COMSTAC Regulatory Working Group Report

Part 450 – Challenges and Recommendations

July 11, 2023

The Regulatory Working Group ("RWG") was tasked with drafting a report that identifies any requirements in 14 CFR Part 450 that COMSTAC believes require additional clarification by the FAA or a regulation change. In the case that regulation changes are recommended, the Working Group was asked to 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 (Parts 420 and 433).

14 CFR Part 450, "Launch and Reentry License Requirements," governs the licensing of launch and reentry vehicle operations and was published as a final rule in December 2020.[1] The effective date was March 10, 2021. To date, four (4)[2] of the twenty-six (26) active launch and reentry licenses listed on the FAA's "Licenses, Permits and Approvals" website have been issued under Part 450.[3] However, it is the Working Group's understanding that the FAA is actively processing dozens of Part 450 license applications. As a result, launch and reentry vehicle operators' experience with the regulations is varied – some have not yet transitioned to Part 450, some have only ever applied and operated under Part 450 and many are at varying stages of the application process.

Considering the varying degrees of Part 450 experience, RWG solicited inputs from members of COMSTAC as well as members of industry familiar with Part 450 to identify issues with the regulations and provide recommendations. In the interest of providing FAA with comprehensive and useful feedback, this report reflects the various inputs and is not intended to present a consensus position on each aspect of the rule or recommendation. That is simply not possible given the diversity of experiences at this time.

This report includes the full list of the regulations within Part 450 that were identified by contributors as requiring additional clarification or changes. Note that the issues included herein are not all-inclusive. As more launch and reentry operators gain experience with Part 450 regulations that are not listed may be identified as benefiting from clarification or changes.

[1] Code of Federal Regulations, Title 14, Chapter IV, Part 450; Docket No. FAA–2019–0229, 85 Fed. Reg. 79739, Dec. 10, 2020.

[2] The final rule allowed for "Legacy Licenses" to continue to operate under their existing licenses for a set period of time, which means that there are on-going launch and reentry operations that have yet to be licensed under Part 450. *Ibid.*

[3] *Federal Aviation Administration*, "Licenses, Permits and Approvals," https://www.faa.gov/space/licenses (last accessed on April 25, 2023).

That said, a few common themes emerged, and those are summarized here:

- The importance of Advisory Circulars (ACs), the need for their timely publication, and a process by which they can be continually updated was uniformly supported, particularly as the FAA works to understand and plan for updates to Part 450. Issues have been reported regarding applicants utilizing ACs and discovering errors or having their resulting documentation rejected. It is also important that ACs make distinctions between launch and reentry when differences exist, as well as specifically clarify the intent of each recommendation in order to allow for variability suited to the particular launch vehicle and prevent regulatory burdens with no public safety benefit. FAA should specify the types of systems or operational data that may impact ground and/or flight safety.
- The timeframes for reviewing application materials and providing timely feedback are a cause of concern. Lack of transparency and reliable timeframes for receiving FAA feedback were reported during the pre-application consultation prior to "acceptance," during the official review period and while the review period was officially tolled. While this issue relates to FAA's available resources, multiple industry representatives characterize Part 450 as complex, which they identify as the main cause of the significant time increases for Part 450 licenses. Many of the detailed comments are directed at streamlining the process.
- While Part 450 was intended to provide more flexibility, applicants' experiences were often the opposite. Instead of allowing for diverse approaches that were tailored to the vehicle or operations, the review process drove applicants toward strict requirements and, in some cases, placing limits on their operations with no public safety benefit. The review process concerns were often tied to FAA staffing challenges. The lack of sufficient expertise to assess new compliance methods shifts the burden to operators who have been asked for significantly more detailed deliverables in FAA-preferred formats. The review process would benefit from FAA's ability to review diverse compliance methods and provide feedback to operators that clearly delineates between comments intended for clarification purposes only, versus comments that cite a deviation from the regulation(s). Only the latter category should be used to require changes or prevent approval of an application or module.
- In combining licensing of launch and reentry operations, Part 450 subjects reentry applicants to numerous requirements that are not applicable or appropriate. 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 compliance for Flight Safety Analysis, toxic release analysis, etc.
- 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.

The RWG also received concerns about the FAA's ability to efficiently and timely process Part 450 application materials. Multiple licensees reported their license review timeframes exceeding the statutory 180-day review period[4] despite the FAA utilizing its tolling authority while document revisions and reviews were actively underway. To that end, recommendations supporting FAA's investment in process improvements and staffing are intended to improve communication and accountability with regard to license status and review timeframes. A review of Part 450 implementation should include identification of key roles and expertise required to evaluate license applications in a performance-based framework. Additional expertise in the appropriate skill areas would also support our recommendation that the FAA publish guidance and initiate efforts to correct deficiencies in Part 450 identified in this report while continuing to implement the rules across diverse applicants. One recommendation aimed at addressing FAA staffing challenges is to limit the duplication of oversight of operations on a federal Range. Where an operator is subject to Range requirements, the FAA should accept the Range's review and approvals and thereby significantly reduce resources required for FAA review as well as the burden on the operator.

