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INITIAL REGULATORY EVALUATION, INITIAL REGULATORY FLEXIBILITY ANALYSIS, INTERNATIONAL TRADE IMPACT ASSESSMENT, AND UNFUNDED MANDATES ASSESSMENT

NOTICE OF PROPOSED RULEMAKING

LICENSING AND SAFETY REQUIREMENTS FOR LAUNCH (14 CFR PART 413, 415, 417)

**OFFICE OF AVIATION POLICY AND PLANS
OPERATIONS REGULATORY ANALYSIS BRANCH, APO-310**

Gary S. Becker

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Executive Summary

This draft regulatory evaluation examines the costs and benefits of the proposed rule that would codify the FAA's license application process for launch from a non-federal launch site. The proposed regulations are also intended to codify the safety requirements for launch operators regarding license requirements, criteria, and responsibilities in order to protect the public from the hazards of launch whether launching from a federal range or a non-federal launch site.

The incremental cost of this proposal is expected to be minimal, if non-existent. In general, there would be no change in costs to the licensee of satisfying the requirements of the proposed rulemaking. Costs would be the same whether licensing on a case-by-case basis or according to the proposed rulemaking. There would also be no change in costs to a Federal range since no services would be provided when launching from non-federal sites. Finally, there would be no change in cost to the FAA since the same work would be performed by the FAA in either situation.

The FAA does not expect there to be any change in safety benefits. There may be some cost savings to the licensee because launch operators would have a better understasnding of the FAA license requirements, data and information requirements, and reporting requirements and formats beforehand. There may also be some cost savings when launching from the federal ranges. The FAA codified requirements will apply to all licensed commercial launches. Launch operators would know the FAA and federal range requirements, data and information requirements, and reporting requirements and

formats. Finally, there may be some cost savings from launching at federal ranges since the launch operators have improved knowledge of requirements.

The proposed rule would not impose a significant economic impact on a substantial number of small entities. In terms of international trade, the proposed rule would neither impose a competitive trade disadvantage to U.S. entities nor to foreign entities. This proposal does not contain any Federal intergovernmental or private sector mandate. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

1. Introduction

This document contains an analysis of the costs and benefits of the Federal Aviation Administration (FAA) Notice of Proposed Rulemaking (NPRM) on Licensing and Safety requirements for Launch (14 CFR Parts 401, 413, 415, and 417).

The proposed rulemaking would codify current practices (i.e., the requirements that would be imposed when licensing on a case-by-case basis) for licensing launches from non-federal sites and reflect existing requirements for licensed launches from federal launch ranges. The primary intended benefit of this proposed rule is to ensure that the same level of safety exists when launching from non-federal sites as when launching from federal ranges.

There are minimal costs associated with this rulemaking. That is because, according to the Associate Administrator for Commercial Space Transportation, the proposed rulemaking codifies current practice (i.e., the requirements that would be imposed when licensing on a case-by-case basis) by the FAA for licensing launches from non-federal sites.[1] Because the same requirements would be imposed whether licensing on a case-by-case basis or under the proposed rulemaking, it is anticipated that there would be no cost

[1] Under its statutory authority, the FAA has licensed, and continues to license commercial launches that take place from federal ranges. Until recently, all commercial launches took place under the direction of federal launch range and safety organizations, which imposed comprehensive safety requirements on launch operators. The FAA was able to rely significantly on the safety oversight activities (performed by the Department of Defense and the National Aeronautics and Space Administration) of the federal launch ranges. Consequently, many safety issues did not need to be addressed explicitly in the FAA's regulations.

impacts on license applicants resulting from the proposed rulemaking. It is also unlikely that there would be any cost impacts on the FAA.

2. **Background**

The Commercial Space Launch Act of 1984 as codified and amended at 49 U.S.C. Subtitle IX - Commercial Space Transportation, chapter 701--Commercial Space launch Activities, 49 U.S.C. 70101-70121 (the Act), authorizes the Department of Transportation and thus the Office of the Associate Administrator for Commercial Space of the Federal Aviation Administration to oversee, license and regulate commercial launch and reentry activities and the operation of launch and reentry sites as carried out by U.S. citizens or within the United States. The Act directs the FAA to exercise this responsibility consistent with public health and safety, safety of property, and the national security and foreign policy interests of the United States. 49 U.S.C. 70105. The FAA is also responsible for encouraging, facilitating and promoting commercial space launches by the private sector. 49 U.S.C. 70103.

Under its statutory authority, the FAA licenses commercial launches that occur on federal ranges. Until recently, all commercial launches took place under the direction of federal launch range and safety organizations. The FAA was able to rely significantly on the safety oversight activities performed by the Department of Defense (DoD) and the National Aeronautics and Space Administration (NASA) on the federal launch ranges.

Recent space industry changes have resulted in investments in, and development of, non-federal launch sites and their use by commercial space launch providers. A non-federal launch site is a launch site not located on a federal launch range. The FAA anticipates an increasing number of launches from an increasing number of non-federal launch sites. Safety oversight activities currently performed by the DoD and NASA at federal ranges are not always available at non-federal sites. Consequently, under the existing regulations, the FAA has licensed launches from non-federal sites on a case-by-case basis.

3. **Industry Profile**

Historically, launch operators conducted their launches from federal launch ranges operated by DoD and NASA. These Federal launch ranges include the Eastern Range, located at Cape Canaveral Air Station in Florida (CCAS), and the Western Range, located at Vandenberg Air Force Base (VAFB), in California, both operated by the U.S. Air Force; Wallops Flight Facility in Virginia, operated by NASA; White Sands Missle Range (WSMR), located in New Mexico, operated by the U.S. Army; and the Kauai Test Facility in Hawaii, a tenant on the Navy's Pacific Missile Range facility, owned by the Department of Energy and operated by Sandia Laboratories. Recently, the FAA issued a license for the conduct of launches from Kwajalein Missle Range, Republic of the Marshall Islands, which is operated by the U.S. Army. Federal launch ranges provide the advantage of having existing launch infrastructure and range safety services. Launch

companies are able to obtain a number of services from a federal launch range, including radar, tracking and telemetry, flight termination, and other launch services.

In recent years, the industry has moved to launch from locations other than the established federal ranges. This has resulted in the development of a number of non-federal launch sites. On September 19, 1996, the FAA granted the first license to operate a launch site to Spaceport Systems International whose launch site, California Spaceport, is located within VAFB. Three other launch site operators have received licenses. The Spaceport Florida Authority (SFA) received an FAA license to operate Launch Complex 46 at CCAS as a launch site. Virginia Commercial Space Flight Authority (VCSFA) received a license to operate Virginia Spaceflight Center (VSC) within NASA's Wallops Flight Facility. Most recently, Alaska Aerospace Development Corporation (AADC) received a license to operate Kodiak Launch Complex (KLC) on Kodiak Island, Alaska as a launch site and Sea Launch was licensed to launch from a platform located in the Pacific Ocean. This latter launch site is the first "private use site," a launch site owned and operated by the launch operator and not provided for use by others.

As stated, the commercial space launch industry is growing and diversifying. Between the first licensed commercial launch in March 1989 and January 2000, inclusive, 123 licensed launches have taken place from five different federal launch ranges, two launches have taken place from a non-federal launch site, and two other launches from a launch site operated by a licensed launch site operator. The vehicles have included traditional orbital expendable launch vehicles, such as the Atlas, Titan, and Delta, and

sub-orbital Black Brant boosters. They have also included new expendable launch vehicles using traditional launch techniques, such as Athena, Conestoga, and Taurus and unique vehicles such as the airborne Pegasus and the Zenit 35L (launched from a platform located at the equator). The commercial launch industry has evolved from one relying on traditional orbital and sub-orbital launch vehicles to one with a diverse mix of vehicles using new technology and new concepts. In addition, a number of international ventures involving U.S. companies have also formed, further adding to this diversity. For example, Sea Launch Limited Partnership, utilizes a Russian and Ukranian launch vehicle, a Zenit 3SL, and has already received two launch licenses from the FAA. Launch vehicles such as Sea Launch's Zenit, Lockheed Martin's Athena, and Orbital Sciences' Pegasus have been used primarily for orbital launches such as communications satellites. Launch vehicles such as Starfire I and Terrier Orion have been used for suborbital launches. These launch vehicles are smaller than those used for orbital launches.

The FAA estimates that between 2002 and 2006, for launch operator licenses and launches, two sub-orbital licenses and five orbital licenses will be issued. For the same time period, for launch specific licenses and launches, 27 sub-orbital and three orbital launches (case-by-case launches) will be issued.[2] The FAA also estimates that between 2003 and 2006, for launch operator licenses and launches, nine sub-orbital launches and 20 orbital launches will be issued. The FAA also estimates, for the same time period,

[2] A launch specific license is a license that specifies the number of specific launches that can be made under that license. Each launch occurs under the same set of conditions and is valid only for the launching of one type vehicle. A launch operator license is for multiple launches. For example, under this kind of

that 25 orbital launches (covered by this rulemaking) will be conducted. For the same time period, for launch specific licenses and launches, 22 sub-orbital launches and 3 orbital launches will be conducted. Figure 1 shows the license and launch forecast through 2006.

It should be noted that the license/launch forecast includes a broad mix of launch operators ranging from large organizations such as Lockheed Martin and Orbital Sciences Corporation to small organizations such as amateur rocket enthusiasts concerned primarily with small-scale unguided sub-orbital rockets. The forecasted license applications for these small-scale rockets are a significant factor in the forecast for license applications.

4. Comparison of Existing and Proposed Rules

The FAA is proposing to amend its launch licensing and safety regulations in order to better specify the responsibilities of a launch operator. The proposed amendments to the regulations specify the responsibilities of a launch operator when launching from a non-federal launch site and codify the safety requirements for launch operators regarding license requirements, criteria, responsibilities and operational requirements. The proposed regulatory action is intended to maintain the same level of safety at ranges as

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license, an operator could launch any number of commercial satellites out of Cape Canaveral using a family of launch vehicles on a variety of flight azimuths.

