-based regulatory framework, and allow for multi-mission licensing. Space Policy Directive-2 (SPD-2), issued in May 2018, tasked the Department of Transportation (DOT) with streamlining AST's launch and reentry regulations under an umbrella policy of ensuring "that regulations adopted and enforced by the executive branch promote economic growth; minimize uncertainty for taxpayers, investors, and private industry; protect national security, public-safety, and foreign policy interests; and encourage American leadership in space commerce." Specifically, this directive required AST to consider (1) utilizing a single license for all types of launch and reentry operations and (2) replacing prescriptive regulations that mandated specific solutions with performance-based criteria that could better encompass ongoing innovation in the industry.[4] Industry applauded SPD-2 when it was announced and was eager to engage in the development of a streamlined regulatory framework, as reflected by the many public comments submitted when AST published its Notice of Proposed Rulemaking (NPRM).

After announcing the NPRM, FAA also chartered the Streamlined Launch and Reentry Requirements Aviation Rulemaking Committee (ARC) in spring 2018 to solicit specific, consensus industry recommendations to maximize success in a new licensing regime. In its final report, the ARC identified prioritizing performance-based and flexible requirements, reforming the pre-application consultation process, defining review timelines, and eliminating duplication in jurisdiction on Federal ranges as prerequisites for the new regulation.[5]

In April 2019, AST published the Notice of Proposed Rulemaking (NPRM) for Part 450 introducing the streamlined framework for both launch and reentry operations.[6] FAA stated the framework was built around performance-based regulations where "operators would be able to use a means of compliance that has already been accepted by the FAA or propose an alternate approach."[7] Unfortunately, the proposed rule did not incorporate much of the guidance included in the final ARC report. After the proposed rule was released, industry filed a comprehensive set of individual comments to the public docket to highlight the major structural and substantive concerns inherent in the draft rule and propose solutions. These concerns ultimately went unaddressed and AST promulgated the final rule in 2020.

[4] Space Policy Directive 2—Streamlining Regulations on Commercial Use of Space (May 24, 2018), https://trumpwhitehouse.archives.gov/presidential-actions/space-policy-directive-2-streamlining-regulations-commercial-use-space/
[5] 84 FR 15301, https://www.federalregister.gov/d/2019-05972/p-180
[6] 84 FR 15296, https://www.federalregister.gov/documents/2019/04/15/2019-05972/streamlined-launch-and-reentry-licensing-requirements
[7] 84 FR 15298, https://www.federalregister.gov/d/2019-05972/p-152

Part 450's inherent defects were evident from day one: not only are processes and procedures *not* streamlined, they are unclear, lack clarity of intent, are subject to differing and often conflicting interpretations, and are substantially slower to go through and more constraining on innovation and operational tempo than legacy regulations. The structural issues with Part 450 are being compounded by implementation challenges that are getting worse, not better, with time. AST has the power today to make positive change but has not yet meaningfully acted to do so.

The many concerns industry raised in its public comments have come to fruition in every stage of the AST licensing process, outlined below:

1. The AST licensing process begins with licensee pre-application consultation.
2. Once means of compliance, or methodologies, proposed by the operator are approved by AST, the licensee documents all supporting license application material. This documentation serves to verify an operator adhered to their proposed means of compliance and complies with the AST's risk criteria.
3. Once review is complete, AST grants a license with any terms and conditions unique to the operation and launch or reentry vehicle. Alternatively, AST may deny a license application.

As it stands, AST's management of Part 450 has led to significant delays in each of these phases. For example, while Part 450 was designed to authorize a set of multiple missions on a given vehicle to reduce licensing burdens on both the government and industry, AST continues to focus on single-mission licenses for launch and reentry operations. Even for these single-mission licenses, confusion about the regulation, driven by insufficient guidance and inconsistent interpretation, prompts continuous license modifications, which arrest the complex technical tasks associated with launch and reentry vehicle development and testing.

By law, FAA must provide licensing determinations within 180 days; however, *every single license* issued under Part 450 has significantly exceeded this requirement, some by years, in part due to the mandatory pre-application period, which AST has determined is not subject to the 180-day statutory licensing time period.[8] It is unreasonable for licensing to be more time consuming than developing and testing rockets. Ironically, FAA's performance under the legacy regulations Part 450 was intended to replace has improved in recent years, but this improvement has not extended to Part 450 and will be erased once the prior framework is sunset in 2026.

