



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: Guidance on Submitting an
Application for a Part 450 Vehicle Operator
License

Date: DRAFT
Initiated By: AST-1

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This Advisory Circular (AC) provides guidance on demonstrating compliance with the requirements of a license application in accordance with §§ 413.11 and 413.13 of title 14 of the Code of Federal Regulations (14 CFR). It details the criteria for submitting an application and the FAA's evaluation of the application for a license determination under 14 CFR part 450.

The Federal Aviation Administration (FAA) considers this AC an accepted means of compliance (MOC) for complying with the regulatory requirements of §§ 413.11 and 413.13.

This is a guidance document. Its content is not legally binding in its own right and will not be relied upon by the United States Department of Transportation as a separate basis for affirmative enforcement action or other administrative penalty. Conformity with the guidance document is voluntary only. Nonconformity will not affect rights and obligations under existing statutes and regulations.

If you have suggestions for improving this AC, please use the Advisory Circular Feedback Form at the end of this AC.

Executive Director, Office of Operational Safety
Commercial Space Transportation

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1 **PURPOSE.**

This Advisory Circular (AC) provides guidance on demonstrating compliance with the requirements for a vehicle operator license application in accordance with Title 14 of the Code of Federal Regulations (CFR) §§ 413.11 and 413.13. This document details the criteria for application acceptance, along with guidelines and expectations for an applicant to follow during the FAA evaluation process, to achieve a license determination for a vehicle operator license under Title 14 CFR part 450.

This AC should be used in conjunction with AC 413.5, *Pre-Application Consultation and Lifecycle Overview for Licenses and Permits*. AC 413.5 provides top-level guidance on the FAA evaluation process. This AC concentrates on items unique to Part 450 vehicle operator licenses and provides guidance on application acceptance criteria and the corresponding submission schedule that impacts the FAA's evaluation.

1.1 **Level of Imperatives.**

This AC presents one, but not the only, acceptable Means of Compliance (MOC) with the associated regulatory requirements. FAA will consider other means of compliance for submitting an application that an applicant may elect to present. In addition, an operator may tailor the provisions of this AC to meet its unique needs, provided the changes are accepted as a means of compliance by FAA. Throughout this document, the word “must” characterizes statements that directly follow from regulatory text and therefore reflect regulatory mandates. The word “should” describes a requirement if electing to use this MOC; variation from the provisions of this AC is possible, but must satisfy the regulation to constitute an alternative MOC. The word “may” describes variations or alternatives allowed within the accepted MOC set forth in this AC.

1.2 **Cancellation.**

This AC cancels AC 413.13-1, *Guidance on Submitting a Complete Enough and Complete Application for a Vehicle Operator License*, dated December 18, 2023.

1.3 **Principal Changes.**

This revision to this AC includes the following principal changes:

- The terms “Completeness,” “Complete Enough,” “Complete,” “Acceptance,” and “Phases” have been clarified from the previous version.
- While the content and intent of the process have not changed, the language and narrative describing the process and applicant requirements have been updated.
- Additionally, this AC now provides more context on when it should be used and places greater emphasis on applicant requirements.

1.4 **Where You Can Find This AC.**

You can find this AC on the FAA's website at https://www.faa.gov/regulations_policies/advisory_circulars and the Dynamic Regulatory System (DRS) at <https://drs.faa.gov>.

2 **APPLICABILITY.**

- 2.1 This AC provides guidance for launch and reentry vehicle applicants and operators who must comply with 14 CFR Part 450, Launch and Reentry License Requirements. It is intended for those seeking a launch or reentry vehicle operator license, as well as for licensed operators seeking a new, renewed, or modified vehicle operator license.
- 2.2 This is a guidance document. Its content is not legally binding in its own right and will not be relied upon by the Department as a separate basis for affirmative enforcement action or other administrative penalty. Conformity with the guidance document is voluntary only. Nonconformity will not affect rights and obligations under existing statutes and regulations.
- 2.3 The material in this AC does not change or create any additional regulatory requirements, nor does it authorize changes to, or deviations from, existing regulatory requirements.

3 **APPLICABLE REGULATIONS AND RELATED DOCUMENTS.**

3.1 **Applicable United States Code (U.S.C.) Statute.**

51 U.S.C. Subtitle V, Chapter 509, Commercial Space Launch Activities.

3.2 **Related FAA Commercial Space Transportation Regulations.**

The following 14 CFR regulations must be accounted for when showing compliance with 14 CFR Part 450. The full text of these regulations can be downloaded from the [U.S. Government Printing Office e-CFR](#). A paper copy can be ordered from the Government Printing Office, Superintendent of Documents, Attn: New Orders, P.O. Box 371954, Pittsburgh, PA, 15250-7954.

- Section 401.7, *Definitions*.
- Part 413, *License Application Procedures*.
- Part 440, *Financial Responsibility*.
- Part 450, *Launch and Reentry License Requirements*.
- Part 460, *Human Space Flight Requirements* (if applicable).

3.3 **Related FAA Advisory Circulars.**

FAA ACs are available through the FAA website, <http://www.faa.gov>.

- AC 413.5, *Pre-Application Consultation and Lifecycle Overview for Licenses and Permits*
- AC 440.17, *Reciprocal Waiver of Claims Requirements*.
- AC 450.3, *Definition of Launch and Scope of a Vehicle Operator License*
- AC 450.31, *Applying for FAA Determination on Policy or Payload Reviews*
- AC 450.45-1, *Launch and Reentry of Space Nuclear Systems*
- AC 450.45-2, *Compliance when Contracting with a Federal Entity*
- AC 450.101, *High Consequence Event Protection*
- AC 450.103, *Safety System Program*
- AC 450.107, *Hazard Control Strategies*
- AC 450.108, *Flight Abort Rule Development*
- AC 450.109, *Flight Hazard Analysis*
- AC 450.110, *Physical Containment as a Hazard Control Strategy*
- AC 450.115, *High Fidelity Flight Safety Analysis*
- AC 450.115, *Describing Flight Safety Analysis Methods*
- AC 450.117, *Trajectory Analysis for Normal Flight*

- AC 450.123, *Population Exposure Analysis*
- AC 450.137, *De Minimis Far Field Overpressure Blast Effects Analysis*
- AC 450.139, *Toxic Hazards*
- AC 450.141, *Computing Systems and Software*
- AC 450.161, *Control of Hazard Areas*
- AC 450.167, *Tracking for Launch and Reentry Safety Analysis*
- AC 450.169, *Launch and Reentry Collision Avoidance Analysis*
- AC 450.173, *Part 450 Mishap Plan – Reporting, Response, and Investigation Requirements*
- AC 450.179, *Ground Safety*
- AC 460.15, *Human Factors Considerations in Commercial Space Flight*

3.4 Related Government Documents.

- Federal Aviation Administration (FAA), “Getting Started with *Licensing*,” available at: https://www.faa.gov/space/licenses/licensing_process.
- FAA, *Notice of Federal Site Providing Ground Safety Services and Oversight for Launch or Reentry Activities Conducted From a Commercial Site Located on Land Owned by a Federal Site*, Issued May 9, 2025.
- FAA, *United States Coast Guard Letter of Intent (LOI) Policy Statement*.
<https://www.faa.gov/space/legislationregulationguidance/uscg-letter-intent-loi-policy-statement>.
- Department of Transportation (DOT) and FAA, *Statement of Policy on Waiving Ground Safety Regulations at Cape Canaveral Air Force Station, Vandenberg Air Force Base, Wallops Flight Facility, and Kennedy Space Center*, effective November 3, 2020.
- *Memorandum of Agreement Between the Department of the Air Force and the Federal Aviation Administration for Launch and Reentry Activity on Department of the Air Force Ranges and Installation*, Agreement Number FAA-DAF-SLR-2021.
- National Environmental Policy Act, dated January 1, 1970,
<https://www.epa.gov/nepa/what-national-environmental-policy-act>
- *Risk Committee, Range Safety Group, Range Commanders Council, Flight Termination Systems Commonality Standard*, RCC 319-24, dated June 2019.
- *Risk Committee, Range Safety Group, Range Commanders Council, Common Risk Criteria for National Test Ranges*, RCC 324-11, dated February 2011.

Note: The industry documents referenced in this chapter refer to the current revisions or regulatory authorities’ accepted revisions.

4 **DEFINITION OF TERMS.**

For this AC, the definitions from § 401.7 apply.

5 **ACRONYMS.**

AC – Advisory Circular

ATO – Air Traffic Organization

CATEX – Categorical Exclusion

CFR – Code of Federal Regulations

CSSI – Computing System Safety Items

EA – Environment Assessment

EIS – Environmental Impact Statement

FAA – Federal Aviation Administration

FSA – Flight Safety Analysis

FTSR – Flight Termination System Report

LOA – Letter of Agreement

LOI – Letter of Intention

MPE – Maximum Predicted Environment

MOC – Means of Compliance

NASA – National Aeronautics and Space Administration

NEPA – National Environmental Policy Act

NM – Nautical miles

NOP – Neighboring Operations Personnel

OMB – Office of Management and Budget

Pc – Probability of Casualty

POF – Probability of Failure

RF – Radio Frequency

RTSR – Range Tracking System Report

U.S.C. – United States Code

U.S. – United States

WR – Written Reevaluation

6 INTRODUCTION.

The process for submitting a Part 450 application begins with pre-application consultation. As referenced in *AC 413.5 Pre-Application Consultation and Lifecycle Overview for Licenses and Permits*, the applicant first interacts with FAA during pre-application consultation. Once an application is submitted and accepted, the 180-day application review period begins. At the conclusion of the evaluation, if FAA makes a positive determination, the applicant receives a launch license authorization and becomes an operator.

Even after an applicant becomes an operator, this AC continues to apply to modifications or new licenses sought by the operator. When an operator introduces an update to the operation or a new vehicle or site, the operator must discuss the updates during pre-application consultation before submitting any application materials. FAA may deem the proposed update to be a new application or a modification to the existing authorization. Moreover, with an established operator, this is a critical determination for the evaluation timeline and should occur during pre-application consultation.

6.1 Pre-Application Consultation and Acceptance.

Prior to application submission, an applicant must consult with FAA to discuss the application process and possible issues relevant to the licensing decision. In particular, the applicant should consult with FAA on Part 450 regulations that are prerequisites for application acceptance and regulations that need to be addressed early to ensure timely review of application materials. These regulations are identified and discussed in Chapter 7, *Part 450 Pre-Application Consultation and Prerequisites*.

FAA will only accept an application once FAA has accepted MOCs for prerequisite regulations and the applicant has addressed each regulation in Part 450, in accordance with § 413.11. A discussion of the application acceptance process may be found in paragraphs 9.2 and 9.3 of this AC.

6.2 Three-Phase Application Review Process.

After application acceptance, FAA has 180 days to review the application. During the application review period, FAA may elect to evaluate Part 450 license applications in three sequential parts or phases to efficiently process the materials. The phased application review process is the FAA's method for logically and efficiently evaluating materials submitted in a defined sequence for a Part 450 vehicle operator authorization. It is intended to provide greater transparency for the applicant as to the progress of the FAA's evaluation. This document explains what is expected of the applicant during each phase:

- Phase 1: Initial Assessment and Foundational Elements. This phase centers on evaluating the core components of the application that are fundamental to the entire application.
- Phase 2: Detailed Analysis and Mitigation Strategies. This phase is a more in-depth examination of the applicant's safety analyses, hazard controls, and risk mitigation measures.

- Phase 3: Verification, Validation, and Final Approvals. This final phase involves verifying that the applicant's systems and processes are in place and functioning as intended.

A discussion of the three-phase review process may be found in Chapter 9. Checklists for the three phases of review may be found in paragraphs 10.2, 10.3, and 10.4 of this AC.

The FAA's three-phase review process is not to be misconstrued with the requirements of § 450.33, Incremental review and determinations, see paragraph 7.3 of this AC.

6.3 **Part 450 Evaluation Conclusion.**

At the end of the last phase (Phase 3), the license evaluation is finalized. A positive determination will result in FAA issuing the applicant an authorization to operate a vehicle in accordance with the representations in the application pursuant to Part 450 and § 413.19. Note that FAA can specify additional terms and conditions in the license and orders that are necessary to ensure regulatory compliance, irrespective of the representations in the application. A negative determination will result in a denial of the application in accordance with § 413.21, as described in AC 413.5.

7 **PART 450 PRE-APPLICATION CONSULTATION AND PREREQUISITES.**

Under § 413.5, a prospective applicant must engage in pre-application consultation with FAA before applying. During pre-application consultation, the applicant and FAA discuss the application process and possible issues relevant to the FAA's licensing decision.

This chapter sets out regulatory requirements that should be addressed during pre-application consultation.

- Paragraph 7.1 identifies means of compliance and alternatives to compliance that should be discussed during pre-application consultation.
 - Paragraph 7.1.1 discusses regulations for which an applicant must have an accepted means of compliance before application acceptance.
 - Paragraph 7.1.2 discusses regulations for which an applicant should identify a means of compliance during pre-application consultation.
 - Paragraph 7.1.3 discusses unique means of compliance and alternatives to compliance that should be addressed during pre-application consultation.
 - Paragraph 7.1.4 provides a checklist for applicants, consolidating the information in Paragraph 7.1.
- Paragraphs 7.2 through 7.6 discuss other items that FAA encourages applicants to address during pre-application consultation to ensure timely review of application materials.

Note: The objective of pre-application consultation is to answer questions and obtain guidance for all Part 450 requirements—especially those regulations without explicit application requirements, which are still subject to inspection, such as §§ 450.101, 450.157, 450.159, and 450.169.

7.1 **Means of Compliance.**

A means of compliance (MOC) is the approach used to satisfy a section or subsection of the regulations. Thus, every requirement may have one or more MOC.

During pre-application consultation, FAA will work with applicants on compliance planning for the regulations. FAA has identified six types of MOCs that provide acceptable paths for meeting the regulations:

1. A published advisory circular,
2. An FAA-accepted standard, as listed in the Part 450 Means of Compliance Table¹,
3. Services provided by an approved Federal entity per § 450.45(b),
4. A safety element approval per § 450.39 or Part 414,
5. An applicant-specific description of methods that have been approved during pre-application consultation, and

¹ All publicly available FAA-accepted MOCs are maintained on the FAA website at: <https://www.faa.gov/media/85521>

6. For flight safety analysis (FSA), the actual mission data is being used as “representative” data, along with a description of the methods used to generate the data.

Note: The Flight Safety Analysis section of this document (see Chapter 8) includes additional discussion on the MOC for § 450.115(b), especially MOC types 5 and 6.