Figure 1 License and Launch Forecast

	Year								No. of Licenses	No. of Launches
	'99	'00	'01	'02	'03	'04	'05	'06	'02 to '06	'03 to '06
Launch Operator Licenses and Launches										
No. of Sub. Orb. Licenses	0	0	0	0	1	0	1	0	2	
No. of Sub. Orb. Launches	0	0	0	0	0	2	2	5		9
No. of Orbital Licenses	0	1	1	2	0	0	2	1	5	
No. of Orbital Launches [Case-by-Case Licenses]	0	0	4	6	6	6	6	2		20
No. of Orbital Launches [Covered by Rulemakng]	0	0	0	0	4	4	4	13		25
Launch Specific Licenses and Launches										
No. of Sub. Orb. Licenses	0	8	5	6	5	5	5	6	27	
No. of Sub. Orb. Launches	0	0	9	5	7	5	5	5		22
No. of Orbital Licenses	4	1	2	0	1	2	0	0	3	
No. of Orbital Launches	0	4	1	2	0	1	2	0		3

Note: The difference in the time frames associated with licenses and launches is due to the assumption that there is a one-year lag between obtaining a license and undertaking a launch. The basis for this information is contained in the Appendix of the report prepared by Princeton Synergetics, Inc. to the FAA. Data provided by the Office of the Associate Administrator for Commercial Space Transportation, Licensing & Safety Division, FAA, December 28, 1999.

delineated in prior FAA rulemakings related to commercial space transportation.[3] This rulemaking builds on the safety successes and standards of federal launch ranges.

The following is a summary of the proposed rulemaking and includes clarification and supporting rationale. A more detailed discussion by part/section along with the potential impacts can be found in the report entitled "Economic Impact Assessment for a Notice of Proposed Rulemaking (NPRM) on Licensing & Safety Requirements For Launch: Non-Federal Launch Sites (14 CFR Part 401, 413, 415, 417)" by Princeton Synergetics.[4]

Payload Review and Safety Determination: Current FAA regulations (Section 415.53) state that the FAA does not review payloads that are subject to regulation by the Federal Communications Commission (FCC) or the Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), or that are owned or operated by the U.S. government. The proposed rule clarifies that the FAA will not review those payloads for their impact on national interests. However, flight safety analyses would be required for even those payloads exempted by 14 C.F.R. § 415.53. The FAA is proposing that all payloads on licensed launches be reviewed for potential effects on the safety of the proposed launch. If the payload hazards dictate a change in flight commit criteria, trajectory, or other safety-related factors, the launch operator and the FAA need to be

[3] 14 CFR Parts 401 et al., Commercial Space Transportation Licensing Regulations; Final Rule, Federal Register, April 21, 1999. Subpart F of this rulemaking describes the FAA's safety review for a proposed launch from a launch site other than a federal launch range. It states that the FAA will conduct a review on an individual, case-by-case basis until it issues regulations of general applicability. It further states that the case-by-case review will conform to existing standards and precedent.

[4] Princeton Synergetics Inc. Economic Impact Assessment for a Notice of Proposed Rulemaking (NPRM) on Licensing & Safety Requirements for Launch: Non-Federal Launch Sites (14 CFR Part 401, 413, 415, 417 Submitted to Department of Transportation, Federal Aviation Administration, Associate Administrator

able to assess and respond to the hazards posed by the satellite. The federal launch ranges conduct such a review for payloads launched from their sites and account for the hazards created by payloads in their flight safety analyses. Absent the federal range review, the FAA would regulate the performance of the same function for launches from non-federal launch sites. The authority of the FCC and NOAA would remain unaffected and the FAA would not duplicate their roles.

Safety Review for Launch from a Non-Federal Launch Site: Under the existing rules and current practice, the FAA requires a safety review for all launches from a non-federal launch site. The FAA is proposing to re-codify its existing requirements for that review. Proposed part 417 contains the safety requirements with which a licensee must comply. Proposed part 415 would require a license applicant to demonstrate how it would satisfy the requirements of Part 417 in order to obtain a license. As part of a license evaluation, the FAA would issue a safety approval if an applicant demonstrates that it would meet the safety responsibilities and requirements for a launch. The safety review would require an applicant to submit data, prepare test plans, conduct and supply analyses and do so in accordance with specified timetables.

In order to obtain a license to launch from a non-federal site, a launch operator would be required to demonstrate that it would satisfy the FAA's regulatory requirements. The submitted material would be similar to that submitted to a federal launch range in order to launch from a site such as Cape Canaveral or Vandenberg Air Force Base. A launch

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for Commercial Space Transportation. 145 Parkside Drive, Princeton, New Jersey. January, 2000. Revised March 2000.

operator, will, however, notice some differences. While the same work would be performed in order to launch, different entities would be performing the tasks. Where, for example, a federal launch range would perform much of the flight safety analysis for a launch operator to launch, the proposed requirements would place that task primarily upon the launch operator. This would result in work being performed and costs incurred by the launch operator and the FAA that previously would have been incurred by the federal range. In the course of its safety review, the FAA would review information provided by the launch operator for validity and accuracy and to determine that the processes are in place to conduct a safe launch. The goal of the FAA is to achieve the same level of safety as would be achieved for a launch from a federal range.

Launch Safety: The proposed rulemaking would clarify the roles and responsibilities of a launch licensee. It specifies that a launch operator is responsible under an FAA license for the safety of the flight of its launch vehicle and the launch processing, or preparation of that launch vehicle for flight. The proposed requirements highlight the interplay between the application process and compliance with the responsibilities of a licensee. Because the FAA grants a license based on the representations contained in a launch operator's license application, which representations address the processes and procedures the applicant proposes to have in place, the licensee's responsibilities under its license would be to ensure the continued accuracy of all material representations. The FAA has proposed to impose affirmative verification measures in order to ensure that a launch operator is operating as it represented it would.

Flight Safety Analysis: The proposed rulemaking would establish requirements for a safety analysis that covers the hazards of both normal and non-normal flight, with the results of the analysis used to develop and implement flight safety rules and procedures that govern the licensed launch. The flight safety analysis would develop flight control lines (boundries that geographically define a region over which a launch vehicle is allowed to fly), would develop flight safety limits, and would require wind weighting (the analysis of wind effects at different altitudes on the performance of an unguided vehicle) to determine launch azimuth and elevation settings for unguided launch vehicles. Additionally, hazard areas would be established for both preflight processing of a launch vehicle and flight.

Risk: The proposed rulemaking would continue the use of the collective casualty expectancy risk employed to evaluate potential public risk due to a proposed launch. The proposed rulemaking would also require an applicant to demonstrate that the launch could be conducted without exceeding an individual casualty probability of $1 \text{ X } 10^{-6}$, as is required at federal launch ranges. Finally, the proposed rulemaking would require the applicant to demonstrate that each proposed launch would not exceed established criteria for the impact probability of hitting aircraft and/or ships.

Flight Safety System: The proposed rulemaking contains requirements governing a flight safety system, that would provide a means of preventing a launch vehicle and any component, including any payload, from reaching the public in the event of a launch vehicle failure. A flight safety system would consist of an onboard vehicle flight

termination system, a command control system, and various support systems, including tracking, telemetry, display, and communications, and all associated hardware and software.

The proposed rulemaking, based on information from FAA's Office of the Associate Administrator for Commercial Space Transportation, reflects much of what is current practice and what are current requirements at the federal launch ranges. The FAA seeks to maintain the same high level of safety that the federal ranges have achieved. The proposed rulemaking specifies performance requirements for any flight safety system a licensed launch operator would employ, whether that flight safety system is the more familiar radio signal initiated command destruct system, or an autonomous system, such as the Russian and Ukrainian thrust termination system. As one of the more general performance goals, a flight safety system would be required to keep the hazards associated with a launch vehicle and its payload from reaching populated and other protected areas. A launch operator seeking a license would be required to demonstrate convincingly its ability to meet this requirement. If a launch operator plans to employ the flight termination system that most licensees rely on today, the proposed rulemaking would provide the performance, design, test and installation requirements with which the licensee would be required to comply. If a launch operator proposes an atypical flight safety system, the launch operator would be required to provide a clear and convincing demonstration that it would achieve an equivalent level of safety to that obtained through adherence to the requirements.

Ground Safety: The proposed rulemaking addresses ground safety by imposing launch processing requirements that would apply both to a launch operator already in possession of a launch license and to an applicant for a launch license. Like the requirements governing flight safety analysis and a flight safety system, an applicant for a license would be required to demonstrate convincingly that it would be able to meet the requirements that apply to the preflight preparation of a launch vehicle and related post-launch activities at a United States launch site. The goal of FAA's requirements is to ensure that safety issues unique to a launch are addressed while at the same time avoiding duplication with the requirements of other civilian regulatory agencies.

5. Current Practice

In order to assess the regulatory impact of this proposed rule, it is necessary to establish a base from which impacts are measured. This base is referred to as current practice. Whether launching from a federal range, a launch site located on a federal range, or a non-federal launch site, a launch operator is responsible for ground and flight safety under its FAA license. At a federal launch range a launch operator is currently required to comply with the rules and procedures of the federal range. The current procedures and practices, which are based on the existing safety requirements, have been found to satisfy the majority of the FAA's safety concerns. In the absence of federal launch range oversight, each launch operator would be required to demonstrate the adequacy of its ground and flight safety programs to the FAA in order to satisfy the FAA's existing statutory responsibility.

The first licensed launch from a non-federal launch site occurred on a modified mobile drilling platform located in the Pacific Ocean. For this launch, no federal launch range safety review was available. The FAA did not require Sea Launch Limited Partnership to obtain a license to operate this launch site because it was considered to be a "private launch site" since Sea Launch did not plan to make it available for use by others. The FAA's approach to the evaluation of Sea Launch's launch license application was to ensure an equivalent level of safety as achieved at the federal launch ranges. Although the foreign safety system, technology, procedures, and operations create a number of differences, according to FAA's Associate Administrator for Commercial Space Transportation, the FAA was able to successfully apply the federal launch range approach as a benchmark for the FAA's safety determination.