Critically, while AST's implementation of Part 450 is unacceptable today, this failure—and by extension, its negative impacts on launch and reentry operators and their public and private sector customers—will soon get much worse. When AST published Part 450, it created a 2026 deadline for all companies operating under the existing legacy rules to transition to Part 450. Many legacy operators are today choosing to operate under the old regulatory framework for as long as they can because, despite expending significant resources in preparation for the transition to Part 450, industry faces too much uncertainty and too many obstacles with Part 450 license implementation. Over the next year and a half, AST's deadline for transition will cause a regulatory pile-up that

[8] Continuing U.S. Leadership in Commercial Space at Home and Abroad: Hearings before the Full Committee Hearing of House Science & Space Technology Committee, (2023), (testimony of Caryn Schenewerk). https://www.commerce.senate.gov/services/files/563D7730-7FAD-426E-A08B-D6E3068A17D5

may ground currently flying U.S. space systems, disabling U.S. access to space as a result of incoherent regulations, poor implementation, and insufficient staffing.

PART 450 CHALLENGES

AST must be willing to act to implement necessary regulatory and internal process changes to address the primary issues with Part 450, outlined below.

Lack of Advisory Circulars (ACs)

ACs are important and necessary FAA tools that complement regulations by providing guidance on the FAA's interpretation of a regulation and the level of detail expected to demonstrate compliance. FAA may also publish ACs to provide technical clarifications to regulations. However, after Part 450 was published in December 2020, AST has fallen behind on its commitments to issue ACs. For example, after attaching a single draft AC to the final rule, AST did not release its first AC until July 2021.[9] Recognizing the need to move faster, AST published a website in 2021 that included a schedule showing the vast majority of ACs would be released by the end of 2022. AST ultimately did not publish most of those ACs and has since removed the schedule from the website.[10] At FAA's Commercial Space Transportation Advisory Committee (COMSTAC) meeting in April of this year, AST announced 12 additional ACs would be published in 2024. As of today, AST has published two minor updates to previously implemented ACs and only one new AC.[11] AST also makes no announcement when ACs are published; operators must manually and frequently check AST's website to see if a new AC has been published.

And so, nearly four years after the Part 450 rule was issued, AST has not published a complete set of ACs. In fact, AST has issued *fewer than half* the ACs that AST itself said would be required for a Part 450-based licensing process to operate effectively. Much of the guidance AST has issued simply advises operators to fall back means of compliance previously included in the legacy regulations, defeating the entire purpose of Part 450's performance-based regulatory model.[12] As COMSTAC noted, this practice of relying on legacy means of compliance has led to "the [Part 450] review process [driving] applicants toward strict requirements and, in some cases, placing limits on their operations with no public safety benefit."[13] In essence, AST has reverted to the worst parts of the previous prescriptive regime while adding additional steps and time and disincentivizing novel approaches to vehicle design, operations, and flight safety.

The Part 450 final rule repeatedly recognizes the need for clear guidance in order to understand and comply with regulatory requirements and states FAA "will provide" an AC on a given regulatory requirement in order to "provide an approach to compliance," but has not yet done so

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[9] 14 CFR Part 450 Subpart C Accepted Means of Compliance Table, https://www.faa.gov/sites/faa.gov/files/Part_450_Means_of_Compliance_Table%20v3%206_24_2024.pdf

[10] "Part 450: Means of Compliance Table." Federal Aviation Administration, https://www.faa.gov/space/streamlinedlicensingprocess/part-450-means-compliance-table

[11] AC No: 450.101-1, updated on May 3, 2024, https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_450.101-1B.pdf; AC No: 450.139-1, published on July 8, 2024, https://www.faa.gov/documentLibrary/media/Advisory_Circular/450.139-1.pdf; AC No: 450.115-1B, updated on August 2, 2024, https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_450.115-1B.pdf.

[12] Of the 43 technical requirements of Part 450, only 16 Advisory Circulars are published https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.list/?&appliedFacets=%7B%22officenumber%22%3A%22AST-1%22%7D

[13] COMSTAC Regulatory Working Group Report: Part 450 – Challenges and Recommendations, (July 11, 2023), https://www.faa.gov/media/68016

in many cases.[14] In addition to failing to deliver a complete set of ACs—the minimum AST acknowledged was required for Part 450 to function—AST has also not prioritized releasing ACs to clarify the most complex or new requirements within Part 450 that contribute to the biggest delays in timely license approval.