7.1.1 Section 450.35, Means of Compliance.

For five regulations, FAA must accept the MOC prior to accepting an application. These prerequisites to application acceptance are listed in § 450.35(a) as follows:

1. Section 450.115(b) regarding flight safety analyses: An operator's flight safety analysis method must (1) have a level of fidelity sufficient to demonstrate that any risk to the public satisfies the safety criteria of § 450.101, including the use of mitigations, accounting for all known sources of uncertainty, using a means of compliance accepted by the Administrator, and (2) identify the dominant source of each type of public risk with a criterion in § 450.101(a) or (b) in terms of phase of flight, source of hazard (such as toxic exposure, inert, or explosive debris), and failure mode.
2. Section 450.139(e)(1) regarding toxic hazards for flight: A toxic risk assessment must account for airborne concentration and duration thresholds of toxic propellants or other chemicals. For any toxic propellant, other chemicals, or combustion product, an operator must use airborne toxic concentration and duration thresholds identified in a means of compliance accepted by the Administrator.
3. Section 450.145(b) regarding highly reliable flight safety system: A highly reliable flight safety system must, using a means of compliance accepted by the Administrator, have a design reliability of 0.999 at 95 percent confidence and commensurate design, analysis, and testing for the portion of the flight safety system onboard the vehicle or not onboard the vehicle, if used.
4. Section 450.163(a)(1) regarding lightning hazard mitigation: An operator must establish flight commit criteria that mitigate the potential for a launch or reentry vehicle intercepting or initiating a direct lightning strike, or encountering a nearby discharge, using a means of compliance accepted by the Administrator.
5. Section 450.187(e)(1) regarding toxic hazards mitigation for ground operations: An operator using toxic risk assessment must manage the risk from any toxic release hazard and demonstrate compliance with the criteria in § 450.185(c). A toxic risk assessment must account for airborne concentration and duration thresholds of toxic propellants or other chemicals. For any toxic propellant, other chemicals, or combustion product, an operator must use airborne toxic concentration and duration thresholds identified in a means of compliance accepted by the Administrator.

Because of the complex nature of these requirements, the applicant must submit the MOC for these five regulations for FAA acceptance during the pre-application consultation, in accordance with § 450.35. MOC acceptance in accordance with § 450.35 may take an extended period of time.

Additionally, FAA acceptance of a MOC requirement remains valid only if FAA determines that 1.) the operations proposed or represented in the application are consistent with all the conditions relevant to the MOC, and 2.) the application materials (e.g., data) demonstrate correct implementation of the MOC.

Note: Section 450.115(b) is referenced in several regulations, each of which must be addressed with individual MOCs. For an in-depth discussion of those regulations, see Chapter 8.

7.1.2 Means of Compliance for Other Regulations.

While FAA encourages applicants to submit any MOC during pre-application consultation, applicants are particularly encouraged to submit MOCs for the following regulations during pre-application consultation.

7.1.2.1 ***Section 450.107 Hazard Control Strategies.***

The core of Part 450 regulation is based on the identification of hazard control strategies for a given operation, as required by § 450.107, *Hazard control strategies*. It is essential for applicants to identify and review the hazard control strategy for each part or phase of the operation to determine which Part 450 requirements apply for compliance. Further, a single mission may employ multiple hazard control strategies.

Additionally, there is a regulatory connection between the FSA methodologies and § 450.107, *Hazard control strategies*. Although § 450.107 is not a prerequisite for application acceptance, the submitted application must align with the approved FSA MOCs. Specifically, concerning § 450.107, applicants should aim to understand this requirement during pre-application consultation to ensure that the accepted FSA MOCs remain consistent with the proposed mission and any subsequent submissions.

Given the importance of the functional hazard analysis to the hazard control strategy determination and the overall Part 450 license application, applicants are encouraged to seek FAA acceptance of their proposed MOC for § 450.107(b) during pre-application consultation. This approach helps ensure a timely review and minimizes the risk of delays, including the potential for tolling the application.

7.1.2.2 ***Section 450.139(f)(7) Toxic hazards for flight.***

This requirement, in particular § 450.139(f)(7)(i), may impact other submissions required by § 450.107 for the failure modes associated with toxic scenarios. Further § 450.139(f)(7)(ii) has a methodology submission requirement that should be discussed with FAA during pre-application consultation. Early discussion with FAA helps ensure a timely review and minimizes the risk of delays, including the potential for delaying acceptance of the application.

7.1.2.3 ***Section 450.143 Safety-critical system design, test, and documentation.***

An applicant must comply with § 450.143 if 1.) they are using flight abort as a hazard control strategy and the consequence of any reasonably foreseeable failure mode in any significant period of flight is between 1×10^{-2} and 1×10^{-3} conditional expected casualties for uncontrolled areas per § 450.108(b)(2) or 2.) they are using flight hazard analysis as a hazard control strategy and the applicant cannot demonstrate through its flight hazard analysis that the likelihood of any hazardous condition specifically associated with the system that may cause death or serious injury to the public is extremely remote, pursuant to § 450.109(b)(3). If an applicant intends to show compliance with § 450.143, although not listed in § 450.35(a), FAA strongly encourages the applicant to discuss their safety-critical system design, test, and documentation with FAA during pre-application consultation. Further, in using § 450.143, other requirements, such as § 450.103 or § 450.141, may need early consideration. This approach helps ensure a timely review and minimizes the risk of delays, including the potential for tolling the application.

7.1.2.4 ***Section 450.163(a)(2) Lightning hazard mitigation.***

Although not listed in § 450.35(a), if an applicant chooses to use § 450.163(a)(2) for lightning hazard mitigation (as opposed to § 450.163(a)(1), which is in § 450.35(a)), applicants are strongly encouraged to discuss the vehicle design with FAA during pre-application consultation.

7.1.2.5 ***Section 450.177 Unique safety policies, requirements, and practices***

To ensure timely review, applicants proposing to use any MOC to satisfy unique safety policies and requirements under § 450.177 should also seek FAA acceptance of their proposed means of compliance during pre-application consultation.

7.1.3 **Unique Means of Compliance or Alternatives to Compliance.**

During pre-application consultation, applicants should also identify any unique means of compliance or alternative approach to compliance that the applicant intends to use for any Part 450 requirement. This includes an equivalent level of safety under § 450.37, use of safety-related Federal services under § 450.45, and use of Federal ground safety services in accordance with § 450.179(b). Additionally, applicants should indicate if they are utilizing a safety element approval pursuant to § 450.39 or pursuing a safety element approval in conjunction with the vehicle application.

7.1.3.1 Section 450.45 Federal Entity Services.

For an applicant seeking services with a Federal entity (such as the U.S. Space Force or NASA), the applicant can leverage the services to show compliance with select regulations. However, the Federal entity must meet the requirements of Part 450, as described in AC 450.45-2, *Compliance when Contracting with a Federal Entity*. The Federal government entities that have satisfied specific requirements of Part 450 are documented in their respective Notice of Determination, issued November 21, 2025 (or subsequently). An applicant seeking to utilize services covered by the determination should note this during pre-application consultation.

7.1.3.2 Section 450.179(b) Ground Safety.

The path for complying with ground safety requirements should be established during pre-application consultation. In particular, an applicant intending to rely on ground safety services and oversight provided by a Federal launch or reentry site to meet ground safety requirements should submit information before application acceptance confirming that:

1. The launch or reentry is being conducted from a Federal launch or reentry site;
2. The operator has a written agreement with the Federal launch or reentry site for the provision of ground safety services and oversight; and
3. The Administrator has determined that the Federal launch or reentry site's ground safety processes, requirements, and oversight are consistent with the Secretary's statutory authority over commercial space activities:
 - <https://www.govinfo.gov/content/pkg/FR-2025-05-09/pdf/2025-08097.pdf> (Policy on Federal ground safety services provided at commercial sites located on Federal land Federal Sites: CCSFS, VSFB, WFF, KSC)²
 - <https://www.faa.gov/media/6566> (KSC determination)
 - <https://www.faa.gov/media/95476> (Wallops determination)

In the case of § 450.179(b)(3), the following reference may also be helpful:

- FAA DAF SLR-2021.0³, which documents a memorandum of agreement for launch and reentry activity at Department of the Air Force ranges and installations, and

² FAA, *Notice of Federal Site Providing Ground Safety Services and Oversight for Launch or Reentry Activities Conducted From a Commercial Site Located on Land Owned by a Federal Site*, Issued on May 9, 2025.

³ *Memorandum of Agreement Between the Department of the Air Force and the Federal Aviation Administration for Launch and Reentry Activity on Department of the Air Force Ranges and Installation*, Agreement Number FAA DAF SLR-2021.0

7.1.4 Means of Compliance Checklist:

- A. To satisfy the requirements for § 450.35, *Means of Compliance*, the applicant must identify an accepted MOC for § 450.35(a)(1) – (5) as follows:
- ☐ (1) Section 450.115(b)(1) is embedded within several regulations (see Chapter 8), and each must be addressed with individual MOCs:
 - ☐ § 450.108(g)(1), *Flight abort*
 - ☐ § 450.117(d)(1), *Trajectory analysis for normal flight*
 - ☐ § 450.119(c)(1) – (2), *Trajectory analysis for malfunction flight*
 - ☐ § 450.121(d)(1) – (4), *Debris analysis*
 - ☐ § 450.123(c)(1), *Population exposure analysis*
 - ☐ § 450.131(f)(1), *Probability of failure analysis*
 - ☐ § 450.133(e)(1), *Flight hazard area analysis*
 - ☐ § 450.135(c)(1), *Debris risk analysis*
 - ☐ § 450.137(c)(2) – (c)(5), *Far-field overpressure blast effects analysis*
 - ☐ (2) Section 450.139(e)(1), *Toxic hazards for flight*
 - ☐ (3) Section 450.145(b), *Highly reliable flight safety system*
 - ☐ (4) Section 450.163(a)(1), *Lightning hazard mitigation*
 - ☐ (5) Section 450.187(e)(1), *Toxic hazards mitigation for ground operations*
- B. An applicant may identify a means of compliance for the following regulations, if applicable:
- ☐ Section 450.107(b), *Hazard control strategies*
 - ☐ Section 450.139(f)(7), *Toxic hazards for flight*
 - ☐ Section 450.143, *Safety-critical system design, test, and documentation*
 - ☐ Section 450.163(a)(2), *Lightning hazard mitigation*
 - ☐ Section 450.177, *Unique safety policies, requirements, and practices*
- C. An applicant should identify any requirement for which the applicant intends to use one of the following:
- ☐ Equivalent level of safety, per § 450.37.
 - ☐ Safety element approval, per § 450.39 (and indicate if the applicant will be pursuing a safety element approval in conjunction with the vehicle application).
 - ☐ Provision of services by a Federal launch or reentry site, per § 450.45(b).
 - ☐ Provision of ground safety services by a Federal launch or reentry site, per § 450.179(b).

7.2 **Section 450.3 Scope of a Vehicle Operator License.**

The “Scope of License” is a determination made by FAA. Per § 450.3(d), the applicant must identify pre- and post-flight ground operations at a U.S. launch site such that FAA can determine when the launch or reentry operation would begin and end. FAA encourages the applicant to submit the scope of license materials during pre-application consultation to ensure that the submissions being developed for § 450.35 Means of Compliance and subsequent application acceptance are adequately scoped.

Once FAA and the applicant mutually understand the applicant’s concept of operations, FAA will determine the scope of license using the information provided by the applicant. An applicant wishing to change or update an FAA’s scope of license determination should discuss the proposed revision during pre-application consultation.

7.2.1 Section 450.3 Scope of a Vehicle Operator License Checklist:

To enable FAA to determine the scope of license, an applicant must identify pre- and post-flight ground operations at a U.S. launch site and should provide the following information:

- ☐ For launch, a list of pre-flight ground operations at a U.S. launch site that are considered potentially hazardous activities before any mitigations are applied.
- ☐ For launch, a list of potentially hazardous activities for post-flight ground operations, ensuring that the launch site is safe and all components are secured either in orbit or after returning to Earth.
- ☐ For reentry, a list of activities conducted in Earth orbit or outer space to assess reentry readiness.
- ☐ For reentry, a list of post-flight ground operations necessary to ensure the reentry vehicle, and its components, are returned to a safe condition on the ground after impact or landing. Note that post-flight ground operations include activities in the water following a water landing or splashdown.

Note: The pre- and post-flight operations include any operations that are potentially hazardous to the public before any mitigations (e.g. restricting public access).

7.3 **Section 450.33 Incremental Review and Determinations.**

During pre-application consultation, an applicant may submit application materials in modules using an incremental approach, in accordance with § 450.33, *Incremental review and determinations*. However, not all sections of Part 450 are suitable for this modular incremental approach. As suggested by the evaluation phases described in this AC, there are dependencies throughout Part 450 that prevent FAA from making a determination on certain sections until other sections have been verified as meeting requirements first—that is, the evaluation of a Part 450 application must happen in a very specific sequence, which is described in this AC.

For FAA to consider an incremental review, the applicant must submit a plan during pre-application consultation describing the modular application structure and submission sequence. For example, FAA cannot provide formal approval for a prescribed hazard control without an understanding of the vehicle and operations, or before the vehicle and mission have been designed. Submitting documents without any logical order and without an FAA-approved plan will result in rejection of the submission. However, if FAA performs an incremental review and provides a positive determination on a module, that module should be referenced in the appropriate sections of the application. FAA will not need to reevaluate that module, but the applicant must ensure its continuing accuracy within the overall application.

7.4 **Section 450.41 Policy and § 450.43 Payload Review and Determination.**

For most applications, the policy and payload reviews are started shortly after application acceptance. However, the policy and payload reviews can be accomplished independently of the license application evaluation process. During pre-application consultation, if there are policy or payload issues identified that may result in an extended interagency review, accomplishing the payload or policy review early is encouraged. FAA can make a policy and payload determination prior to application acceptance for the vehicle operator or the payload owner. More information on policy and payload reviews can be found in AC 450.31-1, *Applying for FAA Determination on Policy or Payload Reviews*.

Note: Policy and payload approvals may be rescinded if the representations made in the application are not accurate. Continuing accuracy is the responsibility of the operator and/or the payload owner. The issuance of a policy or payload determination does not relieve the applicant of its obligation to comply with all applicable requirements of law or regulation that may apply to its activities.

Note: For an independent payload determination, the payload review approval is contingent upon the launch operator performing the associated operations in accordance with the representations made in the application by a payload operator.

7.5 **Section 450.47 Environmental Review.**

Coordination supporting the environmental review may begin during pre-application consultation. After an applicant outlines its proposed operations, FAA will work with the applicant to determine the appropriate environmental document (CATEX, WR, EA, or EIS) under the *National Environmental Policy Act* (NEPA).⁴ The applicant should provide a draft environmental document that is ready for public review, as applicable, before the environmental portion of the application is accepted.

⁴ <https://www.epa.gov/nepa/what-national-environmental-policy-act>.

7.5.1 Section 450.47 Environmental Review Checklist:

To meet the environmental review requirements, the applicant should:

- ☐ Coordinate with the FAA's environmental specialists.
- ☐ Create a draft environmental assessment, environmental impact statement or other environmental documentation as required by FAA.