The current regulations governing launch primarily address launches as they take place from DOD or NASA federal launch ranges. The regulations for launch from a federal launch range are designed to avoid duplication of effort between the FAA and the federal launch ranges in overseeing the safety of launches. The ranges require compliance with their safety rules as a condition of using their facilities and services. The federal ranges act, in effect, both as landlords and as providers of launch facilities and services.

The federal launch range requires a launch operator to provide data regarding its proposed launch. The range evaluates the data to ascertain whether the launch operator will comply with range requirements. The range also uses the data to prepare range

support for the mission. The Department of Defense ranges require that a launch operator apply for and obtain specific mandatory approvals from the range in order to conduct certain specified operations. For example, the Air Forces's "Eastern and Western Range Requirements 127-1," dated March 1995[5], requires a launch operator to obtain approvals for hazardous and safety critical procedures before the range will allow those operations to proceed. In the event that a launch operator's proposal does not fully comply with federal range requirements, a range may issue a deviation or a waiver if the mission objectives of the launch operator and safety could otherwise be achieved (i.e., Meets Intent Certification). Unlike Meets Intent Certification, EWR-127-1 contemplates acceptance of greater risk for deviations and waivers. Unlike the federal launch range process, when unique or compelling circumstances exist, a launch operator may obtain a deviation or waiver to a safety requirement in order to meet mission requirements for a government launch. By implication, this involves an acceptance of greater risk. A licensed launch operator under the FAA's proposed regulations would have to demonstrate an equivalent level of safety if it wanted to avoid a published requirement. This is keeping with the FAA's current practice for licensed commercial launch but may mark a change for some who are accustomed to conducting government launches.

In summary, in the absence of the proposed rulemaking, licensing of commercial launches from non-federal ranges would proceed on a case-by-case basis with the requirements that would be imposed on a licensee constituting current practice. Current practice in the absence of the proposed rulemaking therefore reflects: (1) the set of

[5] While there is a later edition of EWR-1 published in 1997, the March 1995 version was used as a basis for the requirements in this proposed rulemaking.

requirements, methods and procedures utilized by the federal launch ranges to achieve safety; (2) the FAA licensing requirements imposed upon launch operators launching from federal ranges which includes the range requirements; and (3) the requirements, methods, and procedures utilized by the FAA for the licensing of Sea Launch (the FAA's first licensed launches that took place without the support of any federal launch range).

6. **Costs and Benefits of Compliance**

Introduction

This chapter contains an analysis of the costs of FAA's Notice of Proposed Rulemaking on the licensing and safety requirements for launch from non-federal launch sites. Although 14 CFR Parts 401 et al., are primarily concerned with the launch and related operations at federal ranges, it currently requires operators to seek a license for the launch of a launch vehicle from a site that is not operated by a federal launch range. These licenses, in the absence of the proposed rulemaking, would continue to be issued on a case-by-case basis.

The proposed rule would impact all launches that would take place from non-federal sites. To date, three licensed launches have taken place from non-federal sites outside of the United States and utilizing foreign launch vehicles that utilize technology normally used by U.S. launch vehicles.

When a commercial launch takes place from a federal range, costs are incurred by the launch range, by the FAA, and by the commercial launch operator. A portion of these costs are incurred in the process of demonstrating that adequate safety, as required by the federal range and the FAA, will be achieved. The FAA licensing process relies, to a large extent, upon the federal range safety approvals and analyses and public safety related data provided to the FAA by the launch operator. The FAA's attempt at achieving the same level of safety associated with launching from federal ranges when launching from non-federal sites, whether licensing on a case-by-case basis or in accordance with the proposed rulemaking, should result in the same total cost associated with achieving the safety requirements. There is a difference in which Federal entity (Federal launch range operator or the FAA) bears the cost, but that is due to the location of the launch, not as a result of the rulemaking.

Potential Cost Impacts

Princeton Synergetics, under contract to the Department of Transportation, Federal Aviation Administration, Associate Administrator for Commercial Space Transportation, prepared a report that was published in March 2000 on the economic impact of the notice of proposed rulemaking on licensing and safety requirements for launches from non-federal launch sites. This report identified the potential economic cost impacts that are expected to result from the FAA's proposed rulemaking. The report also discussed the impact of the current rulemaking on international trade, on small businesses and small government entities, and whether an unfunded mandate exists.

Table 1 from the Princeton Synergetics analysis, which is reproduced in the appendix, contains an analysis of the proposed rulemaking. The table identifies the part or section of the proposed rule, provides a brief summary, and then describes the potential impact. The impacts are those resulting from the proposed rulemaking relative to current practice and not those resulting from the use of a non-federal launch site. The following short-hand notation is used throughout the table: *Would be required with/without the proposed rulemaking.* This is used to indicate that the FAA would impose the same requirements for obtaining a launch operator license when licensing on a case-by case basis or when licensing as per the proposed rulemaking. In addition, the phrase *current practice at federal ranges* implies that the requirements are currently imposed by federal ranges upon launch operators seeking to launch from federal ranges.

The following examples, from the Princeton Synergetics report, illustrate the information presented in the table and the rationale for the impact conclusions.

Part 415, Launch Licenses, Subpart D - Payload Review and Determination:
Current practice at federal ranges is for the federal range to perform reviews of certain payloads in order to assess the implications of the payloads on the safety of launch and related operations. This proposed revision clarifies that the FAA reviews payloads in order to assess the implications of the payloads on the safety of launch and related operations when such launch operations take place at non-federal launch sites.

Since the FAA has the statutory responsibility of maintaining public safety for launches conducted from non-federal sites as well as from federal ranges, it would be necessary for the FAA to require the same ground safety related analyses for launches from non-federal sites. As at federal ranges, OSHA, EPA, and the NRC would participate in this process. There currently is a lack of clarity with respect to the overlap between these agencies and the FAA information and analysis requirements. This is likely to increase launch operator costs until an understanding is gained through experience as to the specifics of each agency's information and analysis requirements. This, however, would be the case whether licensing is performed on a case-by-case basis or according to the proposed rulemaking. Since the same requirement would be imposed by the FAA with or without the proposed rulemaking, there would be no additional economic impact.

Part 415 Appendix A, Safety Review Document Outline: The proposed rulemaking contains format and content requirements for a safety review document. The requirements parallel current practice at federal ranges and is intended to standardize reporting. Standardizing reporting should lead to cost savings by the FAA by increasing the efficiency of the FAA review process. It should also lead to license applicant cost savings by providing a better understanding of FAA information requirements. Licensing on a case-by-case basis will ultimately lead to a similar understanding of the FAA information requirements so that the launch applicant cost savings (attributed to the proposed rule) would be transitory in nature. Table 2 summarizes in qualitative terms, the economic impacts of the proposed rulemaking.

Table 2 Qualitative Description of Economic Impacts of the Proposed Rulemaking on Licensing of Launch Processing and Flight from Non-Federal Launch Sites

Parties Affected	Costs/Cost Savings
Licensee	• In general, there will be no change in cost of satisfying the requirements of the proposed rulemaking. Costs would be the same when licensing is performed on a case-by-case basis or according to the proposed rule-making. • Cost savings may result because launch operators know FAA license requirements, data and information requirements, and reporting requirements and formats. • Because federal ranges may utilize the FAA codified requirements, cost savings may result when launching from federal ranges because launch operators know FAA and federal range requirements, data and information requirements, and reporting requirements and formats.
Federal Range	• No change in cost since no services are provided [when launches are from non-federal sites]. • Cost savings may result from launching at federal ranges since the launch operators have improved knowledge of requirements.
FAA	• In general there will be no change in cost since the same work would be performed by the FAA when licensing on a case-by-case basis and according to the proposed rule-making. • Cost savings may result from improved license applicants' knowledge of FAA requirements, thus requiring less interactions with the FAA.

Note: Based upon information provided by Princeton Synergetics, Inc. March 2000.

Impact on Launch Operator

When launching from a federal range, a launch operator seeking a launch license from the FAA would incur costs associated with satisfying both federal range safety requirements and FAA safety requirements. In addition, federal range costs incurred that are directly related to safety analyses and other support services would be charged by the federal range to the launch operator. These costs include directly incurred costs and overhead. When seeking a license to launch from a non-federal site, the license applicant would not utilize the services of the federal range and would perform the activities that would normally be performed by a federal range and billed to the applicant.

Princeton Synergetics obtained information from a launch operator on certain costs that would be incurred. This launch operator indicated that their cost associated with satisfying FAA license requirements for launching from a non-federal site includes $1.5 million[6] for development which is the initiation of license discussions through and including the first mission) and $0.7 million per year for maintenance of ongoing missions (4-6 launches per year or approximately $0.15 million per launch).

Based upon information provided to the FAA by Princeton Synergetics, the following impacts resulting from the proposed rulemaking are expected:

[6] All monetary values are expressed in 1999 dollars.

Costs/Cost Savings

The proposed rulemaking, based upon information provided by the Office of the Associate Administrator for Commercial Space Transportation, codifies current practice, which are the requirements that would be imposed when licensing on a case-by-case basis for licensing launches from non-federal sites. Because the same requirements would be imposed whether licensing on a case-by-case or as per the proposed rulemaking, it is anticipated that there would be no additional cost impacts on license applicants resulting from the proposed rulemaking. Actually, cost savings may result because launch license applicants might be more knowledgeable (than before the proposed rule) of FAA license requirements, data and information requirements, and reporting requirements and formats. These cost savings impacts are not quantifiable but are anticipated to be small because of the total licensing related costs (of which this would be only a part) and the relatively small number of anticipated launches from non-federal sites during the analysis time frame.