Furthermore, AST is missing basic guidance for Part 450 that would otherwise enable a more efficient licensing review process. For example, AST has a requirement where a "licensee is responsible for the continuing accuracy of representations contained in its application for the entire term of the license."[15] However, this requirement is vague and leaves significant gaps for interpretation. Without guidance in place, AST has defaulted to assume *any* change in a detail of the proposed operation under Part 450 requires a formal license modification, even those that have zero impact on public safety and are minor by definition. This places an unnecessary burden on AST staff and operators as even the most reasonable license update requires a formal modification, which in turn adds additional schedule in the form of a modification letter request, formal AST review and concurrence, and new license revision. AST simply does not have the capability to keep doing this without major schedule impacts for all operators. It also runs counter to AST's goal of issuing multi-mission licenses for similar operations.

In the absence of ACs, there is little ability for productive and consistent conversation surrounding an operator's proposed means of compliance. With no centralized anchor, the process leads to unlimited and continuing requests for information by AST, resulting in a vicious circle of iteration and unbounded feedback loops with no clear goals. In many cases, this has made submitting a fully complete application to AST in a first attempt functionally impossible for both new and established operators.

Equally as important is continuous improvement and revision of ACs. The goal of a performance-based regime is to continually expand the envelope of potential means of compliance. As additional Part 450 license applications are reviewed and approved, a sign of a healthy regulatory framework would be the addition of alternative means to an AC on a regular basis. Lessons learned from each effort can help build out a menu of options that enable innovation. Reviewing, synthesizing, and publishing updates and alternatives should be actions that are tracked and used as success metrics for the Part 450 regime overall.

Reluctance to Accept Novel Means of Compliance

Further complicating the situation, AST's published ACs are not intended to be the only exclusive option for demonstrating compliance with Part 450 requirements. Part 450 specifically establishes that each AC "presents one, but not the only, acceptable means of compliance with the associated regulatory requirement."[16] Indeed, the flexibility to allow novel means of compliance was fundamental to Part 450's intent and industry widely supports the concept. This flexibility in approach to solving highly complex and uncertain problems *should* enable operators and AST to determine new compliance methodologies to unlock the benefits of performance-based regulations while improving public safety, encouraging ongoing innovation, and providing a more efficient path for new vehicle licensing.

[14] 85 FR 79566, https://www.federalregister.gov/documents/2020/12/10/2020-22042/streamlined-launch-and-reentry-license-requirements
[15] 14 CFR 450.211, https://www.ecfr.gov/current/title-14/section-450.211
[16] AC No: 450.123-1, https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_450.123-1_Population_Exposure_Assessment_2022.pdf

While this option for novel means of compliance makes great sense in theory, AST has been unable to make it work in practice. Indeed, AST's *implementation* of this element of Part 450 has added bureaucracy, cost to both operators and FAA, uncertainty, and time needed to complete the licensing process. In the cases where AST has not published necessary ACs to provide guidance to prospective licensees, the office treats "means of compliance" documents that applicants submit as wholly novel and requires a series of iterative reviews, each recursively adding time. In the cases where there is an existing AC, if an operator deviates from that published AC in *any* way to tailor its compliance approach to its specific vehicle or operations, AST considers the entire approach a "unique means of compliance." This drastically increases approval timelines, even if the operator utilizes most of an AC's guidance.

This problem is further compounded because AST has not issued formal guidance on the definition of what a "means of compliance" is or what constitutes sufficient information for the office to concur with or reject a proposed analytical approach. This is a fundamental failure of the system. While appropriate and thorough reviews are reasonable and necessary, AST frequently requires applicants to justify their new means of compliance to such an extreme and unreasonable level of irrelevant detail that the approach is no longer universally applicable to their operations beyond the singular mission in question—fundamentally precluding the multi-mission licenses Part 450 was designed to enable.

Additionally, AST divides technical reviews into stovepiped categories of Flight Safety, System Safety, and Flight Safety Systems, but does not have a formal process established to foster internal information flow between these reviews. There is no person within AST responsible for overseeing all technical reviews for a license application. This breakdown inhibits AST from holistically understanding an operator's overall means of compliance strategy across these technical categories throughout the process, contributing to inefficiency.