7.6 **Section 450.147 Agreements.**

While Part 450 does not list agreements as a specific prerequisite for application acceptance, initiating these agreements, as required by § 450.147, is advisable during pre-application consultation. In some cases, these agreements may need to be executed prior to application acceptance. For instance, in accordance with § 450.147(a), the vehicle operator must have a use agreement in place with the site operator at the time of application, before any licensed operations can occur at the site.

7.6.1 Section 450.147 Agreements Checklist:

To meet the § 450.147 Agreements requirements, the applicant should have:

- ☐ An executed agreement with the site operator to operate at the launch or reentry site.
- ☐ An agreement with an applicable Federal Entity if they are going to use Federal services.
- ☐ A draft letter of intent with the U.S. Coast Guard.
- ☐ A draft letter of agreement with the FAA Air Traffic Organization (ATO).

7.7 **Section 450.175 Test Induced Damage.**

An applicant must coordinate potential test-induced damage with FAA before the planned activity, and with sufficient time for FAA to evaluate the proposal during the application process or as a license modification. As such, this requirement can be accomplished during pre-application or during any phase of the evaluation or post-licensing as a modification.

8 ADDITIONAL PART 450 APPLICATION GUIDANCE: FSA.

8.1 Part 450 FSA Structure.

FSA consists of §§ 450.113 through 450.139. Sections 450.113 and 450.115 provide general requirements that apply to each of the sub-analyses in §§ 450.117 through 450.139. Section 450.35(a)(1) states that an MOC for § 450.115(b)(1) must be accepted by FAA before an application can be accepted. Applicants should carefully study AC 450.115-2 to understand the requirements for FSA MOCs.

Note: Section 450.115(b) is a requirement on the level of fidelity of the applicant's FSA method. The FSA method is the accumulation of the methods for each sub-analysis (§§ 450.117 through 450.137), as well as flight abort (§ 450.108):

- § 450.108(g)(1), *Flight abort*
- § 450.117(d)(1), *Trajectory analysis for normal flight*
- § 450.119(c)(1) – (2), *Trajectory analysis for malfunction flight*
- § 450.121(d)(1) – (4), *Debris analysis*
- § 450.123(c)(1), *Population exposure analysis*
- § 450.131(f)(1), *Probability of failure analysis*
- § 450.133(e)(1), *Flight hazard area analysis*
- § 450.135(c)(1), *Debris risk analysis*
- § 450.137(c)(2) – (c)(5), *Far-field overpressure blast effects analysis*

Note: Different phases of flight may use different FSA methods. Applicants should perform preliminary functional hazard analyses (§ 450.107) prior to submitting their FSA methods for review since the system safety process identifies “reasonably foreseeable events and failures” that ultimately determine the proper scope of the FSA methods under § 450.115(a). For this reason, applicants should include any preliminary functional hazard analyses with their FSA methodology documentation to facilitate the FAA's review of their FSA methods (see paragraph 7.1.2.1 of this AC).

Note: When operating from a Federal Range, it is common to use Federal Entity Services for most of the sub-analyses, but the applicant must provide an applicant-specific method for the sub-analyses that the Federal Range does not perform (see paragraph 7.1.3.1).

8.2 FSA Application Requirements.

Each of the FSA sub-analysis sections includes application requirements, which can be grouped into three categories: methodology, narratives, and representative data, as discussed below.

8.2.1 Methodology.

This type of requirement begins with “a description of the methods,” referring to § 450.115(c). An applicant-specific MOC for FSA (type 5 in paragraph 7.1 Means of Compliance) for a regulation section is an FAA-approved methodology. For FAA to begin an evaluation of a methodology, the minimal criteria for the submission are detailed in the FSA ACs⁵.

8.2.2 Narrative Descriptions.

There are several requirements of this type (i.e., § 450.108(g)(2) and (4), § 450.110(c)(2), § 450.111(d)(1)-(2), § 450.119(c)(3), § 450.121(d)(1) and (4), § 450.135(c)(2), § 450.137(c)(1)-(5) and (8)). Additional ACs⁶ provide guidance on satisfactory versions of these narratives. It is critical that the narrative covers all phases of flight.

8.2.3 Representative Data.

This involves performing an FSA for a representative operation, which falls under the scope of the vehicle operator license (§ 450.3). The operation should be suitable for all vehicle configurations (see § 450.45). For example, if solid rocket boosters are part of one configuration, they should be included in the representative analysis. The analysis must cover all phases of flight as required by § 450.113 and satisfy the safety criteria in § 450.101. This demonstrates that the methods have sufficient fidelity to be appropriate for the license, per § 450.115(b)(1). This analysis process is repeated throughout the lifecycle of all proposed operations, covering all phases of flight, to demonstrate compliance with the safety criteria for each operation at the time of the launch commit decision. Application materials should be detailed enough to demonstrate compliance with the safety criteria for all proposed operations within the scope of license.

8.3 **FSA Methodology Description.**

If an applicant is submitting a new methodology that will be used as an MOC for any of the FSA requirements, this should be discussed early in pre-application conversations. A novel approach requires significant effort for both the applicant and FAA. Applicants should carefully study AC 450.115-2 to understand the expectations for a methodology description.

⁵ AC 450.115-1B *High Fidelity Flight Safety Analysis*, AC 450.115-2 *Describing Flight Safety Analysis Methods*, AC 450.117-1 *Trajectory Analysis for Normal Flight*, AC 450.123-1 *Population Exposure Analysis*, AC 450.137-1 *De Minimis Far-Field Overpressure Blast Effects Analysis*

⁶ AC 450.115-1B *High Fidelity Flight Safety Analysis*, AC 450.115-2 *Describing Flight Safety Analysis Methods*, AC 450.117-1 *Trajectory Analysis for Normal Flight*, AC 450.123-1 *Population Exposure Analysis*, AC 450.137-1 *De Minimis Far-Field Overpressure Blast Effects Analysis*

8.4 FSA MOC for a Single Planned Flight Profile.

Scoping the initial FSA MOC using a single planned flight profile may reduce the initial effort for an applicant's first operations. This approach may require less rigor in the methodology description because it limits the scope of the FAA's evaluation of compliance with §§ 450.115(b) and 450.101(g). This approach may be useful to applicants who only need a single flight profile for first flights of a new vehicle in development, but it is not intended for long-term operational needs. The drawback to this approach is that each new mission profile requires license modification and subsequent FAA review. This approach is practical for situations where collective risk is significantly below the safety criteria and mitigations can include larger operational restrictions (e.g., larger hazard areas). It is generally not practical to optimize operational constraints for a frequent operational cadence.

To utilize this approach, an applicant may choose to scope their methodology and data to a single planned flight profile instead of requesting that a methodology be approved for a variety of flight profiles and operations. The applicant should discuss the suitability of this approach with FAA during pre-application consultations. If the applicant chooses to utilize this approach, the application should state that:

- The data in application submissions are for the actual planned flight profile rather than just "representative" data.

The risk analysis is applicable to all foreseeable conditions within the launch commit criteria, in accordance with §§ 450.135(a)(1) and 450.137(a)(1).

9 **PART 450 THREE-PHASE EVALUATION PROCESS.**⁷

9.1 **Introduction to the Part 450 Application Evaluation Three-Phase Review Process.**

For Part 450 applications, the FAA's three-phase application review process accounts for the logical dependencies between sections of the Part 450 regulation. Some sections generate data or information needed for subsequent sections. For instance, application submissions evaluated during Phases 2 and 3 may be provided later in the process as vehicle testing concludes and operational documentation becomes more refined closer to flight. In general, FAA begins evaluating a phase only after the materials identified for the previous phase have met the requirements.

Note: The checklists in the Appendices in Chapter 11 of this AC, include a narrative discussion for each application requirement, and are intended to help applicants prepare their applications. These narratives are brief; other ACs specific to different aspects of the regulation provide much more guidance for applicants to comply with the regulations.

9.2 **Part 450 Application Submission.**

All Part 413 and Part 450 regulations, including prerequisites, must be addressed in the initial application submission. Some regulations may have multi-part requirements that have Phase 1, Phase 2, and/or Phase 3 components (please see the requirements for each phase in paragraphs 10.2 to 10.4 and in the Appendices in Chapter 11).

- Materials submitted at each phase should be high-quality and robust, aiming to ensure that FAA will not require additional information or clarification during the evaluation process.
- If the applicant fails to supply accurate and complete materials at any point during the evaluation, FAA can toll or deny the application.
- All updated and revised materials should include unambiguous information to track revisions, such as a red-lined "track-changes" document submitted for reference.

All submitted application documents must comply with the requirements in § 450.45(e)(1) and should use formatting suitable for technical reports and be free from grammatical and cross-referencing errors.

9.3 **Application Acceptance.**

FAA may accept an application once 1) FAA has accepted MOCs for requirements listed in § 450.35; and 2) the applicant ensures that each Part 450 requirement is addressed (i.e. including those with Phase 2 or Phase 3 submissions or are not applicable). However, to avoid delays in application evaluation, FAA strongly encourages applicants to submit materials for the items in the Pre-Application Consultation Checklist (Paragraph 10.1) and the Phase 1 Checklist (Paragraph 10.2).

⁷ Reference AC 413.5, *Pre-Application Consultation and Lifecycle Overview for Licenses and Permits*.

Note that FAA regulations contain several similar terms that can be confusing: “Complete Enough,” “Complete,” and “Completeness.” The FAA’s “Complete Enough” check is the initial screening that occurs with Application Acceptance, and “Complete” or “Completeness” is an FAA determination with Application Evaluation.

9.3.1 Initial Screening.

The purpose of the FAA’s initial screening is to determine whether each of the Part 450 requirements has been addressed. This is not a qualitative assessment—it is a “yes or no” assessment. The quality of the application is determined during the application evaluation, after application acceptance.

The criteria to pass the FAA’s initial screening are that the applicant has provided an individual response for each Part 450 requirement, including prerequisites and regulations that are not applicable.

- For submissions that will be turned in later in the evaluation during Phases 2 or 3, the specific regulations must be initially noted as “pending submission” in the application, per the guidance in this AC (see paragraphs 9.1 and 9.2 of this AC).
- If a requirement is not applicable, the application should state this. Although not required for the initial submission, justification regarding why a requirement is not applicable may be needed during the evaluation.

9.3.2 Complete or Completeness of Information.

A “complete” application or the “completeness of information,” as referenced in §§ 413.13 and 413.17, is achieved only after FAA finishes its evaluation and determines that the applicant has achieved compliance with all of the applicable requirements.

Note: A “complete application” is robust, addressing all the regulatory requirements and demonstrating compliance, enabling FAA to make a determination.

Note: During the evaluation, FAA may find a response inadequate, deficient, or unclear. Depending on the severity of these issues, FAA may allow the applicant to update the material, or it may toll (pause) or deny the application, as described in AC 413.5.

9.4 **Part 450 Evaluation: Phase 1, Phase 2, and Phase 3.**

As detailed in Chapter 10, application evaluation begins after the application is accepted; once it is accepted, FAA begins the 180-day application review, and Phase 1 will begin. During Phase 1, FAA evaluates the materials that logically must be evaluated first. During phases 2 and 3, FAA evaluates the materials that are most efficiently evaluated only after the previous phase requirements have been met. To avoid delays in the license evaluation process, Phase 2 requirements should be submitted within 30 calendar days of application acceptance, and Phase 3 requirements within 60 calendar days of application acceptance. FAA may toll an application if these requirements are not submitted according to this schedule.

10 **REQUIREMENTS TO OBTAIN A VEHICLE OPERATOR LICENSE BY PHASE.**

During pre-application, FAA accepts the MOCs (§ 450.35) and reviews other preliminary items detailed in paragraph 10.1, such as Scope of License (§ 450.3).

Application evaluation begins after the application is accepted; once it is accepted, FAA begins the 180-day application review, and Phase 1 will begin. Application acceptance occurs when the applicant accomplishes the Pre-Application Consultation Checklist (see paragraph 10.1), the Phase 1 Evaluation Checklist (see paragraph 10.2), ensures that each Part 450 requirement is addressed (i.e., even those with Phase 2 or Phase 3 submissions or are not applicable, see paragraph 9.3.1), and submits the application in accordance with Part 413.

In Phase 1, FAA first evaluates the items listed in paragraph 10.2, such as System Safety Program Plan (§ 450.103) and Hazard Control Strategies with a functional hazard analysis (§ 450.107). These requirements ensure the applicant has a solid foundation for its safety approach, has considered the key hazards, and has a credible plan for mitigating them.

In Phase 2, the FAA evaluates the items listed in paragraph 10.3, such as the prescribed hazard controls.

Finally, in Phase 3, FAA finalizes the evaluation by completing the Safety Review, Payload/Policy Determination and Environmental Review, as listed in the requirements of paragraph 10.4.

Note: Some of the regulations have subsections or components that span more than one phase. Applicants should collaborate with FAA to understand the specific elements of each regulatory section addressed in each phase of the evaluation. Please review the Appendices in Chapter 11 for additional information and explanation on the requirements of each regulation.