Finally, as indicated above and reflected in the recommendations below, clarifying guidance balanced with regulatory changes are necessary to address the challenges with Part 450 and improve streamlining of regulation. Accountability through simple metrics should be used to monitor the success of these efforts. Specific trends such as decreasing application review periods, increasing the cadence of AC publication, and increasing transparency into the licensing process are indicators of a more robust system.

As the FAA receives an increasing number of applications and existing licenses transition 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. Specifically, Parts 420 and 433 are dependent on Part 450 – operators use of launch and/or reentry sites are significantly diminished if they cannot efficiently obtain a Part 450 vehicle operator's license. The FAA has initiated Space Advisory Rulemaking Committees (SpARCs) for certain aspects of the regulations, including Part 440 and 460. The COMSTAC supports the efforts of those SpARCs and encourages the FAA to support that effort without constraining resources necessary to clarify Part 450 through Advisory Circulars, policy documents and adopt amendments, as needed.

Part 450 Inputs and Recommendations:

Rule Section	**Issue**	**Recommendation**
§ 413.11	The lack of clear timeframes for FAA's response to application submissions results in increased licensing costs for the industry. Specifically, the FAA's approach to determining whether an	Provide for clear timeframes for FAA's initial application review and determination of the "complete enough" review. The recommendation is within 10

[4] 51 USC 50905

	application is "complete enough for the FAA to start its review" is ambiguous. It allows for avoiding accountability under the statutory 180-day requirement for license issuance. Further, once accepted, the FAA is reportedly overusing its ability to toll the 180-day clock. When applicants respond to FAA's tolling letter with documents, the FAA is maintaining the toll while it reviews and provides feedback on the documents through multiple revision cycles with the applicant until the FAA is prepared to fully approve the document.	business days of submission. Further recommend providing clear, written guidance on the level of maturity the FAA requires for an application to be "accepted."
§ 450.43	The current definition of payload is not appropriately bounded for suborbital flights.	Recommend the FAA adopt different payload classes to facilitate streamlined approval.
§ 450.101 (c)	The FAA appears to be struggling with how to apply this regulation to reentry. Members of industry noted in response to the NPRM that this regulation was not ready to be used operationally, but the FAA ignored that feedback without providing evidence that reentry had been tested in this analysis framework. Specifically, the application of CEc to Reentry in a manner that requires mitigation with a flight safety system would guarantee the negative outcome predicted by CEc.	Explicitly state that this regulation is not applicable to reentry vehicles or move it into the 450.101(a) criteria for launch.
§ 450.101 (c)	The implementation of CEc is causing some challenges for launch vehicle operators.	FAA should ensure that it can provide guidance to launch vehicle operators on efficiently and effectively implementing CEc.
Part 450 System Safety (450.103,	The FAA system safety model incorrectly adopts NASA/DOD system safety practices that typically operate on timelines and budgets far exceeding those in the commercial space industry. Such an	The new 450 system safety framework should have clear success metrics: if a company meets X quantitative, agreed-upon goal(s) then it will have met the

450.109, 450.141)	approach unfairly (and inadvertently) benefits companies with the resources to withstand a very long and very expensive review timeframes. In short, the 450 system safety framework is burdensome beyond what is necessary to protect the public. The FAA has required applicants to complete 2 separate functional hazard analyses (450.107(b) and 450.185) prior to preapplication, which requires a completed rocket design prior to initiating the licensing process.	system safety requirement of Part 450.
§ 450.108	The concepts of 'Limits of a Useful Mission' as applied by the FAA are inconsistent with how analysis is done in industry. The FAA approach results in a tedious workflow that is time consuming and costly without clear public safety benefit. The industry approach is the result of years of Defense Department practice. Traditional practice has been "show me where you want to fly, show me where your termination bounds are, and confirm that the termination lines maintain appropriate public safety risk thresholds." Defining what is/is not considered 'useful', especially when data collection is specifically stated to be 'not useful' by the FAA, is of no use to understanding how a mission affects public safety.	Part 450 should be revised to define public safety objectives and the elements of useful/helpful analysis. To the extent that clarification or streamlining can effectively be accomplished through written guidance, the FAA should prioritize publishing an AC on this issue.
§ 450.108	The Flight Abort system defined in § 450.108 is required to be "highly reliable" per section § 450.145(a) when the criteria of § 450.108(b)(1) is met (when required to actually protect the public). The FAA has interpreted the regulation as requiring	The FAA should clarify that the "highly reliable" requirement is related to public safety.