Finally, AST's feedback throughout the review process is neither consistently clear nor timely. AST routinely provides feedback late. If an operator wishes to discuss the feedback, counter it, or provide alternate means to address it, AST often states this type of back-and-forth collaboration—again, the purpose of Part 450—would increase its license finalization timelines, strongly discouraging continued dialogues to improve efficiency and public safety. Further, operator success in proposing novel means of compliance can be entirely reliant on the specific resource or resources assigned. Operators have reported changing guidance when the primary point of contact for a certain means of compliance changes. With each key technical resource fully consumed with their own activities it can be difficult to leverage the power of multiple points of view to help arrive at optimal, safe conclusions. As with many of the other issues I outline, this practice appears driven by a continued lack of internal AST understanding of *how* to conduct licensing under Part 450 and could be solved by clear guidance from AST leadership.

FAA Staffing and Resource Challenges

These challenges and delays are further exacerbated by AST resource constraints and the diversion of limited resources to irrelevant distractions. To meet the current demand for licensing—let alone match the cadence of industry growth—AST must be sufficiently staffed with appropriate expertise to review technical aspects of license applications. CSF has long advocated for more

resources for AST to complete its public safety licensing mission and appreciates that Congress has consistently increased funding levels for AST. However, more money is not a silver bullet for solving this situation, and it has become clear that funding is not the primary driver for AST's most pressing issues.

AST is chronically understaffed, in part due to ongoing slowness inherent in FAA's hiring practices. AST requires highly qualified engineers to appropriately understand submitted licensing materials, but I have heard anecdotally that many such qualified applicants are lost to other opportunities while FAA's bureaucratic and cumbersome hiring practices churn over many months, even when AST has sufficient funds to hire the required number of reviewers and has extant expedited hiring authority. Without these qualified applicants, AST's challenges will continue.

Additionally, the team assigned to review license applications is also responsible for developing ACs, creating an internal conflict. Given AST's staffing posture, the office is in the difficult position of deciding how to allocate resources to minimize licensing delays today versus producing new ACs, drafting policies, and evaluating methodologies that will minimize licensing delays in the future. Practically, this situation has limited the office's ability to process license materials in parallel, resulting in lengthy sequential processing that impacts an operator's development and test efforts. AST has such minimal bandwidth that it is unable to complete new license approvals and modifications while concurrently evaluating proposed methodologies to meet future licensing needs under Part 450.

Perhaps most concerning, AST is devoting vital resources, including new technical hires desperately needed for launch and reentry license evaluations, to explore new areas of activity clearly outside of its statutory authority, like mission authorization, and on ramping up expertise on occupant safety despite the recent repeated extensions of the learning period. AST should be dedicating its resources to licensing while it works through these issues with Part 450 implementation. As this Committee rightly established in the Commercial Space Act of 2023, AST must effectively meet its existing responsibilities before it can consider future mission expansions and should not allow competition for authority with other federal agencies to impede its core responsibilities. Instead, AST must seek to find creative ways to optimize and increase efficiency of its core licensing functions, including adjusting its approach to licensing based on the maturity of a launch or reentry system and operator. AST should focus on post-flight audits of licensing material for mature systems and operations. This would minimize time spent on recurring pre-flight bureaucratic activities and open AST's resources to other license reviews, including for new entrants to the marketplace. This approach would also lend itself to use of Delegated Authorities, which would delegate validation of compliance to an outside technical authority, as utilized within the aviation industry, to increase the availability of AST staffing for more critical work.[17]

Lack of Transparency Regarding Timelines and Status

Congress wisely implemented a statutory deadline for AST to review and make determinations on launch and reentry licensing applications. AST has 180 days following acceptance of the

[17] "Delegated Organizations." Federal Aviation Administration, https://www.faa.gov/other_visit/aviation_industry/designees_delegations/delegated_organizations.

application to approve or deny an application. However, AST has not consistently met this requirement for licenses within Part 450.