10.1 Application Acceptance Checklist.

- ☐ The application must address all Part 450 requirements and be submitted in accordance with Part 413.
- ☐ Prerequisites. In accordance with § 450.35, the following requirements are prerequisites for application acceptance and must be completed during pre-application consultation:
 - ☐ § 450.115(b), Flight safety analysis methods (see Appendix D)
 - ☐ § 450.108(g)(1), *Flight abort*
 - ☐ § 450.117(d)(1), *Trajectory analysis for normal flight*
 - ☐ § 450.119(c)(1) – (2), *Trajectory analysis for malfunction flight*
 - ☐ § 450.121(d)(1) – (4), *Debris analysis*
 - ☐ § 450.123(c)(1), *Population exposure analysis*
 - ☐ § 450.131(f)(1), *Probability of failure analysis*
 - ☐ § 450.133(e)(1), *Flight hazard area analysis*
 - ☐ § 450.135(c)(1), *Debris risk analysis*
 - ☐ § 450.137(c)(2) – (c)(5), *Far-field overpressure blast effects analysis*
 - ☐ § 450.139(e)(1), *Toxic hazards for flight* (see Appendix D)
 - ☐ § 450.145(b), *Highly reliable flight safety system* (see Appendix E)
 - ☐ § 450.163(a)(1), *Lightning hazard mitigation* (see Appendix F)
 - ☐ § 450.187(e)(1), *Toxic hazards mitigation for ground operations* (see Appendix G)
- ☐ Other Pre-Application Consultation items. Coordination with FAA is encouraged for the following requirements before application submission:
 - ☐ § 450.3, *Scope of a vehicle operator license* (FAA determination required to start Phase 1)
 - ☐ § 450.33, *Incremental review and determinations* (if applicable)
 - ☐ § 450.47, *Environmental review* (Draft) (see Appendix A)
 - ☐ § 450.147, *Agreements* (Draft Letter of Agreement (LOA)/LOI, Executed site/Federal agreements) (see Appendix F)
 - ☐ § 450.175, *Test-induced damage* (if applicable) (see Appendix F)
 - ☐ § 450.179(b), *Ground safety—general* (if applicable) (see Appendix G)
 - ☐ Any additional MOCs (see paragraph 7.1.2), if applicable:
 - ☐ § 450.37, *Equivalent level of safety*
 - ☐ § 450.39, *Use of safety element approval*
 - ☐ § 450.177, *Unique safety policies, requirements, and practices* (see Appendix F)
 - ☐ § 450.107, *Hazard control strategies* (see Appendix C)
 - ☐ § 450.143, *Safety-critical system design, test, and documentation*
 - ☐ § 450.163(a)(2), *Lightning hazard mitigation* (see Appendix F)

10.2 Phase 1 Evaluation Checklist.

The following regulations contain a Phase 1 regulation, subsection, or component:⁸

- ☐ § 450.3, *Scope of a vehicle operator license* (FAA determination)
- ☐ § 450.37, *Equivalent level of safety* (if applicable)
- ☐ § 450.39, *Use of safety element approval* (if applicable)
- ☐ § 450.41, *Policy review and approval* (May be started in pre-application) (see Appendix A)
- ☐ § 450.43, *Payload review and determination* (May be started in pre-application) (see Appendix A)
- ☐ § 450.45(e)(1)–(7), *Safety review and approval* (see Appendix A)
- ☐ § 450.47, *Environmental review* (Draft) (see Appendix A)
- ☐ §§ 450.103(b)–(d) and (e)(2), *System safety program* (see Appendix B)
- ☐ §§ 450.107(d)(1) and (a)–(b), *Hazard control strategies* (see Appendix C)
- ☐ §§ 450.109(a), (b), (b)(1)–(b)(3), (c)–(e), (f)(1), (f)(2), *Flight hazard analysis* (see Appendix C)
- ☐ § 450.110(c)(2), *Physical containment* (see Appendix D)
- ☐ §§ 450.111(e)(1), (e)(2), *Wind weighting* (see Appendix D)
- ☐ §§ 450.117 (d)(2)–(d)(4), *Trajectory analysis for normal flight* (see Appendix D)
- ☐ §§ 450.119 (c)(3), (c)(4), *Trajectory analysis for malfunction flight* (or Phase 2. See Appendix 11D.5 § 450.119 Trajectory Analysis for Malfunction.)
- ☐ § 450.121(d)(5), *Debris analysis* (see Appendix D)
- ☐ § 450.131(f)(2), *Probability of failure analysis* (or Phase 2. See Appendix 11D.8 § 450.131 Probability of Failure Analysis.)
- ☐ § 450.137(c)(2), *Far-field overpressure blast effects analysis* (see Appendix D)
- ☐ §§ 450.139(a), (f)(1)–(f)(6), *Toxic hazards for flight* (see Appendix D)
- ☐ §§ 450.141(a), (b)(1), (b)(2), (c), (d)(1), *Computing systems* (see Appendix E)
- ☐ §§ 450.143(a), (f)(1), *Safety-critical system design, test, and documentation*
- ☐ §§ 450.145 (d)(1)–(d)(3), *Highly reliable flight safety system* (see Appendix E)
- ☐ § 450.147, *Agreements* (Draft LOA/LOI, Executed Site/Federal agreements)
- ☐ §§ 450.163(a)(2), (b)(2) *Lightning hazard mitigation* (see Appendix F)
- ☐ § 450.175, *Test-induced damage* (if applicable) (see Appendix F)
- ☐ § 450.177, *Unique safety policies, requirements, and practices* (see Appendix F)
- ☐ § 450.179(a) or (b), *Ground safety—general* (see Appendix G)
- ☐ § 450.181, *Coordination with a site operator* (see Appendix G)
- ☐ §§ 450.185(a)–(c), (f)(1)–(f)(3), *Ground hazard analysis* (see Appendix G)
- ☐ §§ 450.187(a), (f)(1)–(f)(6), *Toxic hazards mitigation for ground operations* (see Appendix G)

⁸ FAA encourages the applicant to work with their licensing lead to gain insight into what “components” of each regulatory section will or should be addressed in each phase of the evaluation.

10.3 Phase 2 Evaluation Checklist.

The following regulations have a Phase 2 regulation, subsection, or component:⁹

- ☐ § 450.45(e)(1) *Safety review and approval* (as applicable) (see Appendix A)
- ☐ §§ 450.103(a) and (e)(1), *System safety program* (see Appendix B)
- ☐ §§ 450.107(d)(2) and (c), *Hazard control strategies* (see Appendix C)
- ☐ § 450.108, *Flight abort* (see Appendix C)
- ☐ §§ 450.109(b)(4), (b)(5), (f)(1), *Flight hazard analysis* (see Appendix C)
- ☐ § 450.110(c)(1), *Physical containment* (see Appendix D)
- ☐ § 450.111 (e)(3), *Wind weighting* (see Appendix D)
- ☐ §§ 450.119 (c)(3), (c)(4), *Trajectory analysis for malfunction flight* (or Phase 1. See Appendix 11D.5 § 450.119 Trajectory Analysis for Malfunction.)
- ☐ § 450.123(c)(2), *Population exposure analysis* (see Appendix D)
- ☐ § 450.131(f)(2), *Probability of failure analysis* (or Phase 1. See Appendix 11D.8 § 450.131 Probability of Failure Analysis.)
- ☐ §§ 450.137(c)(1), (c)(3), (c)(4), (c)(8), *Far-field overpressure blast effects analysis* (see Appendix D)
- ☐ §§ 450.139(b)–(e), (f)(7) *Toxic hazards for flight* (see Appendix D)
- ☐ §§ 450.141(b)(3), (d)(2), (d)(3), *Computing systems* (see Appendix E)
- ☐ § 450.143(f)(7), *Safety-critical system design, test, and documentation*
- ☐ §§ 450.145 (d)(4), (d)(5), *Highly reliable flight safety system* (see Appendix E)
- ☐ § 450.149, *Safety-critical personnel qualifications* (see Appendix F)
- ☐ § 450.153(a), *Radio frequency management* (see Appendix F)
- ☐ § 450.161, *Control of hazard areas* (see Appendix F)
- ☐ §§ 450.163(a)(2), (b)(2), *Lightning hazard mitigation* (see Appendix F)
- ☐ § 450.165(a), *Flight commit criteria* (see Appendix F)
- ☐ § 450.167, *Tracking* (see Appendix F)
- ☐ § 450.171(a), *Safety at end of launch* (see Appendix F)
- ☐ § 450.175, *Test-induced damage* (if applicable) (see Appendix F)
- ☐ § 450.179(a), *Ground safety—general* (see Appendix G)
- ☐ § 450.183(a), *Explosive site plan* (see Appendix G)
- ☐ §§ 450.185(d), (e), (f)(3), *Ground hazard analysis* (see Appendix G)
- ☐ §§ 450.187(b)–(e), (f)(7), *Toxic hazards mitigation for ground operations* (see Appendix G)
- ☐ § 450.189(f), *Ground safety prescribed hazard controls* (see Appendix G)

⁹ FAA encourages the applicant to work with their licensing lead to gain insight into what “components” of each regulatory section will or should be addressed in each phase of the evaluation.

10.4 Phase 3 Evaluation Checklist.

The following regulations have a Phase 3 regulation, subsection, or component:¹⁰

- ☐ § 450.45(a), (e)(1), *Safety review and approval* (Final) (see Appendix A)
- ☐ § 450.47, *Environmental review* (Final) (see Appendix A)
- ☐ § 450.103, *System safety program* (see Appendix B)
- ☐ § 450.107(c), *Hazard control strategies* (see Appendix C)
- ☐ §§ 450.109(b)(5), (f)(1), (d) *Flight hazard analysis* (see Appendix C)
- ☐ § 450.111, *Wind weighting* (verify § 450.111(c)(1) and (2) are met) (see Appendix D)
- ☐ § 450.133, *Flight hazard area analysis* (see Appendix D)
- ☐ § 450.135, *Debris risk analysis* (see Appendix D)
- ☐ §§ 450.137(c)(5), (c)(6), (c)(7), *Far-field overpressure blast effects analysis* (see Appendix D)
- ☐ §§ 450.139(d), (e), (f)(8), *Toxic hazards for flight* (see Appendix D)
- ☐ §§ 450.141(b)(4), (d)(4), (d)(5), *Computing systems* (see Appendix E)
- ☐ §§ 450.143(b)–(e), (f)(2)–(f)(6) *Safety-critical system design, test, and documentation*
- ☐ § 450.145(d)(6), *Highly reliable flight safety system* (Note: post-flight requirement §450.213(d)) (see Appendix E)
- ☐ § 450.147, *Agreements* (Final LOA/LOI) (see Appendix F)
- ☐ § 450.151, *Work shift and rest requirements* (see Appendix F)
- ☐ § 450.153(b), *Radio frequency management* (see Appendix F)
- ☐ § 450.155, *Readiness* (see Appendix F)
- ☐ §§ 450.163(a)(1), (b)(1), *Lightning hazard mitigation* (verification/validation for (a)(2), (b)(2)) (see Appendix F)
- ☐ § 450.165(b), *Flight commit criteria* (see Appendix F)
- ☐ § 450.171(b), *Safety at end of launch* (see Appendix F)
- ☐ § 450.173, *Mishap plan—reporting, response, and investigation requirements* (see Appendix F)
- ☐ § 450.175, *Test-induced damage* (if applicable) (see Appendix F)
- ☐ § 450.179(a), *Ground safety—general* (see Appendix G)
- ☐ § 450.183(b), *Explosive site plan* (see Appendix G)
- ☐ §§ 450.185(e), (f)(3), *Ground hazard analysis* (see Appendix G)
- ☐ §§ 450.187(d), (e), (f)(8), *Toxic hazards mitigation for ground operations* (see Appendix G)
- ☐ § 450.189(f), *Ground safety prescribed hazard controls* (see Appendix G)

¹⁰ FAA encourages the applicant to work with their licensing lead to gain insight into what “components” of each regulatory section will or should be addressed in each phase of the evaluation.

11 **APPENDICES: REQUIREMENTS TO OBTAIN A VEHICLE OPERATOR LICENSE BY REGULATION:**

Appendix A: Title 14 CFR 450 Subpart B: Requirements to Obtain a Vehicle Operator License

- § 450.41, § 450.43, § 450.45, § 450.47

Appendix B: Title 14 CFR 450 Subpart C: System Safety Program

- § 450.103

Appendix C: Title 14 CFR 450 Subpart C: Hazard Control Strategies.

- § 450.107, § 450.108, § 450.109

Appendix D: Title 14 CFR 450 Subpart C: Flight Safety Analysis.

- § 450.110, § 450.111, § 450.115, § 450.117, § 450.119, § 450.121, § 450.123, § 450.131, § 450.133, § 450.135, § 450.137, § 450.139

Appendix E: Title 14 CFR 450 Subpart C: Prescribed Hazard Controls for Safety-Critical Systems

- § 450.141, § 450.145

Appendix F: Title 14 CFR 450 Subpart C: Other Prescribed Hazard Controls

- § 450.147, § 450.149, § 450.151, § 450.153, § 450.155, § 450.161, § 450.163, § 450.165, § 450.167, § 450.171, § 450.173, § 450.175, § 450.177

Appendix G: Title 14 CFR 450 Subpart C: Ground Safety

- § 450.179, § 450.181, § 450.183, § 450.185, § 450.187, § 450.189

Appendix A. Title 14 CFR 450 Subpart B: Requirements to Obtain a Vehicle Operator License

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
A.1 § 450.41 Policy Review and Approval.	In accordance with § 450.41, <i>Policy review and approval</i> , a policy approval is issued to an applicant unless FAA determines that a proposed launch or reentry would jeopardize U.S. national security or foreign policy interests, or international obligations of the U.S. In accordance with § 450.41(c), FAA advises an applicant of any issue raised during a policy review that would impede issuance of a policy approval. To support the applicant's response, FAA may seek additional information from an applicant in support of interagency consultation to protect U.S. Government interests. FAA consults with the Department of Defense, the Department of State, and other Federal agencies, including NASA, to address issues associated with an applicant's proposal. During pre-application consultation, the applicant will discuss any unique situations or raise any concerns with FAA regarding its proposed operations.	§ 450.41(e)(1) • Is there a specified vehicle configuration (set of stages/boosters) or a list of configurations? • Is the type of each stage and booster specified? • Is there a model identifier for each configuration? § 450.41(e)(2) • For each stage, is there a description that includes: - o Dimensions? - o Mass? - o Types of propellants, with quantities? - o Maximum thrust? § 450.41(e)(3) • Is there a declaration of foreign ownership? § 450.41(e)(4)	Phase 1

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
	The flight profile, per § 450.41(e)(4), needs to be provided in order for other agencies to adequately evaluate the potential for issues. Trajectory ranges should cover the azimuths that are contemplated relative to each launch or landing site. The regions where normal impacts occur should specify the region of the ocean, any regions on land or within 200 nautical miles (NM) of land, as well as any regions intersecting foreign territory, including territorial waters.	• Are launch and/or reentry sites specified? • Are contingency abort sites specified or listed as none? • Is there a range of flight trajectories defining the extent of the contemplated licensed activity? • If there are contingency sites, are there contingency abort profiles? • Is there a sequence of planned events or maneuvers for each vehicle configuration? • Are there regions defined where normal impacts or landings may occur? • Is there a list of intermediate orbits that are contemplated for each configuration? • Is there a list of final orbits that are contemplated for each configuration?	