Federal Launch Ranges

When seeking a license to launch from a non-federal site, the license applicant would not utilize the services of the federal range and would perform the activities that would normally be performed by a federal range and would not be billed for services provided by the Federal launch range. This is a shifting of the cost burden, but it is a result of the

decision to launch from a non-federal site and not a consequence of the proposed rulemaking.

Because federal ranges are not involved in commercial launches from non-federal sites, there are no direct cost consequences from the FAA proposed rulemaking. However, federal range costs may be reduced as a result of a federal launch range's use of the FAA codified requirements that improve launch operators' knowledge of range requirements thus resulting in more efficient interactions between the federal range and the launch operator. These cost savings are not quantifiable but are not likely to be large because the number of new federal range users whose knowledge base would be affected is likely to be small and the existing users of the federal ranges are likely to be knowledgeable with respect to range requirements.

Federal Aviation Administration

Princeton Synergetics, obtained estimates from the Office of the Associate Administrator for Commercial Space regarding the level of effort of FAA activities associated with various licensing operations associated with launching from non-federal sites. These served as the basis for estimating the FAA costs associated with the licensing of launch operations from non-federal sites on a case-by-case basis. The base case consists of imposing requirements that constitute current practice upon launch applicants. It encompasses the set of requirements, methods, and procedures utilized by the federal launch ranges that satisfy FAA safety requirements; the FAA licensing requirements

imposed upon launch operators launching from federal ranges; and the methods and procedures that FAA used to license Sea Launch. The FAA activities associated with licensing include: (1) application evaluation for orbital launches, (2) application evaluation for sub-orbital launches, (3) application evaluation for launches from non-US territory, (4) application evaluation for renewals and amendments, and (5) safety inspections. The base case costs associated with these activities are summarized in the following paragraphs.

Princeton Synergetics calculated the anticipated FAA licensing costs associated with licensing launch vehicles under the base case and under the proposed rulemaking. Based upon its analysis of the base case and the proposed rule, the cost under the base case is estimated at $12.2 million over five years, from 2002 to 2006. The discounted cost over five years at 7 percent is estimated at $8.7 million. The FAA has stated in the preamble to the proposed rule as well as in this document that the same requirements would be imposed whether licensing on a case-by-case basis or as per the proposed rulemaking (and the above costs would be borne by the FAA to review and monitor their licenses). It is anticipated therefore, that there would be no additional cost impacts on the FAA resulting from this proposed rule.

Cost savings may result from establishing formal requirements and procedures documented as part of this proposed rulemaking. The non-quantified cost savings would result from license applicants having more precise knowledge of what information is required for obtaining a license to launch from a non-federal site and would result in

more efficient interactions between the applicants and the FAA. These non-quantifiable cost savings would be the direct result of the proposed rulemaking and not from the utilization of non-federal sites.

7. Initial Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 establishes "as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the business, organizations, and governmental jurisdictions subject to regulation." To achieve that principal, the Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The Act covers a wide-range of small entities, including small businesses, not-for-profit organizations and small governmental jurisdictions.

Agencies must perform a review to determine whether a proposal or final rule will have a significant economic impact on a substantial number of small entities. If the determination is that it will, the agency must prepare a regulatory flexibility analysis (RFA) as described in the Act.

However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980 Act provides that the head of an agency may so certify and an RFA is not

required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

Enactment of this proposal would impose minimal, if any, quantifiable cost as documented in the regulatory evaluation. Therefore, the FAA has determined that this proposed rule would not have a significant adverse economic impact on a substantial number of small entities, and therefore, a regulatory flexibility analysis is not required under the terms of the RFA. The FAA solicits comments with respect to this finding and determination and requests that all comments be accompanied by clear documentation.

8. **International Trade Impact Assessment**

The Trade Agreement Act of 1979 prohibits Federal agencies from engaging in any standards or related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and where appropriate, that they be the basis for U.S. standards. In addition, consistent with the Administration's belief in the general superiority and desirability of free trade, it is the policy of the Administration to remove or diminish to the extent feasible, barriers to international trade, including both barriers affecting the export of American goods and services to foreign countries and barriers affecting the import of foreign goods and services into the United States.

In accordance with the above statute and policy, the FAA has assessed the potential effect of this proposed rule and has determined that because it has no quantifiable cost or benefit impact it would have no affect on any trade-sensitive activity.

9. **Unfunded Mandates Assessment**

The Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104-4 on March 22, 1995, is intended, among other things, to curb the practice of imposing unfunded Federal mandates on State, local, and tribal governments.

Title II of the Act requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in a $100 million or more expenditure (adjusted annually for inflation) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a "significant regulatory action."

This proposed rule does not contain such a mandate. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

10. APPENDIX

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [14 CFR Parts 401, 413, 415, 417]

Part/Section	Summary	Potential Impacts
Part 415, Launch Licenses	Contains the requirements for obtaining a license to launch a launch vehicle; changes are directed at launching from a non-federal launch range.	Specific impacts, if there are any, are discussed in Subparts A - F and Appendices A and B.
Subpart A - General	Describes the scope of part 415 and types of launch licenses, and approvals and determinations, and procedures governing issuance of a license.	**No Impact.** Editorial Changes.
Subpart D - Payload Review & Determination	Revision to clarify for FAA review of payloads subject to regulation by the FCC, NOAA, or that are owned or operated by the U.S. Government. Primarily a clarification of safety review.	**No Impact**. FAA current practice[7] for those PLs not subject to FCC, NOAA regulation or owned or operated by U.S. Govt. Also, current practice for federal ranges to perform reviews of PLs subject to FCC, NOAA regulation or owned and/or operated by U.S. Govt. FAA review for non-federal site launches would be required with/without proposed rulemaking.
Subpart E- Post-Licensing Reqm'ts - Launch License Terms & Conditions	Revision to require a licensee who places in space an object owned by a foreign entity, that licensee shall ensure by contract that the foreign entity obtains registration of each object.	Potential minor paperwork impact.
Subpart F - Safety Review for Launch from a Non-Federal Launch Site	Applies to the safety review that the FAA requires as part of the licensing process for launch from a non-federal launch site. Specifics in *ξ415.101 - 415.400.*	N/A
ξ415.101 Scope	Establishes the scope of Subpart F which contains the requirements for the application submission material to demonstrate that applicant will meet safety responsibilities and requirements for launch; also includes administrative requirements.	Specific impacts, if there are any, are discussed in *ξ415.103* through *ξ415.400.*
ξ415.103 General	General statement that the FAA conducts safety reviews in accordance with requirements of Part 417. FAA advises an applicant in writing of its findings.	**No Impact.** This is a general statement that the FAA will conduct safety reviews and will provide its findings in writing. It is FAA current practice to conduct safety reviews and to inform applicant in writing of results.
ξ415.105 Pre-Application Consult,	Requirement that an applicant conduct at least one pre-application consultation meeting with the FAA when	**No Impact**. Current practice by federal ranges and by the FAA.[8]

[7] *14 CFR Parts 401 et al., Commercial Space Transportation Licensing Regulations; Final Rule*, **Federal Register**, April 21, 1999. Paragraph 415.53 of Subpart D delineates the payloads not subject to FAA review.

[8] *14 CFR Parts 401 et al., Commercial Space Transportation Licensing Regulations; Final Rule*, **Federal Register**, April 21, 1999. [Paragraph 413.5]

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
	planning to apply for a new launch license & provides requirements for the data to be presented.	Would be required with/without proposed rulemaking.
ξ415.107 Safety Review Document	Requires applicant prepare a "safety review document" for the FAA to conduct launch safety review. Specific requirements are provided in *ξ415.109 - ξ415.131.* Final document would be used by licensee & FAA for ensuring the implementation of a launch safety program that protects public safety in accordance with Part 417.	Specific impacts, if there are any, are discussed in *ξ415.109* through *ξ415.131*. **Cost savings** impact on FAA due to efficiencies from using standardized form and content in the licensing review & approval process. **Cost savings** impact on applicants as a result of clarified and specified requirements.
ξ415.109 Launch Description	Identifies data required to describe proposed launch that must be submitted to FAA as part of safety review document.	**No Impact**. Current practice at federal ranges. Would be required by FAA with/without proposed rulemaking.
ξ415.111 Launch Operator Info.	Ensures that a launch operator applicant's administrative information [i.e., organization data] is submitted prior to or as part of safety review application	**No Impact**. Current practice by FAA[9] and at federal ranges. Would be required by FAA with/without proposed rulemaking.
ξ415.113 Launch Personnel Certification Program	Requires applicant to submit information on its launch personnel certification program [as per *ξ417.105*] - including identification by position of those individuals who implement the program and a table listing each safety critical task that must be performed by certified personnel.	**No Impact**. Current practice by FAA and at federal ranges. Would be required by FAA with/without proposed rulemaking. Organization requirements are flexible with the the result that there are unlikely to be impacts on small entities.
ξ415.115 Flight Safety	Requires applicant to submit information related to program for protecting the public from hazards associated with the flight of a launch vehicle; perform flight safety analysis [as per Part 417]; demonstrate ability to operate a launch vehicle that uses a flight safety system to protect public safety or to operate a launch vehicle without a flight safety system in such a manner that it is not physically capable of reaching any populated or other protected area; to submit data for a conjunction on launch assessment; to provide information relating to radionuclide material; to submit a flight safety plan.	**No Impact**. Current practice by FAA and at federal ranges. With the proposed rulemaking, much of the effort would be shifted from the federal range to the launch operator. However, this would be required by the FAA with/without the proposed rulemaking.
ξ415.117 Ground Safety	Requires an applicant to submit a ground safety analysis report that identifies potential public hazards and the controls to be implemented to protect the public from each hazard.	**No Impact**. Work load will increase for FAA for first few licensees to eliminate overlap with other regulatory agencies.. Also will increase operator cost because of lack of clarity with respect to OSHA & FAA interface. However, these cost increases are the result of the need to ensure safety with/without the proposed rulemaking.