This problem is compounded by difficulties with the "pre-application" process. As noted above, AST can take months—if not years—to approve an applicant's methodologies submitted as means of complying with the rule. This pre-application process gates FAA's determination that an application is "complete enough" to proceed. FAA internal policy dictates that actions relating to applications not deemed "complete enough" are a part of the pre-application consultation process and do not count against the statutory 180-day review period. In many cases, these determinations that an operator's application is "not complete enough" are the direct result of confusion resultant from Part 450's deficits and AST's lack of published guidance. Further, in limited cases, AST has told applicants that a means of compliance is approved, only to demand, post-facto, additional information for further adjudication, resulting in further delays in the process. This practice is entirely unreasonable.

Because of the previously discussed staffing and resource issues at FAA, the industry understands that FAA has implemented a priority system, working to get the most urgent licensing tasks completed. While prioritization is likely necessary and not inherently incorrect, industry is often not aware of where it sits in this lineup and it is clear that the closer a project launch date gets, the more likely an applicant is to move up in priority. The reliance on pre-application as a gate is further flawed when this reality is taken into consideration. An applicant may find it difficult to receive early feedback and approvals on a means of compliance until it has a full application submitted, a prospective launch scheduled, and becomes a higher priority—at which point it is too late to comfortably iterate the way the FAA prefers to work.

Beyond the broken schedule, applicants typically have extremely limited insight into where their applications are in the process, leading to even further uncertainty. AST has often not granted a license until just a few short days prior to a planned launch or reentry date—or even the day before. Operators cannot appropriately plan for launch and reentry operations in such an opaque system, and it adds burden to other Government agencies with responsibilities relating to a launch, including the DoD or NASA range, FAA's Air Traffic Organization (ATO), the U.S. Coast Guard, and more.

CSF appreciates that AST has recognized this problem and is developing an online clearinghouse called the License Electronic Application Portal (LEAP) intended to allow for real-time tracking of application status. Once implemented, it is our hope that LEAP will be a productive step forward, though it will not address the fundamental issues with Part 450. LEAP's readiness date has been delayed for years and it is unclear when it will become operational. AST also has not issued a solicitation of requirements for industry to respond to, which is concerning as user testing should be prioritized. As AST has developed LEAP, industry has uniformly urged the office to leverage proven, commercially-available software (e.g., Jira) instead of a bespoke, in-house solution that AST can ill-afford given the urgent need to accelerate information sharing, better enable performance tracking, and enhance overall communication. To date, AST has not pursued this path, creating a continued risk that basic tracking, performance metrics, and information sharing tools are not efficiently deployed.

Reentry-Specific Challenges

Consolidating various regulations into a single launch and reentry rule has benefits, but AST's implementation in this case has created additional challenges for reentry operators whose activities are simply different from launch operators. A reentry mission envelope is distinct from a launch operation and accordingly, some requirements for launch operators are not appropriate or applicable to reentry operators.

Specifically, as implemented in Part 450, the new requirement to use "conditional expected casualty" (CE_C) creates an unreasonably high barrier for many reentry operations being conducted today, including missions from the International Space Station (ISS) for NASA. AST previously utilized CE_C to measure relative risk between two vehicle trajectories and to demonstrate safety in waivers under the prescriptive legacy regulations. However, Part 450 codifies use of CE_C as the *only* acceptable means to demonstrate high consequence event protection for reentry operations. While CE_C is one possible measure of risk to the public, it is inappropriate to apply to reentry operations because it does not account for the likelihood of vehicle failure and assumes a vehicle is equally likely to fail at every stage of flight. This assumption is contrary to longstanding engineering practice, including at NASA. Historically, reentry operations for both Government and commercial operations consider and require high vehicle reliability given necessary trajectories overflying the public to landing locations like Kennedy Space Center or offshore sites in the Gulf of Mexico or Atlantic Ocean. And because reentry operations are not always dependent or connected to launch infrastructure, reentry operators are utilizing or are planning to utilize in the future other locations, such as Department of Defense test ranges. These types of operations may not be feasible under Part 450 without altogether waiving the CE_C requirement. No matter how reliable, only a subset of reentry operators can meet CE_C requirements for these typical reentry trajectory designs, as industry noted in comments to the draft Part 450 rule years ago.[18] FAA recognized this possibility in its final published rule, noting that the CE_C requirements establish a potential barrier and states that a reentry "operation would either need to be modified to reduce the consequence of failure modes that would result in an intact impact, or be granted a waiver." [19] Yet, this requirement was still included in the final rule. Unsurprisingly, this decision is causing major challenges to operators and AST today, and by extension, NASA's human spaceflight program.