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
A.2 § 450.43 Payload Review and Determination.	Per § 450.43 Payload review and determination, FAA issues a favorable payload determination for a launch or reentry to a license applicant or payload owner or operator if an applicant, payload owner, or payload operator has obtained all required licenses, authorizations, and permits and its launch or reentry would not jeopardize public health and safety, safety of property, U.S. national security or foreign policy interests, or international obligations of the U.S. In § 450.43(a), FAA clarifies that a payload review is not required when there is no payload. Part 450 preserves the ability of payload owners and operators, as well as launch or reentry operators, to request a payload review independent of a launch license application that exists in the current regulations. While FAA will review all payloads to determine their effect on the safety of launch, FAA will not make a determination on those aspects of payloads that are subject to regulation by the Federal Communications Commission or the Department of Commerce or on payloads owned or operated by the U.S. Government. During	• Is there identification of the payload(s) or class of payloads (or specify no payload)? • For payload(s) being launched, is each item of § 450.43(i)(1) answered? • For payload(s) being reentered, is each item of § 450.43(i)(2) answered? • For unique payloads, is the information provided concerning its intended use sufficient to initiate interagency consultation?	Phase 1

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
	pre-application consultation, the applicant will discuss the type, class, and configuration of payload planned to be flown.		
A.3 § 450.45 Safety Review and Approval.	In accordance with § 450.45 Safety review and approval, FAA will issue a safety approval to an applicant if it determines that an applicant can conduct launch or reentry without jeopardizing public health and safety and safety of property. FAA also notes that an applicant must satisfy the application requirements in § 450.45(e) and subpart C of this part. During pre-application consultation, the applicant will discuss its plans for addressing the application requirements. The vehicle description is essential to the development of functional hazard analyses per § 450.107(b) and flight hazard analyses per § 450.109.	§ 450.45(e)(1) General • Is there a glossary? • Is there a list of reference material? § 450.45(e)(2) Site • Is there a list of launch and reentry sites and contingency abort locations? • For each site/location, ○ Are the boundaries specified? ○ Are the launch or landing point locations quantitatively specified? ○ Is the site operator specified? ○ Are the facilities for pre-flight operations identified? ○ Are the facilities for post-flight operations specified? § 450.45(e)(3) Vehicle description • Does the vehicle description include (“None” may instead be specified where applicable): ○ Structural characteristics?	Phase 1: § 450.45(e) Phase 2–3: Glossary and references, per § 450.45(e)(1), should be updated with subsequent submissions

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		- o Thermal systems? - o Pneumatic systems? - o Propulsion systems? - o Electrical systems? - o Avionics and guidance systems? - o Propellants? • Is there a reference to how hazardous materials are identified? • For each vehicle configuration specified in § 450.3 Scope, is there either a table of hazardous materials or a statement that none exist? - o Does the table(s) include the type of material? - o Does the table(s) include the quantities of material? • Are there drawings of each vehicle configuration specified in § 450.3 Scope? • Does the drawing(s) include physical dimensions? • Does the drawing(s) locate (e.g., label in a drawing showing relative position): - o Safety critical systems? - o Major control systems?	

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		- o Propulsion systems? - o Pressure vessels? - o Other hardware with hazardous energy or materials (or specify that none exist)? • If the rocket is unguided, is there a table or graph of the center of pressure relative to the center of gravity? § 450.45(e)(4) Mission schedule • Is there a generic processing schedule? • Does the schedule include - o Readiness activities? - o Safety-critical pre-flight operations? - o Day-of-flight activities? § 450.45(e)(5) Human space flight • Is there specification as to whether there is a human on board? • If there are humans on board: - o Are the crew qualifications and training described? - o Are the crew training devices, maintenance of training records, and training schedule described?	

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		- o Is the environmental control and life support system described? - o Is the smoke detection and fire suppression system described? - o Are human factors of the vehicle and operations described? - o Is the vehicle's flight test verification program described? - o Is space flight participant training described? - o Are the security measures for space flight participant flights described? § 450.45(e)(6) Radionuclides • Is there specification as to whether there are radionuclides on board? • If there are radionuclides, - o Are the types and quantities identified? - o Is there a reference list of radionuclide safety documentation? - o Is there a description of approvals from the Nuclear Regulatory Commission?	

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
A.4 § 450.47 Environmental Review.	The environmental review for license or permit applications must meet the application requirements of the FAA's Commercial Space Transportation Regulations (Title 14 CFR Part 400) to enable FAA to meet the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq.), FAA Order 1050.1G, <i>FAA National Environmental Policy Act Implementing Procedures</i> , and other applicable environmental laws, regulations, and Executive Orders. The environmental review analyzes the applicant's proposed operations, including associated construction and closure areas. The applicant must clearly define their proposal. The proposed project description will become what is referred to as the Proposed Action in the environmental review.	• Is there one of the following: ○ Draft Environmental Assessment (EA), ○ Final Environmental Impact Statement (EIS), ○ Information supporting a written reevaluation (WR), or ○ Information supporting a categorical exclusion (CATEX)?	Pre-Application: Begin review Phase 1: Draft review prepared Phase 3: Final

Appendix B. Title 14 CFR 450 Subpart C: System Safety Program

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
B.1 § 450.103 System Safety Program.	A documented system safety program establishes and defines pertinent management principles, organizational structures, engineering processes, and safety analysis methodologies meant to ensure public safety is maintained throughout the lifecycle.	Documented system safety program and implementation methods over the lifecycle. § 450.103(a) Safety organization • Is there a description of the safety organization, including the roles of “Mission Director,” “Safety Official,” or other key personnel? • Does it describe lines of communication? • Does it describe approval authority including the manner that safety concerns are addressed? § 450.103(b) Hazard management • Is there a description of the methods to assess the system for hazards? • Does it discuss methods for different phases of the lifecycle? • Does it discuss validating the hazard control strategy determination? • Is there a description of how updates to hazard analyses are communicated through the organization? • Is there a description of how updates to hazard analyses are implemented through the organization?	Phase 1: § 450.103(b)–(d) § 450.103(e)(2): Phase 2: § 450.103(a) § 450.103(e)(1)

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		• Does the description identify whether flight hazard analysis may be required? • If the flight hazard analysis is required, does it discuss tracking of: - o Hazards? - o Risks? - o Mitigation measures? - o Verification activities? § 450.103(c) Configuration management and control • Is there a description of the configuration management and control process? • Does it include all safety-critical systems? • Does it include safety-critical system documentation? • Does it include verification of correctness of versions? • Does it include documenting configurations and versions for each licensed activity? § 450.103(d) Post-flight data review • Is there a description of the post-flight data review process? • Does it discuss consistency comparison of the post-flight data with: - o Hazard control strategy determinations?	

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		- o Flight hazard analyses? - o Flight safety analyses? - o Mitigation and hazard control measures? • Does it discuss resolution of identified inconsistencies? • Does it discuss anomaly identification? • Does it discuss addressing anomalies with respect to: - o Flight hazard analyses? - o Flight safety analyses? - o Safety-critical systems?	

Appendix C. Title 14 CFR 450 Subpart C: Hazard Control Strategies.

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
C.1 § 450.107 Hazard Control Strategies Determination.	The approach to determining and validating hazard control strategies is an iterative process. The functional hazard analysis is utilized to ensure that all potential hazards to the public have a determined hazard control strategy. A functional hazard analysis provides a holistic, systematic approach to identifying potential hazards and supports the validation of adequacy for determined hazard control strategies. If the hazards to the public are potentially mitigated, then the selected strategies are developed, and the supporting data is used as general input for the flight safety analysis. If adequate mitigation is not validated by supporting data, then the hazard control strategy should be revisited. If validation is successful, then the flight safety analysis is used to demonstrate whether the safety criteria are satisfied. If the safety criteria cannot be met, then additional hazard controls must be implemented in accordance with § 450.107(c).	• Are phases of flight identified? • Do phases cover the entire period: ○ For orbital launch, from liftoff through orbital insertion, and through all component impacts or landings? ○ For suborbital launch, from liftoff through all component impacts or landings? ○ For disposal, from the initiation of the deorbit through final impact? ○ For reentry, from the initiation of the deorbit through all component impacts or landing? • Do functional hazard analyses cover every phase of flight? • Does each functional hazard analysis account for: ○ Functional failures? ○ Safety-critical systems? ○ A timeline of safety-critical events?	Pre-Application Consultation: Identify hazard control strategies Phase 1 – 3: § 450.107(d)(1) Phase 1: § 450.107(a)–(b) Phase 2: § 450.107(d)(2) Phase 2–3: § 450.107(c)

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
	The identification of what is safety-critical through the functional hazard analysis is essential for determining the scope of §§ 450.141, 450.143, 450.149, 450.151, 450.153, 450.155, 450.157, 450.163, and 450.165.	- Are there results of the functional hazard analysis (validation of hazard control strategies)? - Is there a hazard control strategy identified for each phase of flight? - Is each hazard control strategy described?	
C.2 § 450.108 Flight Abort.	Development of flight safety limits, which comprises most of this section, is performed in concert with the flight safety analysis. See the introduction to Flight Safety Analysis in this document for more discussion. Flight abort rules are the conditions under which a flight safety system must abort the flight. Some flight abort rules reference flight safety limits. Normally, flight abort rules are provided as a concise set of criteria for a person or computer program to very quickly make a conclusive determination. Flight safety limits are quantitative boundaries, normally based on evaluation of the vehicle state vector (and derived parameters, such as IIP). Normally, flight safety limits are provided in datafiles.	<i>This section only applies if flight abort is identified as a hazard control strategy in § 450.107. If it is not, nothing needs to be submitted.</i> § 450.108(g)(1) Flight abort methods - Does the flight abort methodology reference an accepted means of compliance? § 450.108(g)(2) Evaluation methods & data - Is there a description of how each flight safety limit is evaluated during flight? - Is there a description of how each flight abort rule is implemented during flight? - Are quantitative criteria provided for each flight safety limit for a representative flight?	Pre-Application Consultation: MOC requirement § 450.108(g)(1) Phase 2

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
	“Critical parameters” are parameters that demonstrate the vehicle is capable of completing safe flight through the upcoming phase of flight¹¹. Examples are vehicle thrust and perigee altitude. Commonly, the “list” and the “description” are provided as a table, where the description is precise.	• Are quantitative criteria provided for each parameter in each flight abort rule for a representative flight? • Is there a list of critical parameters used in the flight abort criteria? • Is there a description of each critical parameter? • Is there a description for how values of critical parameters required in paragraphs (c)(3) and (e) of § 450.108 were determined? • Are there quantitative criteria for each critical parameter for a representative flight? § 450.108(g)(3) Graphical depictions • Is there a graphical depiction of each flight safety limit for a representative flight? • Does each graphical depiction include the nominal trajectory? • Does each graphical depiction include the extents of normal flight?	

¹¹ Critical parameters is referenced in the Part 450 preamble: "The FAA notes that, for purposes of § 450.108(c)(3), a “critical vehicle parameter” is a parameter that demonstrates the vehicle is capable of completing safe flight through the upcoming phase of flight for which population is exposed to hazardous debris effects from reasonably foreseeable failure modes."

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		- Does each graphical depiction include trajectories showing the limits of a useful mission? - Does each map include uncontrolled area boundaries together with the launch or landing point? § 450.108(g)(4) Available data - Is there a clear narrative description of vehicle data available to evaluate flight abort rules?	
C.3 § 450.109 Flight Hazard Analysis.	Flight hazard analysis may be utilized as a hazard control strategy but may also be mandated by § 450.107(c) A flight hazard analysis identifies key system design and operation data, documents the overall system safety risk to the public, and determines the necessary hazard controls (mitigations) to ensure the residual risk meets acceptable criteria. The flight hazard analysis should be performed early in system development and operation conceptualization to define the system safety risk to the public in order to	<i>This section only applies if flight hazard analysis is identified as a hazard control strategy in § 450.107 OR if the exception per § 450.143(a)(2) is being applied. If neither applies, nothing needs to be submitted.</i> - Is there a description of the flight hazard analysis methodology for the lifecycle? - Does the flight hazard analysis identify hazards? - Is there a failure mode identified for each hazard? - Does the analysis methodology consider hazards from: - Vehicle operation, including staging and release?	Phase 1 – 3: § 450.109(f)(1) Phase 1: § 450.109(a) § 450.109(b) Method § 450.109(b)(1) to (b)(3) § 450.109(c) § 450.109(d) § 450.109(e) § 450.109(f)(2) Phase 2: § 450.109(b)(4)

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
	positively influence design and operation decisions. AC 450.103-1, <i>System Safety Program</i>, provides guidance on severity categories and likelihood levels in appendices C and D, including acceptable criteria for “extremely remote.”	- o System, subsystem, and component failures or faults? - o Software operations? - o Environmental conditions? - o Human factors? - o Design inadequacies? - o Procedure deficiencies? - o Functional and physical interfaces between subsystems, including any vehicle payload? - o Reuse of components or systems? - o Interactions with the above? • For each hazard, is there identification of: - o Likelihood? - o Severity? • Is there a definition of what constitutes “extremely remote” likelihood? • For every hazard with a severity of death or serious injury to the public, is the mitigated likelihood “extremely remote”? • Are risk elimination and mitigation measures identified and described?	Phase 2–3: § 450.109(b)(5) Phase 3 § 450.109(d)

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		• Are verification methods for risk elimination and mitigation measures identified and described? • Is there documentation of verification and validation achieving the risk levels above? • Is traceability demonstrated in the hazard analysis data: ○ For each hazard, is there at least one failure? ○ For each hazard, is there at least one mitigation? ○ For each failure, is there at least one cause? ○ For each cause, is there at least one mitigation? ○ For each mitigation, is there at least one verification? ○ For each mitigation, is there a risk assessment? • Is there documentation of the techniques for identifying new hazards? • Does the documentation include criteria for identification of new hazards?	

Appendix D. Title 14 CFR 450 Subpart C: Flight Safety Analysis.