[9] *14 CFR Parts 401 et al., Commercial Space Transportation Licensing Regulations; Final Rule*, **Federal Register**, April 21, 1999. [Paragraph 413.7]

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
§415.119 Launch Plans	Requires applicant to submit a series of launch plans and supplemental plans [i.e., emergency response plan, frequency management plan, security plan, launch abort or delay recovery plan, etc.]. The operator's launch plans document the operator's approach for compliance with the requirements.	**No Impact**. Current practice by FAA and at federal ranges to require such. reports. With the proposed rule-making, much of the effort would be shifted from the federal range to the launch operator and to the FAA. However, this would be required by the FAA with/without the proposed rulemaking.
§415.121 Launch Schedule & Points of Contact	Requires that an applicant submit schedule charts and point of contact for the tests, review, rehearsals, and launch safety operations to be conducted [per Part 417]	**No Impact**. Current practice by FAA and at federal ranges. This would be required by the FAA with/without the proposed rulemaking.
§415.123 Computing Systems and Software	Requires applicant to submit material that describes computing systems and software that perform a soft-ware safety critical function.	**No Impact.**. Current practice at federal ranges and would be required with/without proposed rulemaking.
§415.125 Unique Safety Policies and Practices	Requires applicant to identify any public safety related policy and practice unique to the proposed launch.	Current practice at federal ranges and would be required with/without the proposed rulemaking. Unique policies and practices, by their very nature, cannot be identified in advance so if there are impacts they would not be quantifiable at this time.
§415.127 Flight Safety System Data	Identifies data that an applicant must submit to describe any flight safety system to be employed during launch and to participate in related meetings.	**No Impact.**. Current practice at federal ranges and would be required with/without proposed rulemaking.
§415.129 Flight Safety System Testing Data	Identifies the test data that an applicant must submit on flight safety system to be employed during a launch.	**No Impact.**. Current practice at federal ranges and would be required with/without proposed rulemaking.
§415.131 Flight Safety Crew Data	Requires applicant to identify each flight safety crew position, functional roles during launch operations, and to describe the certification & training program for flight safety crew.	**No Impact.**. Current practice at federal ranges and would be required with/without proposed rulemaking.
Part 415 Appendix B, Safety Review Document Outline	Contains format and content requirements for a safety review document. Technical requirements related to the information contained in the document are provided in Part 417. Intent is to standardize reporting and is aimed at reducing differences in evaluation process and reducing FAA time and costs .	Specific impacts, if there are any, are discussed in *§417.101* through *§417.415*. FAA and applicant costs will increase because of a change in who bears the costs as a result of launching from non-federal launch sites. This would be the case with/without proposed rulemaking. However, there will be a **Cost savings** impact on the FAA due to efficiencies from using standardized outline & content in the safety review document. **Cost savings** impact on applicant due to better understanding of FAA information requirements.

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
Part 415 Appendix C, Ground Safety Analysis Report	Provides the general format and content requirements for a ground safety analysis report in accordance with. *ξ415.117.*	**Cost Savings.** Federal ranges require this and additional information to be provided, and is thus current practice and would be required with/without proposed rulemaking. FAA requires info pertaining to public safety whereas federal ranges require broader safety info. Main difference relates to format of report which will have little or no impact on cost. However, cost savings are likely to result by providing applicant a better understanding of FAA information requirements.
C415.1 General	Provides the general format and content requirements for which will be maintained and updated by the applicant. Must contain the hazard analyses.	See Part 415.
C415.3 Ground Safety Analysis Report chapters	Provides a description of administrative items and reqmts for launch vehicle and operations summary, detailed systems information, hazard analysis and supporting data	See Part 415.
Systems & Operations Info.	Presents requirements for identifying all flight & ground hardware including flight safety system and hazardous materials.	See Part 415.
Hazard Analysis Form	Requires the development of a standard form indicating hardware or operation and related hazards and effects, hazard causes, hazard controls and safety verifications.	See Part 415.
Part 417 - Launch Safety	Establishes specific launch safety and operational reqmts that must be met to obtain & maintain a launch license.	Impacts discussed in following sub-paragraphs.
Subpart A - General	Contains general top level requirements applicable to launch safety.	N/A
ξ417.1 Scope	Prescribes the responsibilities of a launch operator conducting a licensed launch and the requirements that a licensed operator must comply with to maintain a license and conduct a launch.	**No Impacts**. Required by statute and is current practice as demonstrated by the licensing of Sea Launch.
ξ417.5 Launch Safety Responsibility	Requires that a launch operator ensure the safe conduct of a licensed launch.	**No Impacts**. Required by statute, is current practice as demonstrated by the licensing of Sea Launch, and would be required with/without proposed rulemaking.
ξ417.7 Launch Site Responsibility	Requires a launch operator to ensure the safe conduct of preflight preparation of its launch vehicle at a launch site in the U.S. For a launch conducted from an exclusive use site where there is no separate launch site operator, requires the launch operator licensee to be responsible for safety.	**No Impacts**. Required by statute, is current practice as demonstrated by the licensing of Sea Launch, and would be required with/without proposed rulemaking.
ξ417.9 Safety Review Document	Requires a launch operator to conduct each launch in accordance with the safety review document developed during the licensing process of Part 415 and requires changes and updates to be submitted for approval before each flight.	**No Impacts**. Current practice at federal ranges and by FAA and would be required with/without proposed rulemaking.

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
ξ417.11 Launch License Readiness Statement	Requires a launch operator to provide the FAA with a written launch license readiness statement.	**No Impacts**. Current practice at federal ranges [similar to "Launch Readiness Certificate"] and would be required with/without proposed rulemaking.
Subpart B - Launch Safety Reqm'ts	Contains launch safety requirements that apply to launch of orbital and sub-orbital expendable launch vehicles.	**No Impacts.** Specifics are discussed in *ξ417.101 - ξ417.127.*
ξ417.101 Scope	States that Subpart B contains requirements that apply to the launch of orbital and sub-orbital expendable launch vehicles.	**No Impacts.** Specifics are discussed in *ξ417.101 - ξ417.127.*
ξ417.103 Launch Operator Organization	Requires a launch operator to maintain an organization that ensures public safety [as per reqmts of Part 417].	**No Impacts**. Considered as current practice [since federal ranges have organizations in place that perform the required functions and is already a requirement in 14 CFR.[10]] and would be required with/without proposed rulemaking.
ξ417.105 Launch Personnel Qualifications & Certification	Requires the launch operator to identify and document launch personnel qualifications and requires the launch operator to implement a certification program including the need to re-certify annually. Required qualifications are stated in *ξ417.343.*	**No Impacts**. Considered as current practice since federal ranges have organizations in place that perform the required functions and is already a requirement in 14 CFR.[11] Though not specifically reqd by FAA Sea Launch provided a certification plan. Requirement for annual certification established by FAA; AF does not have a requirement for this but normally re-certifies at least annually. Would be required with/without the proposed rulemaking.
ξ417.107 Flight Safety	Specifies requirements for protecting the public from the hazards associated with the flight of a launch vehicle.	
	[a] Requires a launch operator to perform and document a flight safety analysis according to Subpart C.	[a] Impacts considered in Part C.
	[b] Specifies that launch operator must demonstrate compliance with both collective and individual risk criteria through analysis.	[b] **No Impacts**. Both collective and individual risk are considered at federal ranges and collective risk is considered in FAA licensing. Consideration of both collective & individual risk are considered as current practice and would be required with/without proposed rule-making.
	[c] Requires launch operator ensure safety of inhabitable orbital objects throughout a sub-orbital launch and obtain a conjunction on launch assessment from US Space Command.	[c] **No Impacts**. Current practice at federal ranges.

[10] . *14 CFR Parts 401 et al., Commercial Space Transportation Licensing Regulations; Final Rule,* **Federal Register**, April 21, 1999. [Subpart C, Paragraph 415.33]
[11]. Ibid.

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
	[d] Requires that the launch of any radionuclide be approved by the FAA as part of the licensing process.	[d] **No Impacts**. Current practice by federal ranges and by the FAA. Would be required with/without proposed rulemaking.
	[e] Requires a launch operator to implement a flight safety system to protect the public.	[e] **No Impacts**. Current practice by federal ranges and by the FAA. Would be required with/without proposed rulemaking.
	[f] Requires a launch operator to implement a flight safety plan.	[f] **No Impacts**. Current practice at federal ranges [by USAF] and would be required with/without proposed rulemaking.
ξ417.109 Ground Safety	Places responsibility for public safety of operations and support systems on launch operator and requires launch operator to perform ground safety analysis & implement a ground safety plan [specific requirements are indicated in Subpart E].	**No Impacts**. The performance of safety analyses and implementation of safety plans are current practice at federal ranges and would be required by the FAA in order to achieve safety requirements with/without proposed rulemaking.. Impact implications of specific requirements are discussed in subpart E.
ξ417.111 Launch Plans	Requires a launch operator to implement a flight safety plan and a ground safety plan both of which to be updated to reflect changes. Plan content requirements are described in Subpart F of Part 415.	**No Impacts**. The implementation of flight and ground safety plans are current practice at federal ranges and would be required by the FAA in order to achieve safety requirements with/without the proposed rule-making. Impact implications of specific requirements are discussed in subpart F.
ξ417.113 Launch Safety Rules	[a} Requires a launch operator to implement written safety rules that govern launch operations including environmental conditions, status of launch vehicle, launch support equipment and personnel. [b] Requires written flight commit criteria that identify the conditions that must be met to initiate flight and must document the actual conditions at time of liftoff. [c] Specifies flight termination rules. For a launch vehicle with a FTS, requires implementation of a set of written rules that specify the conditions under which a flight termination action would be initiated. [d] Requires implementation of written rules governing crew rest.	**No impacts**. Current practice at federal ranges. With the proposed rule-making, much of the effort would be shifted from the federal range to the launch operator. The same activities would be performed but by different parties and would result in cost transfers from the federal ranges to the applicant and to the FAA. However, this would be required by the FAA with/without the proposed rulemaking.
ξ417.115 Tests	Requires a launch operator to implement a test program for flight and ground equipment that protect the public; this includes implementing a flight safety system test plan, a ground system test plan, and a communication systems test plan.	**No impacts**. Current practice at the federal ranges and would be required by the FAA with/without proposed rulemaking.
ξ417.117 Reviews	[a] Requires launch operator to conduct review meetings.	**No impacts**. Current practice at the federal ranges. Requirement would be implemented with/without the proposed rulemaking.