CE_C is one of many examples of where AST did not differentiate between launch and reentry operations when it should have.[20] Other aspects of Part 450 reduce flexibility for reentry operations where launch operations are not similarly constrained. For example, AST provides four hazard control strategies that theoretically could be used for both launch and reentry operations, but in practice only one of these applies to reentry operations.[21] Further, in the few ACs published, rarely are differences in acceptable means of compliance between launch and reentry operations

[18] Blue Origin Part 450 NPRM comments, https://www.regulations.gov/comment/FAA-2019-0229-0104; Sierra Nevada Part 450 NPRM comments, https://www.regulations.gov/comment/FAA-2019-0229-0145; Commercial Spaceflight Federation Part 450 NPRM comments, https://www.regulations.gov/comment/FAA-2019-0229-0150, SpaceX Part 450 NPRM request for clarification, https://www.regulations.gov/comment/FAA-2019-0229-0120; Sierra Nevada Part 450 NPRM request for clarification, https://www.regulations.gov/comment/FAA-2019-0229-0100

[19] Footnotes to 14 CFR Parts 401, 404, 413, 414, 415, 417, 420, 431, 433, 435, 437, 440, 450, and 460, https://www.federalregister.gov/documents/2020/12/10/2020-22042/streamlined-launch-and-reentry-license-requirements#footnote-59-p79601

[20] 85 FR 79566, https://www.federalregister.gov/documents/2020/12/10/2020-22042/streamlined-launch-and-reentry-license-requirements

[21] 14 CFR 450.107, https://www.ecfr.gov/current/title-14/chapter-III/subchapter-C/part-450#450.107

discussed. For instance, in AC 450.107-1, AST provides a sample flight hazard analysis matrix for launch vehicles but not reentry vehicles.[22]

Finally, a recent AST policy announcement applies an additional burden for reentry operators.[23] The policy requires reentry operators to obtain a reentry license prior to launch, even if that reentry will not occur until months or years later. This is overly burdensome as it requires operators to undergo the payload review process with their launch provider in parallel with their reentry licensing effort and is compounded by AST's ongoing delays. The policy cites safety concerns for reentry vehicles without reentry licenses at the time of launch. In Section (IV)(2), the policy states "a random reentry of a reentry vehicle that has not been authorized will likely result in risks above those accepted for FAA licensed-reentry operations."[24] This overly broad assumption does not fairly characterize all reentry capsules, which are greatly varied throughout industry. The policy also relies on a different set of assumptions than the Federal Communications Commission—one of many examples of a lack of coordination between government agencies that complicates the licensing process.[25] Broad application of this policy is not appropriate for all reentry vehicles and will unnecessarily hinder the growth of the small reentry vehicle market in the United States.
For these reasons and more, AST must clarify the differences in applicability of certain requirements to launch and reentry operators and provide for pathways to additional, executable means of compliance. Reentry operations are a vital segment of the space economy and need regulatory clarity and certainty.

Range Coordination
Today, launch and reentry operations involving and/or adjacent to a DoD and/or NASA operated range sometimes require safety analyses conducted by both the DoD/NASA and AST, leading to duplication of effort, confusion, and conflicting requirements imposed on operators. At times, operators have their analyses approved by AST, only to later be rejected by the range—or vice versa. The reality is that Part 450 has reduced clarity on the interactions between NASA, DoD, and AST despite policy guidance. For example, Part 450 allows operators to procure Federal services such as risk analysis evaluation. However, Part 450 also requires specific means of evaluating risk that upend standard approaches to flight safety analysis or operational processes currently utilized by NASA and/or DoD. These conflicts place operators in a difficult position between AST's licensing requirements and the expertise of NASA and DoD personnel.