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
D.1 § 450.110 Physical Containment.	Physical containment is a hazard control strategy described in § 450.110. The focus in pre-application consultation is on the methods used to demonstrate that the launch vehicle does not have sufficient energy for any hazards associated with its flight to reach outside the flight hazard area. FAA reviews the proposed means of compliance in pre-application consultation to confirm that the methodologies will result in compliance with the regulation. <i>This section only applies if physical containment is identified as a hazard control strategy in § 450.107. If it is not, nothing needs to be submitted.</i> § 450.110(c)(1) Extent of hazard • Is the method for determining maximum range of the vehicle described? • Is the size of the hazard area around an impact discussed? § 450.110(c)(2) Clearance • Are the methods for clearing flight hazard areas of the public documented? • Is the potential for critical assets within the flight hazard areas discussed?	Phase 1: § 450.110(c)(2) Phase 2: § 450.110(c)(1)

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
D.2 § 450.111 Wind Weighting.	Wind weighting is a hazard control strategy described in § 450.111. The focus in pre-application consultation is to identify a means of compliance for the wind weighting analysis methods, including the method and schedule of determining wind speed and wind direction for each altitude layer. FAA reviews the proposed means of compliance in pre-application consultation to confirm that the methodologies will result in compliance with the regulation. <i>This section only applies if wind weighting is identified as a hazard control strategy in § 450.107. If it is not, nothing needs to be submitted.</i> § 450.111(e)(1) Methods • Are the methods of performing wind weighting to determine launcher (e.g., launch rail) parameters documented? • Is the method for determining wind as a function of altitude documented? • Is there a schedule for making wind measurements? § 450.111(e)(2) System • Is there a description of the wind weighting safety system? • Does the description include equipment? § 450.111(e)(3) • Is there a wind weighting analysis for a representative flight? • Does it include launch areas winds? • Are there samples of wind weighting output?	Phase 1: § 450.111(e)(1) § 450.111(e)(2) Phase 2: § 450.111(e)(3) Phase 3: Verify that the flight commit criteria meet the requirements in § 450.111(c)(1) and (2)

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
D.3 § 450.115 Flight Safety Analysis Methods.	This requirement is referenced by each flight safety analysis section as part of the methodology descriptions, which are a MOC.	Pre-Application Consultation: § 450.35
D.4 § 450.117 Trajectory Analysis for Normal Flight.	§ 450.117(d)(1) Vehicle’s flight behavior methods - Does the normal trajectory analysis methodology reference an accepted means of compliance? § 450.117(d)(2) Quantitative input data - Is there normal trajectory analysis input data for all phases of flight? - Does the normal trajectory analysis input data include uncertainties? § 450.117(d)(3) Atmospheric conditions - Does the normal trajectory analysis atmospheric data account for all phases of flight? - Is there a definition of the worst atmospheric conditions under which flight will be attempted, such as a table of criteria? - Is there a description of how atmospheric conditions will be evaluated prior to initiating the operation? - Is there a description of how uncertainty in the atmospheric conditions will be evaluated prior to initiating the operation?	Pre-Application Consultation: MOC § 450.117(d)(1) Phase 1 § 450.117(d)(2)–(d)(4)

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
	§ 450.117(d)(4) Nominal flight trajectory analysis outputs for a representative flight. • Does the normal trajectory data account for all phases of flight? • Does the normal trajectory data include position, velocity, and orientation for each second of flight? • Is there a nominal trajectory? • Is there a set of trajectories (normally at least four) that characterize variability in the intended trajectory based on conditions known prior to initiation? • Is there a set of trajectories (normally hundreds) that characterize how the actual trajectory could differ from the intended trajectory due to random uncertainties?	
D.5 § 450.119 Trajectory Analysis for Malfunction Flight.	§ 450.119(c)(1) Vehicle's flight behavior methods • Does the malfunction trajectory analysis methodology reference an accepted means of compliance? § 450.119(c)(2) Limits of useful mission methods • Do the limits of a useful mission determination methodology reference an accepted means of compliance? § 450.119(c)(3) Malfunction flight behavior • Does the malfunction trajectory analysis input data account for all phases of flight?	Pre-Application Consultation: MOC § 450.119(c)(1) and (2) Phase 1 § 450.119(c)(3) and (4) Note that, depending on the MOC type, as described in section 7.1, § 450.119(c)(3) and (4) may be Phase 2, which FAA will determine during pre-application consultation.

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
	• Is there a list of each cause of malfunction flight considered? • Is there a list of each type of malfunction flight for which malfunction flight behavior was characterized? • Is there a quantitative description of the parameters with a significant influence on the vehicle's malfunction behavior? • Does the quantitative description of the malfunction flight parameters include uncertainties? • Does the quantitative description cover each type of malfunction flight characterized? Note: A quantitative description of a parameter specifies the numerical values. A quantitative description of an uncertain parameter should be in the form of a distribution with its numerical parameters specified (e.g., mean and standard deviation for a normal distribution). § 450.119(c)(4) Malfunction flight trajectory analysis outputs for a representative flight • For each phase of flight, are there sets of trajectories (normally a few sets of hundreds or more, depending on the failure mode, phase of flight, and resolution required) for different types of malfunction flight? • Do the malfunction trajectories contain position and velocity as a function of flight time? • Is the probability of each set of trajectories that characterizes a type of malfunction flight specified?	

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
	Is there a set of trajectories that characterizes the limits of a useful mission? (This set normally contains at least six trajectories).	
D.6 § 450.121 Debris Analysis.	§ 450.121(d)(1) Hazardous scenarios - Does the description of hazardous scenarios account for all phases of flight? - Does the description of hazardous scenarios include the event sequence for multiple causes of vehicle breakup and intact impact? § 450.121(d)(2) Breakup analysis methods - Does the methodology reference an accepted means of compliance for breakup criteria (structural limits) analysis? - Does the methodology reference an accepted means of compliance for breakup debris analysis? - Does the methodology reference an accepted means of compliance for impact analyses (when propellant or other hazardous substances are present at impact)? § 450.121(d)(3) Methods for dispersions - Does the methodology reference an accepted means of compliance for computing debris impact dispersions?	Pre-Application Consultation: MOC § 450.121(d)(1)–(4) Phase 1 § 450.121(d)(5)

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
	§ 450.121(d)(4) Atmospheric data • Is there a narrative description of the atmospheric data used? • Does the description include references to specific data sources? • Does the description account for all phases of flight? • Does the description identify the data elements used, including wind uncertainty? § 450.121(d)(5) Output debris data for a representative flight • Does the debris data cover all hazardous scenarios for each phase of flight? • Does the debris data include physical characteristics of debris (size, mass)? • Does the debris data include aerodynamic characteristics of debris (ballistic coefficient with uncertainty, lift uncertainty, breakup-induced velocity)? • Does the debris data include harmful characteristics (including explosives or toxics)?	

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
D.7 § 450.123 Population Exposure Analysis.	§ 450.123(c)(1) Exposure input data methods • Does the methodology reference an accepted means of compliance for determining population exposure regions, characterized by fidelity and resolution required? • Is there a methodology associated with each identified region? • Does each identified methodology reference an accepted means of compliance for developing population exposure data? § 450.123(c)(2) Population exposure data for a representative flight • Is there a demonstration that the region covered by the population exposure data is sufficient? • Does the population exposure data include population as a function of geographic location? • Is the population data in tabular form (normally should be machine readable)?	Pre-Application Consultation: MOC § 450.123(c)(1) Phase 2 § 450.123(c)(2)

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
D.8 § 450.131 Probability of Failure Analysis.	§ 450.131(f)(1) Probability of failure (POF) analysis methods - Does the methodology reference an accepted means of compliance for probability of failure development? § 450.131(f)(2) Failure probability data for a representative flight - Does the POF data account for all phases of flight? - Is there tabular (quantitative) data on the predicted failure rate for multiple failure modes for each phase of flight? - Are there graph(s) of the predicted failure rate for each failure mode for each phase of flight? - Is there tabular (quantitative) data of the cumulative failure probability for each foreseeable failure mode for each phase of flight? - Are there graph(s) of the cumulative failure probability for each failure mode for each phase of flight?	Pre-Application Consultation: MOC § 450.131(f)(1) Phase 1 § 450.131(f)(2) Note that, depending on the MOC type, as described in section 7.1 of this AC, § 450.131(f)(2) may be Phase 2, which FAA will determine during pre-application consultation.
D.9 § 450.133 Flight Hazard Area Analysis.	§ 450.133(e)(1) Vehicle's flight behavior methods - Does the methodology reference an accepted means of compliance for flight hazard area analysis? § 450.133(e)(2) Flight hazard area analysis results for a representative flight - Are there geographic coordinates that define the boundaries of all hazard areas?	Pre-Application Consultation: MOC § 450.133(e)(1) Phase 3

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
	• Are there contours that demonstrate 97 percent probability of containment for debris resulting from normal flight events capable of causing a casualty? Contours, in this section, means a set of geographic coordinates defining an isopleth, normally rendered on a map. • Are there individual probability of casualty contours for unsheltered people? • Do the unsheltered probability of casualty contours specify 1E-5 and 1E-6 levels? • Are there probability of casualty-producing impact contours for persons on a waterborne vessel? • Do the waterborne vessel probability of impact contours specify 1E-5 and 1E-6 levels? • Are there probability of casualty-producing impact contours for persons on an aircraft? • Do the aircraft probability of impact contours specify 1E-6 and 1E-7 levels?	
D.10 § 450.135 Debris Risk Analysis.	§ 450.135(c)(1) Compliance methods	Pre-Application Consultation: MOC § 450.135(c)(1)

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
	- Does the methodology reference an accepted means of compliance for debris risk analysis? § 450.135(c)(2) Atmospheric data - Is there a description of atmospheric data used as input for the debris risk analysis? Normally, this is the same as the data used for debris analysis, § 450.121(d)(4), which could be referenced here. § 450.135(c)(3) Unsheltered casualty area - Is there an effective unsheltered casualty area for all fragment classes for all phases of flight? § 450.135(c)(4) Sheltered casualty area - Is there an effective casualty area for all phases of flight for all representative fragment classes for: - One or more types of buildings? - One or more types of ground vehicles? - One or more types of waterborne vessels? - One or more types of aircraft? § 450.135(c)(5) Debris risk analysis outputs for a representative flight, with both representative and worst-case conditions under which an operation might be attempted. - Is there a total collective casualty expectation? - Is there a total collective casualty expectation?	Phase 3

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
	○ Is there a collective risk contribution for (at minimum) the top 10 population centers? ○ Is there a list of all centers with collective risk exceeding 1% of 2×10^{-4} expected casualties for all neighboring operations personnel (NOPs)? ○ Is there a list of all centers with collective risk exceeding 1% of 1×10^{-4} expected casualties for all members of the public (excluding NOPs)? ● Individual risk ○ Are the 10 population centers with the highest maximum individual risks identified? ○ Is there a list of all centers that exceed 10% of 1×10^{-5} probability of casualty for any neighboring operations personnel? ○ Is there a list of all centers that exceed 10% of 1×10^{-6} probability of casualty for any member of the public (excluding NOPs)? ● Conditional risk ○ Is there a list of the conditional collective casualty expectation results for each failure mode for each significant period of flight (e.g., 1s intervals)? ○ Are all of the outputs required by § 450.135(c)(5) provided for two cases, one labeled “representative” and one labeled “worst foreseeable”?	

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
D.11 § 450.137 Far-Field Overpressure Blast Effects Analysis.	§ 450.137(c)(1) Population center, terrain, etc. description - Is there a description of the population centers used as input that addresses the requirement in § 450.137(b)(3)? - Is there a description of the terrain used as input? Note: This is usually a narrative along with digital data. Note: This requirement is a Phase 2 requirement and is an input to the DFO risk analysis. § 450.137(c)(2) Probability pairs methods - Does methodology reference an accepted means of compliance for computing yield probability pairs? - Is there a set of yield-probability pairs? Note: This requirement has a pre-application component for the methodology/model, which is used to develop the DFO risk analysis inputs. Note: This requirement also has a Phase 1 component that is a vehicle-specific intermediate analysis product used as input to risk analysis. § 450.137(c)(3) Peak incident overpressure methods - Does the methodology reference an accepted means of compliance for computing peak incident overpressure? - Are sample calculations included for a representative range of foreseeable meteorological conditions, yields, and population centers?	Pre-Application Consultation: MOC § 450.137(c)(2) – (c)(5) Phase 1: § 450.137(c)(2) Phase 2: § 450.137(c)(1) § 450.137(c)(3) § 450.137(c)(4) § 450.137(c)(8) Phase 3: § 450.137(c)(5) § 450.137(c)(6) § 450.137(c)(7)

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
	Note: This requirement has a pre-application component for the methodology/model, which is used to develop the DFO risk analysis inputs. Note: This requirement also has a Phase 2 component that is a representative analysis, and an intermediate product used as input to DFO risk analysis. § 450.137(c)(4) Window breakage methods • Does the methodology reference an accepted means of compliance for computing the probability of window breakage? • Is there tabular data for the probability of window breakage as a function of the peak incident overpressure? • Are there graphs of the probability of window breakage as a function of the peak incident overpressure? • Does the probability of window breakage data cover a representative range of window types? • Does the probability of window breakage data cover a representative range of building types? • Does the probability of window breakage data cover a representative range of yields? Note: This requirement has a pre-application component for the methodology/model, which is used to develop the DFO risk analysis inputs.	

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
	Note: This requirement also has a Phase 2 component that is a representative analysis, and an intermediate product used as input to DFO risk analysis. § 450.137(c)(5) Individual probability of casualty (Pc) methods • Does the methodology reference an accepted means of compliance for computing the Pc for a representative individual? • Does the Pc account for a representative range of window types? • Does the Pc account for a representative range of building types? • Does the Pc account for a representative range of yields? Note: This requirement has a pre-application component, which is the DFO risk analysis methodology (taking all the inputs). Note: This requirement also has a Phase 3 component that is a representative output product of DFO risk analysis. § 450.137(c)(6) Exposed persons data • In lieu of the tabular/graphic data on the hypothetical location of members of the public, are there tabular/graphic data on the actual location where members of the public (both NOPs and otherwise) would be subject to the maximum individual risks under the worst-case conditions when an operation might be attempted?	

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
	Note: This is a Phase 3 component that is a representative output product of DFO risk analysis. § 450.137(c)(7) Max expected casualties • Does the application identify a maximum expected casualties that could result from far-field overpressure hazards? Note: This is a Phase 3 requirement that is a representative output product of DFO risk analysis. § 450.137(c)(8) Meteorological measurements • Is there a description of meteorological measurements used as input including the temporal and spatial resolution? Note: This requirement is a Phase 2 requirement and is an input to the DFO risk analysis.	

Section	Application Acceptance Description and Criteria	Evaluation Timeframe
D.12 § 450.139 Toxic Hazards for Flight.	Prior to application acceptance, a means of compliance for § 450.139 must be accepted. Hazards associated with toxics utilized during licensed flight must be properly managed and compliance demonstrated with criteria in § 450.101. § 450.139(e)(1) - Does the methodology reference an accepted means of compliance for toxic risk analysis? § 450.139(f)(1) - Is a reference for what constitutes a toxic substance identified? - Are possible toxic release sources identified from: - Propellants? - Chemicals? - Combustion products? - Derivatives? § 450.139(f)(2) - Is there a list of toxic concentration and duration thresholds? § 450.139(f)(3) - Are meteorological conditions provided? § 450.139(f)(4) - Is a characterization of terrain provided? § 450.139(f)(5) - Is the toxic dispersion modeled identified? - Is other input data to the toxic model provided?	Pre-Application Consultation: MOC § 450.139(e)(1) § 450.139(f)(7) Phase 1: § 450.139(a) § 450.139(f)(1) – (f)(6) Phase 2: § 450.139(b) § 450.139(c) § 450.139(f)(7) Phase 2 – 3: § 450.139(d) § 450.139(e) Phase 3: § 450.139(f)(8)

	§ 450.139(f)(6) • Are representative results of the toxic analysis provided? • Do the results include toxic concentrations and durations? § 450.139(f)(7) • Are failure modes and probabilities of toxic scenarios provided? • Are representative results of a worst-case toxic release provided? § 450.139(f)(8) • Is the use of a containment or risk assessment approach specified? • If a containment approach is used: ○ Is there a description of evacuation plans? ○ Is there a description of meteorological constraints and associated launch commit criteria? • If a risk assessment approach is used: ○ Is there a demonstration of compliance with safety criteria? ○ Is population data provided? ○ Is there a description of risk mitigations?	
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Appendix E. Title 14 CFR 450 Subpart C: Prescribed Hazard Controls for Safety-Critical Systems

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
E.1 § 450.141 Computing Systems.	In pre-application, FAA reviews documentation to define an agreed set of computing system safety items, assess the criticality of each computing system safety item, and evaluate the development processes for the computing system safety items to verify sufficient rigor. The identification and assessment of computing system safety items (CSSI) is accomplished through § 450.107 functional hazard analysis, flight hazard analysis, and/or other software safety analysis.	§ 450.141(d)(1) - Is there a list of computing system safety items (CSSI)? - Is there a description of how severity is determined? - Is there a description of how degree of control is determined? - Is the degree of control specified for each CSSI? - Is the severity of outcome specified for each CSSI? - Are criticality levels defined? - Is the level of criticality specified for each CSSI? § 450.141(d)(2) - Are there safety requirements for each CSSI? - Is a description of the approach for identifying safety requirements included? - Is a description of the approach for evaluating each safety requirement included? § 450.141(d)(3) Is there documentation of: - Responsibilities for tasks associated with CSSIs? - Processes for internal review and approval of CSSIs?	Phase 1: § 450.141(a) § 450.141(b)(1) § 450.141(b)(2) § 450.141(c) § 450.141(d)(1) Phase 2: § 450.141(b)(3) § 450.141(d)(2) § 450.141(d)(3) Phase 3: § 450.141(b)(4) § 450.141(d)(4) § 450.141(d)(5)

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
	With respect to “evidence,” this means artifacts of the development process, such as design documents, test reports, etc.	• Processes to ensure development personnel are trained, qualified, and capable of performing their role? • Processes that trace requirements to verification and validation evidence? • Processes for configuration management? • Processes for testing? • Reuse policies? • Third-party product use policies? § 450.141(d)(4) • Is there evidence of the development process being executed for each CSSI? § 450.141(d)(5) • Is there evidence for verification of implementation of each safety requirement identified for each CSSI?	