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
	[b] Requires launch operator to conduct a review prior to performing hazardous operation.	**No impacts**. Formalizes the federal review practice and is considered as current practice. Requirement would be implemented with/without the proposed rulemaking.
	[c] Requires launch operator to conduct a flight termination system design review.	**No impacts**. Current practice and would be required with/without proposed rulemaking.
	[d] Requires launch operator to conduct a flight safety analysis review.	**No impacts**. Current practice and would be required with/without proposed rulemaking.
	[e] Requires launch operator to conduct a ground safety analysis review.	**No impacts**. Current practice with AF and launch operators performing the reviews. Would be required with/ without proposed rulemaking.
	[f] Requires launch operator to conduct a launch safety review at least 15 days prior to flight.	**No impacts**. Similar to the flight readiness review which is current practice but concentrates on safety and not mission. Would be required with/without proposed rulemaking.
	[g] Requires launch operator to conduct a launch readiness review within 48 hours of first flight attempt.	**No impacts**. Current practice at the federal ranges and would be required with/without proposed rulemaking.
	[h] Requires launch operator to conduct a post-launch review within 48 hours of launch completion.	**No impacts**. Current practice at the federal ranges and would be required with/without proposed rulemaking. Sea Launch was asked by the FAA to have a post-launch review.
ξ417.119 Rehearsals	Requires launch operator to conduct rehearsals designed to exercise the launch crew and systems and includes countdown, launch abort/delay recovery, emergency response, and communications rehearsals.	**No impacts**. Current practice at the federal ranges and would be required with/without proposed rulemaking Sea Launch was asked by the FAA to conduct rehearsals designed to exercise launch crew and systems.
ξ417.121 Safety Critical Preflight Operations	Requires a launch operator to identify and perform safety critical operations which provide the public protection from adverse effects from hazards associated with launch preparation and flight. Activities of concern are- countdown, collision avoidance, meteorological data, local notification, hazard area surveillance, flight safety system preflight tests, and sounding rocket preflight operations.	N**o impacts**. Current practice at the federal ranges and would be required with/without proposed rulemaking.
ξ417.123 Computing Systems & Software	Requires that computing systems and software systems are implemented according to Appendix H.	**No impacts**. Current practice at the federal ranges and would be required with/without proposed rulemaking.
ξ417.125 Launch of an Unguided Suborbital Rocket	[a] Establishes the requirements for the launch of an unguided suborbital rocket [sounding rocket]. [b] Allows a sounding rocket to be launched without a flight safety system if it cannot reach any populated or protected areas; and, when populated or protected areas can be reached identifies safety requirements. [c] Requires that a launch be conducted in accordance with the public risk criteria I *ξ417.107*. [d] Requires that unguided suborbital rocket be stable and defines stability.	**No impacts**. Requirements [a], [b], and [d] through [h] are current practice at federal ranges [White Sands] and [c] is current practice for NASA unguided suborbital rocket launches. These requirements would be required by the FAA with/without the proposed rulemaking.

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
	[e] Requires a launch operator to ensure that a flight safety analysis is performed according to Subpart C. [f] Requires launch operator to ensure certification of personnel involved in the launch. [g] Requires a launch operator to implement a flight safety plan. [h] Requires that a launch operator perform a post-launch review and specifies the content of the review.	
ξ417.127 Unique Safety Policies & Practices	Requires the launch operator to review operations, designs, etc., and identify and implement any additional policies and practices needed to protect the public.	**No impacts**. Current practice at federal ranges and would be required with/without the proposed rulemaking.
ξ417.128 -417.200 [Reserved]	Sections reserved for future use.	N/A
Subpart C - Flight Safety Analysis		
ξ417.201 Scope	Provides requirements for performing flight safety analysis in accordance with *ξ417.107* and identifies analysis products.	Specific impacts, if there are any, are discussed in *ξ417.203* through *ξ417.235*.
ξ417.203 General	[a] Requires a launch operator to perform flight safety analysis to demonstrate capability to monitor and control risk. [b] Requires flight safety products be incorporated in a launch operator's safety plan. [c] Requires license applicant to perform flight safety analysis and submit analysis products to the FAA. [d] Requires a six-month flight safety analysis and analysis products to be submitted to the FAA. [e] Requires a flight safety analysis update no later than 30 days prior to flight. [f] Requires a flight safety analysis for ELVs whether or not a flight safety system is used. Specific requirements are indicated in *ξ417.217, ξ417.227, ξ417.233,* and *ξ417.235*. [g] Requires launch operator to make sure analyses are compatible with each other. [h] Allows launch operator to use alternate analyses of an equivalent level of safety.	**No impacts**. Current practice at the federal ranges. In addition, Sea Launch, as part of the licensing process, was asked to provide the indicated analyses and analysis products. Would be required with/ without the proposed rulemaking.
ξ417.205 Trajectory Analysis	Requires a launch operator to perform trajectory analyses to determine nominal and three-sigma dispersion trajectories and other related trajectory analyses	**No impacts**. Current practice at the federal ranges with analyses performed based upon data provided by the launch operator. There will be a shift in effort from the federal range to the launch operator. This would be the case with/without proposed rulemaking since the requirement would be imposed by the FAA with/ without the proposed rulemaking.
ξ417.207 Malfunction Turn Analysis	Requires a launch operator to perform a malfunction turn analysis and to submit reports to the FAA.	**No impacts**. Current practice at the federal ranges. There will be a shift in effort from the federal range to the launch operator. This would be the case with/without the proposed rulemaking since the requirement

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
		would be imposed by the FAA with/ without the proposed rulemaking.
ξ417.209 Debris Analysis	Requires a launch operator to perform a debris analysis that identifies inert, explosive and other hazardous launch vehicle debris resulting from a launch vehicle malfunction and from any planned jettison of launch vehicle components & to provide reports of the analysis to the FAA.	**No impacts**. Current practice at the federal ranges with launch operator working with the AF. There will be a shift in effort from the federal range to the launch operator. This would be the case with/without the proposed rulemaking.
ξ417.211 Flight Control Lines	Requires a launch operator to perform an analysis to determine the geographic placement of flight control lines that define the region over which a launch vehicle will be allowed to fly and to submit a report to the FAA.	**No impacts**. Current practice at the federal ranges and has been performed by the Air Force. There will be a shift in effort from the federal range to the launch operator. This would be the case with/without the proposed rulemaking because the requirement would be imposed with/without proposed rulemaking.
ξ417.213 Flight Safety Limits	Requires a launch operator to perform a flight safety limits analysis to establish when a malfunctioning launch vehicle's flight must be terminated and to submit a report to the FAA.	**No impacts**. Current practice at the federal ranges. Would be required with/without proposed rulemaking.
ξ417.215 Straight-Up Time	Requires a launch operator to perform a straight-up time analysis to determine the latest time-after-liftoff by which flight termination must be initiated were a launch vehicle to malfunction and fly a near-vertical trajectory rather than a normal trajectory and provide results of the analysis to the FAA.	**No impacts**. Current practice at the federal ranges. Would be required with/without proposed rulemaking.
ξ417.217 Wind Analysis	Requires a launch operator to perform a wind analysis for both launch and for jettisoned debris. Additional analysis [*ξ417.239*] must be performed for suborbital launches and results reported to the FAA.	**No impact**. This is a required analysis at federal ranges and is a coordinated activity of the launch operator and the AF. The proposed rulemaking would shift the burden to the launch operator but this would be the case with/without proposed rulemaking. Would be required with/without the proposed rulemaking.
ξ417.219 No-Longer-Terminate Gate Analysis	Requires a launch operator to perform an analysis to determine the portion of a flight control line, or other flight safety limit boundary, through which a launch vehicle's tracking icon is allowed to proceed. A gate would be permitted for planned flight over a populated or other protected areas only if the launch could be accomplished while meeting the public risk criteria as determined by risk analysis. Results of the analysis would be reported to the FAA.	**No impacts**. This is current practice at the federal ranges for launch vehicles that employ a flight termination system. The FAA has already set up procedures and requirements for launch vehicles that do not use a FTS and have accordingly licensed Sea Launch. This requirement would be imposed by the FAA with/without the proposed rulemaking.
ξ417.221 Data Loss Flight Time	Requires a launch operator to perform a data loss flight time analysis to determine the shortest elapsed thrusting time during which launch vehicle can move from a state where it does not endanger any populated or other protected area to a state where endangerment is possible, & when endangerment is no linger possible and to provide analysis products to the FAA.	**No impacts**. The requirements included in the proposed rule-making provide a functional equivalent to that which is current practice at the federal ranges. This requirement would be imposed by the FAA with/without proposed rulemaking.