This interagency conflict does not serve to promote public safety. AST, NASA, and DoD must work together to find a way to eliminate duplicative requirements and harmonize their operations. Importantly, AST can act *unilaterally* to solve much of this challenge. Specifically, CSF strongly supports a COMSTAC recommendation that AST accept the flight safety analysis performed by a Federal range operated by the United States Space Force (USSF).[26] AST should also similarly

[22] AC 450.107-1 - Hazard Control Strategies Determination,
https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1040123
[23] FR Doc. 2024-08156, (Filed April 16, 24), https://www.federalregister.gov/documents/2024/04/17/2024-08156/launch-of-a-reentry-vehicle-as-a-payload-that-requires-a-reentry-authorization-to-return-to-earth
[24] FAA Notice (89 Fed. Reg. 27473) https://www.federalregister.gov/d/2024-08156/p-22
[25] 47 CFR 5.64(b)(7)(iv)(B)(2), https://www.law.cornell.edu/cfr/text/47/5.64
Requirement 4.7-1 of NASA-STD-8719.14A, https://soma.larc.nasa.gov/SIMPLEx/pdf_files/871914.pdf
[26] COMSTAC Regulatory Working Group Report: Part 450 – Challenges and Recommendations, (July 11, 2023), https://www.faa.gov/media/68016

accept NASA flight safety analysis. USSF and NASA should also consider when it is appropriate to simply accept AST flight safety analysis.

The safety of the uninvolved public is of the utmost importance, but conflicting and uncoordinated safety analyses performed between Government agencies do not enhance public safety. Without action, many within industry may look to operate at the ranges of foreign U.S. partners.

Congress has long agreed with the need for licensing efficiency on a bipartisan, bicameral basis. For example, the Commercial Space Launch Competitiveness Act of 2015 stated that "eliminating duplicative requirements and approvals for commercial launch and reentry operations will promote and encourage the development of the commercial space sector."[27] The Space Frontier Act of 2019 directed DOT to "make more efficient use of resources, reduce the regulatory burden for an applicant for a commercial space launch or reentry license or experiment permit, and promote commercial space launch and reentry."[28]

PROPOSED SOLUTIONS

As I have made clear, AST's challenges in developing and now implementing Part 450 are not only harming the commercial space industry, but directly inhibiting key national space priorities, including the Artemis Program to return Americans to the Moon, by introducing significant schedule delays. AST must resolve these issues for the U.S. to maintain its leadership in space. Thankfully, there are clear solutions, some of which are already in motion. We ask the Committee to support the steps laid out below and provide appropriate oversight to ensure they are carried out expeditiously.

- **While AST must undertake a long-term structural review of Part 450, such a process would take years, at best. Accordingly, Congress should direct AST to undertake immediate, interim steps to prevent a complete breakdown of launch and reentry licensing in the intervening time, including**:
    - Issue internal guidance that appropriately defines the current process, constrains endless iteration and review, and requires rationale associated with information requests;
    - Appoint an Independent Technical Authority to oversee and manage technical discussions, rather than having all technical discussions stovepiped into various branches. Today, no single branch within AST is responsible for an *outcome*. They are only individually responsible for their own piece. A specific person must be responsible for the whole product;
    - AST must immediately remove itself from ground safety matters when these activities within a license are approved by USSF or NASA (or vice versa) to reduce resource burden on AST and to eliminate conflicting interagency guidance;
    - AST must implement commercially-available information sharing software (e.g., Jira) today instead of spending its and licensees' time and money pursuing a bespoke solution;

[27] "Text - H.R.2262 - 114th Congress (2015-2016): U.S. Commercial Space Launch Competitiveness Act." November 25, 2015. https://www.congress.gov/bill/114th-congress/house-bill/2262/text, https://www.congress.gov/bill/114th-congress/house-bill/2262/text

[28] "Text - S.3277 - 115th Congress (2017-2018): Space Frontier Act of 2019." December 21, 2018, https://www.congress.gov/bill/115th-congress/senate-bill/3277/text#toc-ide2f6cf33-d3cb-4df8-86fc-1891c83d6ca2

- AST must accelerate hiring appropriate technical staff for licensing evaluations consistent with its statutory mandates and appropriations;
- AST must consider Delegated Authority, which delegates regulatory compliance verification to outside technical authorities, to increase AST resource bandwidth on critical licensing issues;
- AST must defer much of its review to post-flight audits and inspections for mature, operational launch systems to increase its bandwidth for developmental programs and to relieve AST resources from recurring bureaucratic licensing work that does not affect public safety;
- AST must immediately clarify what constitutes a license modification versus continuing accuracy and minimize reviews for non-substantive license updates that do not affect public safety;
- FAA must rapidly publish ACs, including an AC specific to reentry vehicles or updates to currently published ACs that denote where requirements should be interpreted or met differently by reentry operations;
- FAA must rapidly communicate to Congress if it needs additional hiring authorities to expeditiously address staffing needs, such as authorization to utilize direct hiring authorities under section 3304 of Title 5, United States Code.