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
E.2 § 450.145 Highly Reliable Flight Safety System.	Section 450.35(a)(3) requires that a means of compliance must be accepted by the Administrator for the § 450.145(b) Highly Reliable Flight Safety System prior to application acceptance. The flight safety system includes the Flight Termination System and the Range Tracking System. FAA regulations identify RCC 319 and RCC 324 as a means of compliance accepted by the Administrator for § 450.145 Highly Reliable FSS.	Is there an accepted MOC specified? <i>This is normally a mature draft of tailored versions of RCC 319-19 and 324-11.</i> If the tailoring begins with something other than these versions of the RCC documents, then the operator would need to provide a gap analysis to compare their proposed MOC to the approved MOC of RCC 319-19 and RCC 324-11. A proposed means of compliance is acceptable only if the following questions are answered in the affirmative: - Does the MOC address all the subsystems of the FSS consistent with the definition in § 401.7¹²? - Is there sufficient detail in the MOC to determine that the FSS would meet the level of reliability required in § 450.145(b)? - Has the proposed MOC been coordinated with interagency partners (to the extent necessary)? - Is the tailoring sufficient to support a critical design review (e.g. 90% of the design is addressed)? § 450.145(d)(1) - Is there a description of the flight safety system? - Does the FSS description identify all the subsystems, including components of the FSS?	Pre-Application Consultation Accepted MOC IAW § 450.35(a)(3) Phase 1: § 450.145(d)(1) § 450.145(d)(2) § 450.145(d)(3) Phase 2: § 450.145(d)(4) § 450.145(d)(5) Phase 3: § 450.145(d)(6) Post-Licensing (minimum of 30 days prior to launch at L-30): Acceptance test reports and any updated qualification test reports IAW § 450.213(d)

¹² “Flight safety system” means a system used to implement flight abort. A flight safety system includes any flight safety system located onboard a launch or reentry vehicle; any ground-based command control system; any support system, including telemetry subsystems and tracking subsystems, necessary to support a flight abort decision; and the functions of any personnel who operate the flight safety system hardware or software.

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		To achieve an acceptable MOC, the subsystems and components of the FSS should be properly identified. • Does the description include: ○ Flight safety system component list, including vendor and heritage (if any)? ○ Function(s) of each component? ○ Operational scenario(s), including launch locations or ranges? • Is there a method for predicting the environments for each FSS component that covers all operational scenarios and mission phases? Proper identification of the operational scenarios and mission phases relevant to the FSS environments is necessary to establish an acceptable MOC. § 450.145(d)(2) • Is there a flight safety system design, including top level block diagrams and schematics? • Do the diagrams include: ○ All subsystems used to enable flight abort both on and off the vehicle, including any subsystems used to make the decision to abort flight? ○ Interconnections between systems, including systems not part of the FSS?	

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		§ 450.145(d)(3) • Does the application describe all analyses, tests, and reports necessary to demonstrate the reliability required by § 450.145(a)? • If not, is there a list and schedule for submitting the analyses and documentation of all subsystems required to support the reliability and confidence of a highly reliable flight safety system? • If using a tailored RCC 319, does this list include: ○ Flight Termination System Report (FTSR)? ○ Component preliminary and critical design reviews? ○ Component Maximum Predicted Environment (MPE) Analysis? ○ Reliability analysis? ○ Bent pin analysis? ○ Single point failure analysis? ○ Fratricide analysis? ○ Radio frequency (RF) link and radiation analysis? ○ Sneak circuit analysis? ○ Power budget analysis? ○ Breakup analysis? ○ Command and auto-destruct timing analysis? ○ Qualification by similarity analysis?	

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		- o Software and firmware analysis? • If using a tailored RCC 324, does this list include: - o Range Tracking System Report (RTSR)? - o Component preliminary and critical design reviews (including any software/firmware to be utilized)? - o RTS Reliability analysis? - o Energy/power analysis? - o RF link analysis? - o Reuse analysis? - o Prior flight history analysis? - o RF environment analysis? - o Breakup analysis? - o Dynamic simulation analysis? - o Independence analysis? - o A mature failure modes and effects criticality analysis? - o Qualification by similarity analysis? - o Any software/firmware/processing tools utilized for a tracking solution? - o Methods for producing a tracking source: least squares, Kalman filter, etc.? How is a flight computer combining tracking sources (i.e. reorienting an IMU with a GPS)?	

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		o Address SAASM or M-Code GPS requirements separately (depends on model the applicant selected)? § 450.145(d)(4) • Is there a schedule for submitting procedures for validating tracking data utilized by the flight safety system to make the decision to abort flight? § 450.145(d)(5) • Is there a list and schedule for submitting the qualification and acceptance test plans and procedures for all FSS subsystems and components? • Is there a schedule for conducting approved test procedures? • Do the test plans include test procedures, environments, and success criteria? 450.145(d)(6) • Is there a monitoring plan to validate the operating environments, per § 450.145(c)(1)? If the system is intended for reuse on multiple flights, does the monitoring plan address the assessment of the actual component life remaining or adjustments of inspection periods, per § 450.145(c)(2)?	

Appendix F. Title 14 CFR 450 Subpart C: Other Prescribed Hazard Controls

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
F.1 § 450.147 Agreements.	FAA requires documentation of written agreements between the operator and applicable outside entities. The entities include three types: site operators, entities as identified as needed to control hazard areas (per § 450.161), and entities providing emergency response. These agreements need not be signed at the time the application materials for this requirement are submitted. The agreements should be ready for signature and available for FAA to request. If operating from a site that holds an existing agreement covering vehicle operations, that agreement may be used in lieu of developing a new agreement. With respect to the U.S. Coast Guard, a letter of intent is sufficient as an agreement, per FAA <i>United States Coast Guard Letter of Intent (LOI) Policy Statement</i>. https://www.faa.gov/space/legislationregulationguidance/uscg-letter-intent-loi-policy-statement	• Is there a list of agreements? • Is there a description of each agreement? • Are there effective dates for each agreement? • Does the list include agreements with: ○ Site operators for each launch or reentry site or a statement that the applicant is the site operator? ○ Maritime authorities for Issuance of Notice to Mariners or a statement that no water areas will be affected? ○ Air navigation authorities for Issuance of Notices to Air Missions [formerly Airmen]? ○ Entities providing emergency response services?	Phase 1: Draft LOA/LOI Executed site agreement Phase 3: Final LOA/LOI

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
F.2 § 450.149 Safety-Critical Personnel Qualifications	The performance-based requirement set forth in § 450.149 allows operators to document and describe how they will satisfy the personnel qualification program requirements and identify by position those individuals who implement the program. During pre-application consultation, the applicant will discuss and identify the expected safety-critical tasks and safety-critical personnel qualifications, including training. The discussion will involve internal training and currency requirements, completion standards, or any other means of demonstrating compliance with the regulation. The applicant will be informed that FAA may request and review documentation or observe activities while on site to verify compliance.	§ 450.149(b)(1) - Is there a list of safety-critical tasks (per § 450.107) that qualified personnel must perform? § 450.149(b)(2) - Is there a description of requirements for training for each identified task? - Is there a currency requirement (or specified as none) for each identified task? - Is there a description of capability (e.g., physical, medical) requirements for each identified task? § 450.149(b)(3) - Is there a description of the process for tracking currency?	Phase 2
F.3 § 450.151 Work Shift and Rest Requirements	The performance-based requirement set forth in § 450.151 allows operators to take into account factors affecting crew rest and adopt mitigations and procedures unique to their launch operation. During pre-application consultation, the applicant will be asked to discuss work shift and rest requirements and the plan for implementing rest requirements that	§ 450.151(c) - Is there a set of rest rules for safety-critical personnel? - Do the rules include: - The duration of the work shift? - A process for extending a work shift? - A maximum allowable length of extension of a work shift?	Phase 3

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
	ensure safety critical personnel are physically and mentally capable of performing assigned tasks. The applicant will be informed that FAA may request and review documentation or observe activities while on site to verify compliance. Note: Safety-critical personnel may be determined via association with safety-critical systems (identified via § 450.107 functional hazard analysis), § 450.109 flight hazard analysis, flight safety analysis, § 450.185 ground hazard analysis, or other safety analyses.	○ The number of consecutive work shift days allowed? ● Do the rules include a minimum period of rest required: ○ Between work shifts? ○ Prior to flight countdown work shift? ○ After the maximum number of work shift days allowed? ● Do the rules include a description of the approval process for any deviation from the rest requirements?	
F.4 § 450.153 Radio Frequency Management.	Radio frequency (RF) management is a prescribed hazard control that ensures that the applicant has a plan to ensure RF interference does not adversely affect public safety and that the operator appropriately communicates frequency usage to key impacted stakeholders of the spectrum. If launching from an accepted Federal range, the applicant will meet the § 450.153(a)(2) requirement by following current range process.	● If operating from a Federal range, where the range has been accepted per § 450.45(b) for RF management, the agreement with the site, per § 450.147, specifying responsibility should be specified as the MOC for § 450.153(a)(2). ● If utilizing § 417.111(f) as an MOC, is there a description of how the RFs will be coordinated with site operator(s) and/or government authorities, per § 450.145(b)(2)? ● If utilizing another MOC: ○ Is there a description of the procedures to ensure RF interference does not	Phase 2: § 450.153(a) Phase 3: § 450.153(b)

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
	Note: Safety-critical systems of flight systems are primarily identified via § 450.107 functional hazard analysis. Additional “safety-critical system” designations may be determined via § 450.109 flight hazard analysis, flight safety analysis, § 450.185 ground hazard analysis, or other system safety analyses.	affect performance of safety-critical systems? - o Does the description include a discussion of each flight safety system and safety-critical system? - o Is there a description of how the RFs will be coordinated with site operator(s) and/or government authorities, per § 450.145(b)(2)?	
F.5 § 450.155 Readiness.	An operator must conduct a readiness review(s) for flight, including a determination to proceed. During pre-application consultation, the applicant will be asked to discuss its procedures and processes that will be used to assess readiness to proceed with the flight of a launch or reentry vehicle. The applicant will be informed that FAA may request and review documentation or observe activities while on site to verify compliance. Note: Safety-critical systems are identified via § 450.107 functional hazard analysis. Additional “safety-critical” designations may be determined via association with safety-critical systems, § 450.109 flight hazard analysis, flight safety analysis, § 450.185 ground hazard analysis, or other safety analyses.	§ 450.155(b)(1) Procedures • Is there a description of procedures used to assess readiness to proceed with flight? • Does the description of procedures include the readiness of: - o The vehicle? - o Each launch, reentry, and landing site(s)? - o Contingency abort sites, if any? - o Safety-critical personnel? - o Safety-critical systems? - o Safety-critical software? - o Safety-critical procedures? - o Safety-critical equipment? - o Safety-critical property? - o Safety-critical services?	Phase 3

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		- Does the description include readiness to implement the mishap plan? § 450.155(b)(2) Criteria - Is there a description of the criteria for establishing readiness? - Are there readiness criteria for: - The vehicle? - Each launch, reentry, and landing site(s)? - Contingency abort sites, if any? - Safety-critical personnel? - Safety-critical systems? - Safety-critical software? - Safety-critical procedures? - Safety-critical equipment? - Safety-critical property? - Safety-critical services?	
F.6 § 450.161 Control of Hazard Areas.	In accordance with § 450.161(b), the launch or reentry operator must perform surveillance sufficient to verify or update the assumptions, input data, and results of the flight safety analyses. Flight hazard areas are defined in accordance with §§ 450.133 and 450.139(b)(3). An operator must publicize warnings for each flight hazard area, except for	§ 450.161(d)(1) Control and Surveillance - Is there a description of how day-of-flight control of hazard areas will be performed for: - Land? - Water? - Airspace? - Is there a description of how day-of-flight surveillance of hazard areas will be performed for:	Phase 2

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
	regions of land, sea, or air under the control of the vehicle operator, site operator, or other controlling authority with which the operator has an agreement. During pre-application consultation, the applicant is encouraged to discuss and describe its plan for the control of hazard areas, including publication and verification. An example of means of compliance for § 450.161 can be found in AC 450.161-1, “Surveillance and Publication of Hazard Areas.”	- o Land? - o Water? - o Airspace? • Is there a discussion of how surveillance results will be used to verify or update the assumptions, input data, and results of the flight safety analyses per § 450.161(b)? • Is there a description of the process to verify that the control and hazard plans are consistent with the flight commit criteria? § 450.161(d)(2) Warnings • Is there a description of how hazard areas will be publicized for: - o Land? - o Water? - o Airspace? • Is there a discussion of how hazard area publication is confirmed in accordance with § 450.161(c)? § 450.161(d)(3) Toxics • Is there a description of how flight commit criteria will be established due to the potential for toxic hazards (or a statement that there are no toxic hazards)?	