	the system to be 'highly reliable' for the entire time that it is active, not just during the period when it is required to protect the public. That interpretation incentivizes an operator to modify their end of flight abort (§ 450.108 (e)) rather than be allowed to fly an active abort system farther into the flight.	
§ 450.115(c)	The FAA's approach to reviewing and accepting flight safety analysis (FSA) methodologies has been inconsistent. The FAA's requirements are not well defined and guidance frequently changed. The result is an approach that far exceeds the level of documentation and justification that was required under the previous regulations for launch (Part 415/417) without clear added benefit for safety.	FAA should revise the regulation such that the approaches and level of effort under Parts 415/417 are acceptable under Part 450.
§ 450.115	The references in § 450.115(c)(4) and (5) to "benchmark" are not clear when applied to a new architecture or vehicle.	The FAA should clarify the use of "benchmark" in this section. This clarification could be accomplished by an update to AC 450.115-1.
§ 450.123	The FAA has not provided clear and consistent guidance on an acceptable sources of population data for determining population exposure. Commercial data sources such as LandScan should be acceptable for operations not on a federal Range. While referenced in AC 450.123-1, FAA's acceptance of LandScan has not been consistent.	Update the regulation to explicitly state that in lieu of population data provided by a federal entity, commercial sources are sufficient for activities not on a federal Range. Alternatively, clarify, if necessary, AC 450-123-1 and ensure consistent understanding and application of the guidance by the FAA.
§ 450.131 (f)(1) Pf and 450.121 Debris analysis	The FAA is using these two regulations in conjunction to cobble together a 'requirement' for a reentry vehicle to do a random reentry analysis.	Reentry vehicles which are designed for reentry should not be required to conduct a random reentry analysis.

§ 450.131	This is another example of Part 450 being ill-suited to reentry and is misaligned with the intent of these regulations. The Part 450.131(a) probability of failure analysis requirements are prohibitive for reentry vehicles. The regulations require the use of flight history, of which reentry vehicles generally have significantly less than launch vehicles, to determine probabilities of failure. Further, the FAA has communicated that they will not allow system safety regulations such as 450.107(c) flight hazard analysis to be employed, which could enable lowering probability of failure through fault trees or other system safety-based analyses. This shift in reentry vehicle probability of failure regulations means that safety criteria will not be met for most reentry trajectories of current and future reentry vehicles.	Part 450 should allow continued use of system safety analysis methods as an alternative means of compliance for determining probability of failure of a reentry vehicle. Alternatively, 450.131(a) should be expanded or clarified to provide alternative probability of failure methods for reentry vehicles, including the use of methods beyond the current flight history-based methods in 450.131(a).
§ 450.137	Requiring a full, quantitative, far-field overpressure blast effects analysis for reentry vehicles that are basically empty on reentry is burdensome and unnecessary. A quantitative analysis is a significant effort and not something most companies have internal capabilities to complete. The alternative, contracting the work out (to only a single contractor, presently), is costly with little benefit in scenarios this regulation was not intended to cover, specifically, a reentry vehicle that has depleted its propellants.	There should be a reasonable acceptable means of compliance for this requirement that is appropriate to the vehicle and its operations. Suggest that there be a qualitative means to meet this regulation vs. quantitative when commodities that could result in a far-field overpressure blast effects are in low quantities. The FAA should provide tools to perform simple conservative analyses to prove that a full fidelity analysis is unnecessary. Such tools are utilized by operators and should be evaluated and published for other operators to use, which would relieve reliance on a single source for performing this work.

§ 450.139	Requiring a full, quantitative, toxic release analysis for reentry vehicles that are basically empty on reentry is overly burdensome and unnecessary. A quantitative analysis is a significant effort and not something most companies have internal capabilities to complete. The alternative, contracting the work out, is costly with little benefit in scenarios this regulation was not intended to cover, specifically, a reentry vehicle that has depleted its propellants.	There should be a reasonable acceptable means of compliance for this requirement that is appropriate to the vehicle and its operations. Suggest that there be a qualitative method to meet this regulation vs. a quantitative method when commodities are low toxicity as well as in low quantities.
§ 450.215 (b)(2)	The reference to "anomaly" in this (b)(2) is not appropriately defined. In (b)(1), a reportable anomaly is one that is "material to public health and safety and the safety of property."	(b)(2) should be rewritten as follows: "(2) Any corrective action implemented or to be implemented after the flight due to an anomaly reported in accordance with (b)(1) of this subsection or mishap;"