- **Advance the learning period extension, launch and reentry indemnification and liability extensions, and launch and reentry streamlining provisions of the Commercial Space Act of 2023.** Extending the human spaceflight learning period will keep AST focused on executing its core public safety licensing responsibilities and fixing Part 450 until the appropriate time comes to revisit the commercial human spaceflight safety framework. Additionally, Congress should extend key authorities underpinning the indemnification and liability regime for launch and reentry operations, including 51 USC 50914(a)(5), 51 USC 50914 (b)(1)(C), 51 USC 50915(a)(3)(B), and 51 USC 50915(f). Finally, the bipartisan Garcia-Stevens amendment adopted by voice vote during Committee markup includes reasonable, but highly impactful authorities and guidance for AST that will significantly improve licensing performance, while continuing to protect public safety.

- **Set a statutory timeline for approving applicant means of compliance.** There needs to be a shot clock and transparency on the timeline for work done in the pre-application phase to approve means of compliance. Namely, AST should be required to provide all feedback on an applicant's means of compliance within 30 days to add predictability and consistency to the process.

- **Provide increased, focused resources to AST to emphasize launch and reentry licensing and timely publication of ACs.** AST is currently understaffed and under resourced. While resources are not the sole—or even leading—cause of AST's challenges, ensuring it has enough money and sufficient qualified engineers for licensing activities is one concrete step Congress can take to support fixing Part 450. I commend Congress for approving an increase in appropriations to AST in FY24 and urge a repeat in FY25 with direction that keeps AST focused on its core public safety licensing responsibilities.

- **Encourage DOT to rapidly establish the Part 450 Aerospace Rulemaking Committee (SpARC).** AST recognizes that Part 450 is broken and announced its plans for a Part 450 SpARC in February 2024.[29] CSF appreciates this step, as it will serve as a vital opportunity for industry to engage with AST on the components of Part 450 that need to be fixed. However, six months after this announcement, DOT has not yet acted to formally establish this effort for AST. Congress should direct DOT and AST to formally and immediately establish the SpARC. Since a SpARC process can take years to complete its work, DOT and AST must start this process now to avoid further delay. Congress should also urge AST to ensure the SpARC membership is solely composed of individuals impacted by the regulation to maintain appropriate operational focus. Finally, AST should collaborate with the SpARC in every step of the regulatory development and review process.

- **Encourage the rapid rollout of the LEAP online portal by leveraging commercial tools.** This will provide additional transparency to applicants by allowing for real-time updates on application status. This should be industry facing as well, allowing industry to track metrics and responses openly with the FAA.

- **Accelerate FAA environmental reviews.** Beyond evaluating launches and reentries for public safety, AST also performs environmental compliance reviews, which are often the longest lead item in the licensing process.[30] As part of this effort, AST coordinates with multiple other consulting government agencies, many of which have limited to no familiarity with space operations or space infrastructure. In many cases, this disconnect adds significant schedule while both AST and industry extensively engage each time to share information and educate these other authorities. Given the national schedule urgency for space projects, FAA must accelerate this process, while ensuring an appropriate level of environmental oversight. FAA has a clear model that it can immediately implement. As an agency, it has long recognized the vital national importance of airports and has identified significant airport elements, including runways, passenger terminals, and more, as qualifying for a Categorical Exclusion (CATEX) under the National Environmental Policy Act (NEPA).[31] FAA should extend this existing determination to accelerate space infrastructure buildout for the same national security and economic benefits. Importantly, the Commercial Space Act of 2023, as amended, would direct FAA to apply this authority.

CONCLUSION

The commercial space industry is vital to the lives of everyday Americans as well as our nation's economic competitiveness with China. I thank the Committee for its work on and attention to this important topic.

[29] Meeting the Demand for Space Launch and Reentry Licenses, Federal Aviation Administration. https://www.faa.gov/newsroom/faa-meeting-demand-space-launch-and-reentry-licenses, https://www.faa.gov/newsroom/faa-meeting-demand-space-launch-and-reentry-licenses
[30] 14 CFR 450.47(a), https://www.ecfr.gov/current/title-14/part-450/section-450.47#p-450.47(a)
[31] Categorical Exclusions, n.d. https://www.faa.gov/airports/central/environmental/catex,