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
F.7 § 450.163 Lightning Hazard Mitigation.	This regulation allows two options: 1. Mitigating the potential for lightning strikes or initiation 2. Design of the vehicle to protect safety-critical systems from the effects of lightning. The first option requires per § 450.35(a) an accepted means of compliance prior to application acceptance. The second option would include documentation of the methods and standards applied to the design. Note: Safety-critical systems are identified via § 450.107 functional hazard analysis. Note: Although not required by § 450.35, applicants are strongly encouraged to consult with FAA during pre-application consultation if using the § 450.163(a)(2) option.	• If the flight commit criteria are being used as mitigation: ○ Is an accepted means of compliance for determining flight commit criteria based on lighting specified? ○ Are representative flight commit criteria regarding lightning provided? • If lighting protection is used: ○ Is there documentation of the methods to protect all safety-critical systems? ○ Does the documentation include a discussion of: ▪ Direct lighting strikes? ▪ Nearby discharge?	Pre-Application Consultation: MOC § 450.163(a)(1) § 450.163(a)(2) Phase 1 - 2: Design / Test Approach § 450.163(a)(2) § 450.163(b)(2) Phase 3: § 450.153(a)(1) § 450.153(b)(1) Verification & Validation § 450.163(a)(2) – § 450.163(b)(2)

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
F.8 § 450.165 Flight Commit Criteria.	Flight commit criteria are essential for ensuring that the assumptions underlying the safety analyses are valid. Flight commit criteria are dependent on some products of the analysis process, and thus specific criteria may change for different operations during a license. However, each vehicle should have a template for flight commit criteria and a process for updating specific values. Clarity of flight commit criteria is also critical so there is no ambiguity in the decision process. Section 450.165(a) lists seven specific topics that must be considered for inclusion in the criteria. There are two options for submission: 1. Template + example: a template of flight commit criteria covering all the topics in § 450.165(a) which are relevant. The template should have placeholders for values determined for each operation and a specific reference to the source of each value. The material should also include an associated example with values assigned to placeholders.	• Is there a list of flight commit criteria, or a template list? • Do the criteria include the following: ○ Surveillance of any region of land, sea, or air? ○ Monitoring of any meteorological condition? ○ Launch or reentry window for the purpose of collision avoidance? ○ Confirmation that any safety-critical system is ready for flight? ○ Confirmation from FAA regarding risk to critical assets? ○ For any reentry vehicle, status of safety-critical systems? ○ Any other hazard controls (or a statement that there are none)? • If a template is submitted: ○ Is there a specific reference to the source of the value for each placeholder in the template? ○ Is there an example list as would be used for an operation?	Phase 2: § 450.165(a) Phase 3: § 450.165(b)

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
	2. A static list of flight commit criteria which may not be changed without a license modification, covering all the topics in the § 450.165(a) that are relevant. Note: Safety-critical systems of flight systems are primarily identified via § 450.107 functional hazard analysis. Additional “safety-critical system” designations may be determined via § 450.109 flight hazard analysis, flight safety analysis, § 450.185 ground hazard analysis, or other system safety analyses.		
F.9 § 450.167 Tracking.	The system used to track the vehicle is required to provide data to determine the actual impact locations of all stages and components, and to obtain vehicle performance data for comparison with the pre-flight performance predictions. -	• Is there a description of a method used for tracking? • Does the method discuss measuring and recording in real-time? • Does the method discuss recording position and velocity with respect to time? • Is there a description of systems used for tracking?	Phase 2

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
F.10 § 450.171 Safety at End of Launch.	To address safety at the end of launch, FAA imposed § 450.171 to provide requirements for the prevention of creating orbital debris, with which an applicant would be required to demonstrate compliance in its application. During pre-application consultation, the applicant will discuss and describe its plans to demonstrate compliance to mitigate orbital debris generated from vehicle stages or components that reach earth orbit. A means of compliance for § 450.171 is the Inter-Agency Space Debris Coordination Committee IADC-02-01: IADC Space Debris Mitigation Guidelines or the U.S. Government Orbital Debris Mitigation Standard Practices.	• Is there a description of how safety at the end of launch will be ensured? • Does the description include a discussion of the prevention of unplanned physical contact between: ○ The vehicle and any of its components? ○ The vehicle and the payload? • Is there a list of potential residual energy sources? • Is there a discussion of the process for: ○ Depleting residual fuel? ○ Leaving all fuel line valves open? ○ Venting each pressurized system? ○ Discharging all batteries? ○ Removing other sources of energy, if any?	Pre-Application Consultation: § 450.3 Scope of License Phase 2: § 450.171(a) Phase 3: § 450.171(b)
F.11 § 450.173 Mishap Plan– Reporting, Response, and Investigation Requirements	In accordance with 14 CFR § 450.173(h), an applicant must submit a mishap plan, or other written means, containing processes and procedures for reporting, responding to, and investigating a mishap in accordance with § 450.173(b) through (g). FAA will work with an applicant to ensure the processes and procedures	• Is there a mishap plan or other written documentation of the response to a mishap? • Does the documentation include a description of: ○ Responsibilities of personnel? ○ Personnel reporting responsibilities?	Phase 3

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
	outlined in an applicant's mishap plan contain sufficient detail to allow for FAA evaluation and approval, and for the applicant to implement the plan in the event of a mishap. To aid the applicant in developing their mishap plan, FAA published AC 450.173-1, <i>Mishap Plan – Reporting, Response, and Investigation Requirements</i>. To facilitate review of a mishap plan, applicants should identify whether the mishap plan is applicable to a single launch vehicle type, configuration, or location or applicable to multiple vehicles and locations. Note: For plans applicable to multiple vehicles or locations, FAA may require additional information to verify the satisfaction of applicable requirements for all vehicle types and locations.	- o Allocation of roles/responsibilities between the site operator and launch operator? - o Reporting timelines? - o Special reporting for fatalities or serious injuries? - o The contents of the preliminary mishap report? - o Evacuation plans? - o Fire extinguishing plans? - o Hazard area surveillance? - o Securing impact areas? - o Disposal of hazardous materials? - o Controlling hazards at the site? - o Controlling hazards at the impact areas? - o Preserving data? - o Preserving physical evidence? - o Agreements with government authorities regarding mishaps? - o Agreements with emergency response services regarding mishaps? • Is there a documentation of mishap investigation process?	

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		• Does the process discuss: ○ Investigation of root causes? ○ Reporting results to FAA? ○ Implementation of measures to avoid recurrence? • Is there a discussion of records preservation methods? • Is there a discussion of records retention conditions? • Is there a discussion of records access to FAA officials?	
F.12 § 450.175 Test-Induced Damage.	This section applies to license applicants or operators seeking an optional test-induced damage exception under 14 CFR § 450.175. It allows a license applicant to coordinate with FAA regarding potential test-induced damages before the planned test activity occurs. Some tests are intentionally designed to result in failures, while others are aggressive in nature and may lead to damage. FAA intends for the test-induced damage exception to apply to the testing of specific components and systems, rather than the operation of an entire vehicle, with the understanding that testing could result	• Is there a document containing: ○ Test objectives? ○ Test limits? ○ Expected outcomes? ○ Potential risks, including the applicant's best understanding of the uncertainties in environments, test limits, or system performance? ○ Applicable procedures? ○ Expected time and duration of the test?	Pre-Application Consultation or Phase 1 or Phase 2 or Phase 3: <i>Prior to planned test activity (no later than 30 days before planned activity to allow for adequate review)</i>

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
	in significant damage to or loss of a vehicle. Test-induced damage is not considered a mishap under certain conditions if the applicant has pre-coordinated test activities with FAA, followed proper safety measures, and adhered to required protocols. This is more common as a license modification than during the initial license phase. FAA will consider test failures and damage covered by this section, including damage to ground support equipment, ground support systems, and flight hardware, as test-induced damage and not a mishap, so long as the failure falls within the pre-coordinated scope and FAA-approved testing profile. Any mishap resulting in a serious injury or fatality, damage to property not associated with the licensed activity, or hazardous debris leaving the pre-defined hazard area will be treated as a mishap and not test-induced damage, and will be subject to the reporting, response, and investigation requirements of 14 CFR § 450.173. A license applicant or operator must coordinate potential test-induced damage exception with FAA before		

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
	the planned activity, and with sufficient time for FAA to evaluate the operator's proposal during the application process or as a license modification.		
F.13 § 450.177 Unique Safety Policies, Requirements, and Practices.	FAA expects that advances in technology and implementation of innovations by launch and reentry operators will likely introduce new and unforeseen public safety considerations. In this case, FAA must work with operators on a case-by-case basis to identify and mitigate any unique hazards posed to public health and safety, which are not addressed by Part 450. FAA expects the need for the use of this provision to be rare due to the comprehensiveness and performance-based nature of Part 450. However, during pre-application consultation FAA will inquire and afford the applicant the opportunity to discuss and identify any unique safety policies, requirements, and practices pertaining to its operations.	• Are unique hazards identified, or specified as none? • If unique hazards are identified: ○ Have safety policy, requirements, or practices been included in the application? ○ Is there documentation of demonstration that public health and safety is protected with respect to each hazard? ○ Is there documentation of demonstration of compliance with each policy, requirement, or practice developed in response to this hazard?	Pre-Application Consultation or Phase 1

Appendix G. Title 14 CFR 450 Subpart C: Ground Safety

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
G.1 § 450.179 Ground Safety – General.	At a U.S. launch or reentry site, the public and property must be protected from adverse effects of licensed ground operations via either: (1) demonstrated compliance to the requirements of §§ 450.181 through 450.189, or (2) § 450.179(b) exception.	• If an applicant proposes to use § 450.179(b) exception, FAA requests a copy of the written agreement in accordance with § 450.147(d)(2). • Is there a description and copy of the written agreement with the Federal launch or reentry site for the provision of ground safety services and oversight in section § 450.147?	Pre-Application Consultation: § 450.179(b)
G.2 § 450.181 Coordination With a Site Operator.	Site coordination requirements for a launch or reentry conducted from or to a Federal launch or reentry site or a site licensed under Part 420 or 433. This section applies when the launch or reentry operator is NOT the site operator. It is possible that multiple sites could be involved, such as a launch from one site and landing at another.	• Is there a description of coordination with each site? • Does the description include the following topics: - o Control of public access? - o Coordination with other site users? - o Designation of ground hazard areas? - o Mishap response affecting the public? • For non-Federal sites, is there a description of ground mishap response coordination? • Does the description include roles and responsibilities?	Phase 1

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
G.3 § 450.183 Explosive Site Plan.	Explosive siting requirements for a launch or reentry conducted from or to a site exclusive to its own use.	- Is there an explosive site plan and supporting data, addressing: - Separation distance requirements for handling division 1.1 and 1.3 explosives. - Separation distance requirements for storage of hydrogen peroxide, hydrazine, and liquid hydrogen and any incompatible energetic liquids stored within an intraline distance. - Separation distance requirements for handling incompatible energetic liquids that are co-located. - Separation distance requirements for co-location of division 1.1 and 1.3 explosives with liquid propellants? - Separation distance measurement requirements?	Phase 2: § 450.183(a) Phase 3: § 450.183(b)
G.4 § 450.185 Ground Hazard Analysis.	A ground hazard analysis identifies key integrated system design and operation data, documents the overall ground safety risk to the public, and determines the necessary hazard controls (mitigations) to ensure the residual risk meets acceptable criteria.	- Is there a description of the ground hazard analysis methodology for the lifecycle? - Does the ground hazard analysis identify hazards, including system and operation hazards? - For each hazard, is there identification of:	Phase 1: § 450.185(a) § 450.185(b) § 450.185(c) § 450.185(f)(1) § 450.185(f)(2)

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
	The ground hazard analysis should be performed early in system development and operation conceptualization to define the ground safety risk to the public in order to positively influence design and operation decisions. AC 450.103-1, <i>System Safety Program</i>, provides guidance on severity categories and likelihood levels in Appendices C and D, including acceptable criteria for “remote” and “extremely remote.”	○ Likelihood? ○ Severity? ○ Is there definition of what constitutes “extremely remote” and “remote” likelihood? ● For every hazard with a severity of “death or serious injury,” is the mitigated likelihood “extremely remote”? ● For every hazard with a severity of “major damage to property not associated with the launch or reentry,” is the mitigated likelihood “remote”? ● Are risk elimination and mitigation measures identified and described? ● Are verification methods for risk elimination and mitigation measures identified and described? ● Is there documentation of verification and validation achieving the risk level above? ● Is traceability demonstrated in the ground hazard analysis data: ○ For each hazard is there at least one failure? ○ For each hazard, is there at least one mitigation?	Phase 1 – 3: § 450.185(f)(3) Phase 2: § 450.185(d) Phase 2 – 3: § 450.185(e) Phase 2-3 for completion of § 450.185(e) validation effort

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		○ For each failure, is there at least one cause? ○ For each cause, is there at least one mitigation? ○ For each mitigation, is there at least one verification? ● For each mitigation, is there a risk assessment?	
G.5 § 450.187 Toxic Hazards Mitigation for Ground Operations.	Prior to application acceptance, a means of compliance for § 450.187 must be accepted. Hazards associated with toxics utilized during licensed ground operations must be properly managed and compliance demonstrated with criteria in § 450.185(c).	§ 450.187(e) ● Does the methodology reference an accepted means of compliance for toxic risk analysis? § 450.187(f)(1) ● Is a reference list of toxic substances identified? ● Are possible toxic release sources identified from: ○ Propellants? ○ Chemicals? ○ Combustion products? ○ Derivatives? § 450.187(f)(2) ● Is there a list of toxic concentration and duration thresholds? § 450.187(f)(3) ● Are meteorological conditions provided? § 450.187(f)(4)	Pre-Application Consultation: MOC § 450.187(e)(1) & (f)(7) Phase 1: § 450.187(a) § 450.187(f)(1) – (f)(6) Phase 2: § 450.187(b) § 450.187(c) § 450.187(f)(7)

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		- Is a characterization of terrain provided? § 450.187(f)(5) - Is the toxic dispersion model identified? - Is other input data to the toxic dispersion model provided? § 450.187(f)(6) - Are representative results of the toxic analysis provided? - Do the results include toxic concentrations and durations? § 450.187(f)(7) - Are failure modes and probabilities of toxic scenarios provided? - Are representative results of a worst-case or maximum-credible quantity of any toxic release provided? § 450.187(f)(8) - Is the use of a containment or risk assessment approach specified? - If a containment approach is used: - Is there a description of evacuation plans? - Is there a description of meteorological constraints and associated ground hazard controls?	Phase 2 – 3: § 450.187(d) § 450.187(e) Phase 3: § 450.187(f)(8)

Section	Description	Application Acceptance Criteria	Evaluation Timeframe
		§ 450.187(f)(9) • If a risk assessment approach is used: - o Is there a demonstration of compliance with safety criteria? - o Is population data provided? - o Is there a description of risk mitigations? - o Is there a description of the population exposure input data?	
G.6 § 450.189 Ground Safety Prescribed Hazard Controls.	Prescribed hazard controls ensure adequate mitigation for unique ground safety items associated with protecting public and property.	• Are processes and methods documented for protecting members of the public who enter any area under the control of a launch or reentry operator? • Are there procedures for identifying and tracking the public while on the site? • Are mitigations implemented identified by the ground hazard analysis and toxic hazard analysis?	Phase 2 - 3: § 450.189(f)

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