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
ξ417.223 Time Delay Analysis	Requires a launch operator to perform a time delay analysis to determine the elapsed time between start of a launch vehicle malfunction and the final commanded flight termination and to provide analysis products to the FAA.	**No impacts**. This is current practice at the federal ranges and would be imposed by the FAA with/without the proposed rulemaking.
ξ417.225 Flight Hazard Areas	Requires a launch operator to perform a flight hazard area analysis to determine the land, sea, and air regions that must be publicized, monitored, controlled, or evacuated in order to protect the public from the adverse effects of hazards resulting from the launch and to provide the results of analyses to the FAA.	**No impacts**. This is current practice at federal ranges. The FAA has licensed Sea Launch to launch from a remote area of the oceans and has approved method for establishing ship hazard areas. These requirements would be imposed by the FAA with/without proposed rulemaking.
ξ417.227 Debris Risk Analysis	Requires a launch operator to perform a debris risk analysis to determine the expected average number of casualties [E_c] to the public exposed to inert and explosive debris hazards and provide results of analyses to the FAA. Must demonstrate that $E_c \leq 30x10^{-6}$.	**No impacts**. This is current practice at federal ranges. These requirements would be imposed by the FAA with/ without the proposed rulemaking.
ξ417.229 Toxic Release Risk Anal.	Requires a launch operator to perform a toxic release analysis to determine any potential public hazards from any toxic release that will occur during the proposed flight of a launch vehicle or that would occur in the event of a flight mishap. A toxic release analysis must determine the flight commit criteria that the launch operator implements for each launch to protect the public from casualties that could result from any toxic release.	**No impacts**. This is current practice at federal ranges. These requirements would be imposed by the FAA with/ without the proposed rulemaking.
ξ417.231 Distant Focus Over-pressure Blast Effects Risk Anal.	Requires that a launch operator conduct a deterministic distant focus overpressure analysis, or a statistical risk management approach to establish distant focus over-pressure hazard areas. If the public is present in the hazard area, the launch operator must determine and implement mitigation measures. Analysis products must be provided to the FAA.	**No impacts**. This is current practice at federal ranges. These requirements would be imposed by the FAA with/ without the proposed rulemaking.
ξ417.233 Conjunction on Launch Assessment	Requires that a launch operator obtain a conjunction on launch assessment performed by US Space Command and implement any identified closures in a planned launch window during which flight must not be initiated in order to maintain required separation from inhabitable orbiting objects. Requires that license applicant provide data to the FAA.	**No impacts**. Current practice when launching from federal ranges. The burden would be shifted to the launch operator. However, these requirements would be imposed by the FAA with/without the proposed rulemaking.
ξ417.235 Analysis for Launch of an Unguided Suborbital Rocket Not Using a Flight Safety System	[a] Requires a launch operator to perform a flight safety analysis to determine the launch parameters and conditions under which an unguided suborbital rocket may be flown without a flight safety system [must demonstrate that adverse effects would be contained within controlled areas]. [b] Requires a launch operator to perform a trajectory analysis to determine nominal and 3-sigma dispersed trajectories. [c] Requires a launch operator to perform a hazard area analysis to determine the land, sea, and air areas that must be monitored, controlled, or evacuated to protect	**No impacts**. This is current practice at federal ranges & the requirements would be imposed by the FAA with/ without the proposed rulemaking,

public.
[d] Requires a launch operator to perform a risk analysis to determine public risk.
[e] Requires launch operator to perform wind weighting analysis and to make necessary corrections in launch.
[f] Requires that a launch operator ensure that a conjunction on launch assessment is performed.

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
Subpart D - Flight Safety System	Contains requirements applicable to a launch operator's flight safety system, the primary purpose of which is to prevent a launch vehicle from impacting populated or other protected areas in event of a launch vehicle failure.	Specific impacts, if there are any, are discussed in *ξ417.301* through *ξ417.343*.
ξ417.301 General	[a] Requires that a launch operator ensure that its flight safety system be designed, tested and operated in accord with Subpart D. Requires that a flight safety system consist of a FTS, command control system, and support systems. The FAA will evaluate other types of flight safety systems to determine if they provide equivalent levels safety. [b] Requires that in the event of a launch vehicle failure, a flight safety system must terminate the flight and prevent any hazards from impacting populated or other protected areas. [c] Requires launch operator to implement a test program for its flight safety system that demonstrates the ability of the flight safety system. [d] Requires a licensee to verify that its flight safety system remains as described in its license application.	**No impacts**. The requirements are based upon AF safety documents that describe current practice at the ranges [i.e., requirements imposed by the federal range upon launch operators launching from federal ranges]. These documents, together with lessons learned from the AF, are codified in the proposed rulemaking. The requirements would be imposed by the FAA with/without the proposed rulemaking.
ξ417.303 Flight Termination System Functional Requirements	Requires that a launch operator develop and implement a flight termination system which, once initiated, would render each stage and any other propulsion system, including one which is part of a payload, with the capability of reaching a populated or other protected area, non-propulsive with zero lift and zero yaw. Also requires that a FTS include a command destruct system that is initiated by radio command. The FAA will evaluate the use of any other type of system in place of a command destruct system, such as an autonomous FTS on a case-by-case basis for an equal level of safety.	**No impacts**. The FAA requirements codify requirements that are current practice at the federal ranges and would be required with/without the proposed rulemaking as demonstrated with the licensing of Sea Launch.
ξ417.305 Flight Termination System Reliability	Provides design requirements that a FTS must meet; requires that FTS have a reliability design of 0999; that a system analysis be performed to demonstrate the reliability design; that specific component and system testing be performed; that redundant components be structurally, electrically, and mechanically separated & mounted in different orientations on different axes; and that specified storage and operating lives be achieved.	**No impacts**. Current practice at the federal ranges and would be required with/without the proposed rulemaking.
ξ417.307 Flight Termination System Environment Survivability	Establishes requirements for ensuring that a FTS would survive when subjected to flight & other environments. The requirements are those established at federal ranges. The FAA also requires that the federal ranges' safety margins be added to maximum predicted environments obtained through analysis for launch vehicles, where there are not yet at least 3 samples of flight data.	N**o impacts**. Current practice at the federal ranges and would be required with/without the proposed rulemaking.
ξ417.309 Command Destruct Sys.	Requires that a FTS include at least one command destruct system that is initiated by radio command and meets the redundancy and other component reqmts; adopts the federal launch ranges' requirement for a command destruct system's radio frequency sensitivity; requires that the command destruct system survive the breakup of the launch vehicle to the point that all flight termination functions would be accomplished; requires that for any liquid propellant, a command destruct	**No impacts**. Current practice at the federal ranges and would be required with/without the proposed rulemaking. It should be noted that the FAA has not required Sea Launch to have an FTS since Sea Launch demonstrated to FAA's satisfaction that an alternative could provide the requisite level of safety.

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
	system nondestructively shutdown any thrusting liquid engine as prerequisite for destroying the launch vehicle.	
ξ417.311 Inadvertent Separation Destruct System	Provides performance reqmts applicable to inadvertent separation destruct system: defines how it is to function and ensure its reliability.	**No impacts**. Current practice at the federal ranges and would be required with/without proposed rule making.
ξ417.313 Flight Termination System Safing and Arming	Provides performance requirements governing the safing and arming of a flight termination system. [a] Requires that design must provide for safing of all FTS ordnance through the use of devices that provide a removable and replaceable mechanical barrier for interrupting power to each ordnance firing circuit. [b] Requires, for a launch vehicle flown from land, for each FTS ordnance initiation device to be armed prior to arming any launch vehicle or payload propulsion ignition circuits. [c] Requires, for a launch vehicle flown from the air or sea, design to provide an ignition interlock that prevents the arming of any launch vehicle or payload propulsion ignition circuits unless all FTS ordnance initiation devices and arming devices are armed. [d] Requires FTS provide for remote redundant safing of all FTS ordnance initiation devices before launch and in case of launch abort or recycle operations. [e] Requires that hardware or software used to automatically safe FTS ordnance must be single fault tolerant against inadvertent safing. [f] Requires design of FTS provide for remote monitoring of the safe and arm status of each FTS ordnance initiation and arming device.	**No impacts**. The requirements of *ξ417.313(a)* through *ξ417.313(f)* are all current practice at federal ranges and would be required by the FAA with/without the proposed rulemaking.
ξ417.315 Flight Termination System Testing	Provides general requirements applicable to all testing of a FTS or its components and would require all FTS components to be subjected to a comprehensive test program.	**No Impacts.** The required test program is patterned after the approach developed at the federal ranges, is current practice and would be implemented with/without the proposed rulemaking.
ξ417.317 Flight Termination System Preflight Testing	Provides a broad range of requirements for preflight component tests to be conducted following qualification and acceptance testing to detect changes in performance that may result from shipping, storage, or other environments, and identify what system tests a launch operator must conduct immediately prior to flight.	**No impacts**. The requirements were developed based on requirements traditionally used and considered to be current practice by the Air Force at federal ranges. The FAA requirements would be imposed with/without the proposed rulemaking.
ξ417.319 Flight Termination System Installation Procedures	Establishes FTS installation procedures to both ensure correct installation of FTS components so they work as intended and ensure that personnel performing tasks are qualified for the task.	**No impacts**. Procedures follow those developed at federal ranges and would be implemented by the FAA with/without the proposed rulemaking.
ξ417.321 Flight Termination System Monitoring	Requires monitor consoles include all communications & monitoring capability necessary to ensure the status of a FTS can e ascertained and relayed to the appropriate launch officials. Also requires launch operator establish pass/fail criteria for monitored FTS data to support launch abort decisions and ensure a FTS is performing as expected. Abort criteria would be submitted for FAA approval.	**No impacts**. Requirements are based upon those developed and utilized at federal ranges and would be implemented by the FAA with/without the proposed rulemaking.

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
ξ417.323 Command Control System Requirements	[a] Presents a general description of requirements.	[a] **No impacts**. Presents a general description of requirements.
	[b] Requires that the command control system be compatible with the FTS onboard the launch vehicle.	[b] **No impacts**. Current practice at federal ranges and would be required with/without the proposed rulemaking.
	[c] Requires command control system to have a reliability design of 0.999 and requires its demonstration through analysis.	[c] **No impacts**. Current practice at federal ranges and would be required with/without the proposed rulemaking.
	[d] Requires a configuration management and control plan to govern the command control system.	[d] **No impacts**. Current practice at federal ranges with the range taking care of this function. The proposed rule-making will shift this function to launch operator, but since this would be the case with/without the proposed rule-making there are no impacts.
	[e] Requires command control system to satisfy specific performance requirements including that a transmitter must operate at a radio carrier frequency authorized for use by the launch operator.	[e] **No impacts**. Current practice at federal ranges and would be required by the FAA with/without the proposed rulemaking.
ξ417.325 Command Control System Testing	Establishes test requirements for a command control system.	**No Impacts**. The FAA relies upon federal launch range qualification testing requirements. These are considered as current practice and would be used with/without the proposed regulation.
ξ417.327 Support Systems	[a] Requires a flight safety system to include support sys: vehicle tracking, visual data source, telemetry comm., data display and data recording systems & requires these support systems be compatible.	[a] **No impacts**. Current practice at federal ranges and would be required by FAA with/without the proposed rulemaking.
	[b] Requires vehicle tracking system provide continuous position & status data from lift-off until launch vehicle reaches orbit or can no longer reach any populated or other protected area.	[b] **Cost Savings**. Historically, the federal ranges have required three sources of tracking data. FAA proposes to reduce this to two while still providing sufficient safety.
	[c] Requires visual tracking if line of sight or other restrictions limit the primary tracking source.	[c] through [j] **No impacts**. Current practice at federal ranges and would be required by the FAA with/without the proposed rule-making.
	[d] Requires a telemetry system that provides continuous flight safety data during preflight operations, lift-off, & during flight until the launch vehicle reaches orbit or can no longer reach any populated or protected area.	
	[e] Requires a communications system that connects all flight safety functions with all launch control centers and down range stations.	
	[f] Requires a flight safety data processing, display and recording system that displays and records data for the flight safety official to monitor a launch.	
	[g] Requires a flight safety console containing displays and controls to monitor and evaluate launch vehicle performance and for flight safety official to communicate with other flight safety and launch personnel.	
	[h] Requires a launch operator to calibrate its support systems to ensure that measurement and monitoring devices provide accurate indications.	

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
	[i] Requires launch operator to use a destruct initiator simulator to simulate initiation of a destruct action during the FTS preflight tests. [j] Requires a launch operator's flight safety system to include a timing system synchronized with the US Naval Observatory in Washington, DC.	
ξ417.329 Flight Safety System Anal.	Requires launch operator to perform prescribed systems analyses to verify that the launch operator's FTS and command control systems and components meet the reliability requirements.	**No impacts**. The analyses are to be performed using standard industry system safety and reliability analysis methodologies. Guidelines for these analyses are contained in FAA Advisory Circular AC 413A, April 21, 1999. Considered as current practice and would be required with/without proposed rulemaking.
ξ417.331 Flight Safety Crew Roles and Qualifications	Requires a flight safety system to be operated by a flight safety crew made up of a flight safety official & support personnel possessing qualifications and performing the roles, of functions, defined in this section for each flight safety crew position. An individual flight safety crew member may perform the roles of more than one position provided all required roles and associated tasks are accomplished.	**No impacts**. The identified flight safety crew positions and roles that are required by the FAA are based on the approach traditionally used at the federal ranges. Considered as current practice and would be required with or without proposed rulemaking.
Subpart E - Ground Safety	Contains the FAA's proposed safety requirements for launch processing typically referred to as ground safety.	Impacts, if any, are discussed in *ξ417.401* through *ξ417.417*.
ξ417.401 Scope	Contains public safety requirements that would apply to the preflight preparation of a launch vehicle and related post-launch activities at a US launch site.	Impacts, if any, are discussed in *ξ417.401* through *ξ417.417*.
ξ417.403 General	Requires launch operator ensure that the hazard controls necessary to protect the public are in place, that launch operator perform a ground safety analysis, implement a ground safety plan and conduct launch processing according to any local agreements. Also requires launch operator to keep its ground safety plan current and provide FAA any changes no later than 30 days before that change is implemented.	**No impacts**. The FAA's requirements are based upon current practice at the federal ranges. The FAA's concern is with public safety & would establish the requirements based upon current practice with/without the proposed rulemaking.
ξ417.405 Ground Safety Analysis	Requires a launch operator to perform a ground safety analysis to demonstrate whether its launch vehicle hardware and launch processing present public hazards and that this is performed by a technically competent person. Also requires the identification of all hazards of each launch vehicle system and launch processing operation. Requires that any system that presents a public hazard be single fault tolerant, that the launch operator implement hazard areas and safety clear zones for public hazards and launch location hazards to ensure that any public is kept at a safe distance, that a ground safety analysis identify all hazard causes and controls to be implemented and verifiable and to document its ground analysis in a ground safety analysis report.	**No impacts**. The FAA's requirements are based upon current practice at the federal ranges. The FAA would establish the requirements based upon current practice with/without the proposed rulemaking.

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
ξ417.407 Hazard Control Implementation	Requires a launch operator to implement hazard controls and inspections to ensure that hazard controls are in place and no unsafe conditions exist and that procedures and developed and implemented for the receipt, storage, use, and disposal of hazardous materials including toxic substances and any sources of ionizing radiation.	**No impacts**. The FAA's requirements are based upon current practice at the federal ranges. The FAA would establish the requirements based upon current practice with/without the proposed rulemaking.
ξ417.409 System Hazard Controls	[a] Requires a launch operator to implement the hazard controls identified through ground safety analysis. [b] Requires that any safety factor applied in the design of a structure or material handling equipment take into account static and dynamic loads, environmental stresses and expected wear. [c] Requires a launch operator to test and inspect a flight or ground pressure vessel to ensure that no critical flaws exist. [d] Requires electrical and mechanical systems to be single fault tolerant. [e] Requires propulsion systems to be dual fault tolerant to prevent inadvertent propulsion. [f] Requires an ordnance system to be at least single fault tolerant to prevent inadvertent actuation.	**No impacts**. The FAA's requirements are based upon current practice at the federal ranges. The FAA would establish the requirements based upon current practice with/without the proposed rulemaking.
ξ417.411 Safety Clear Zones for Hazardous Operations	Requires establishment of safety clear zone for hazardous operations and requires launch operator to provide positive control over a safety clear zone to ensure no public access during hazardous operations.	**No impacts**. The FAA's requirements are based upon current practice at the federal ranges. The FAA would establish the requirements based upon current practice with/without the proposed rulemaking.
ξ417.413 Hazard Areas	[a] Requires launch operator define a hazard area within which any adverse effects will be confined should an actuation or other undesirable hazardous event occur. [b] Requires a launch operator to implement a process for authorizing public access on an individual basis. [c] Requires launch operator to implement procedural controls that preclude any hazardous operation from taking place while members of the public have access to the launch location.	**No impacts**. The FAA's requirements are based upon current practice at the federal ranges. The FAA would establish the requirements based upon current practice with/without the proposed rulemaking.
ξ417.415 Post-Launch & Post-Launch Attempt Hazard Controls	[a] Requires a launch operator to implement procedures for controlling hazards and returning the launch facility to a safe condition after a successful launch attempt. [b] Requires a launch operator to implement procedures for controlling hazards associated with failed launch attempts where a solid or liquid launch vehicle engine start command was sent, but the launch vehicle did not liftoff. [c] Requires a launch operator to implement procedural controls for hazards associated with an unsuccessful launch attempt where the launch vehicle has a land or water impact.	**No impacts**. The FAA's requirements are based upon current practice at the federal ranges. The FAA would establish the requirements based upon current practice with/without the proposed rulemaking.
ξ417.417 Propellants and Explosives	Requires a launch operator to comply with the explosive safety criteria in 14 CFR Part 420 and to implement procedures for the receipt, storage, handling and disposal of explosives, and procedural system controls to preclude inadvertent initiation of explosives and propellants.	**No impacts**. This is a codification which mirrors the current practice by the federal ranges. This would be required by the FAA with/without the proposed rulemaking.

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
§417.418 - 417.500 [Reserved]	Sections reserved for future use.	N/A
Part 417 Appendix A, Methodology for Determining Flight Hazard Areas for Orbital Launch	Provides methodologies and equations to be used in in determining flight hazard areas as part of the flight hazard area analyses required in *§417.225*. Alternative methodologies could be used if approved by the FAA during the launch licensing process.	**No impacts**. This is a codification which mirrors the current practice by the federal ranges. The methodologies would be required with/without the proposed rulemaking.
Part 417 Appendix B, Methodology for Determining Expected Casualty	Describes the methodology that would be required for calculating expected casualty [E_c] as part of a debris risk analysis as required in *§417.227*.	**No impacts**. This is a codification which mirrors the current practice by the federal ranges and the FAA. This requirement was imposed on Sea Launch as part of the licensing process. The methodology would be required with/without the proposed rulemaking.
Part 417 Appendix C, Flight Safety Analysis for an Unguided Suborb. Rocket not Using a Flight Safety System	Describes methodologies for performing the flight safety Analysis for the launch of an unguided suborbital sounding rocket.	**No impacts**. This is a codification which mirrors the current practice by the federal ranges [Wallops & White Sands]. The methodology would be required with/without the proposed rulemaking.
Part 417 Appendix D, Flight Termination System Components	Presents requirements that apply to specific components of a flight termination system.	**No impacts**. The requirements were developed based on requirements traditionally used at federal ranges; however these were not adopted in total. The FAA worked with AF to refine the requirements to a performance level that eliminates the use of design solutions as requirements. The approach would be utilized with/ without the proposed rulemaking. The use of performance requirements may lead to cost savings but this would result with/without the current rulemaking.
Part 417 Appendix E, Flight Termination System Component Testing and Analysis	Establishes testing requirements applicable to specific flight termination system components.	**No impacts**. The requirements were developed based on requirements traditionally used at federal ranges; however these were simplified. The FAA worked with the AF to refine the requirements to a performance level that eliminates the use of design solutions as requirements. The approach would be utilized with/ without proposed rulemaking and was already employed in the Sea Launch licensing process.
Part 417 Appendix F, Flight Termination System Piece Part Reqmts.	Establishes requirements for ensuring the quality of electronic piece parts used in flight termination system electronic components.	**No impacts**. The requirements were developed based on current AF range practice. The approach would be utilized with/ without the proposed rulemaking.

Table 1 Overview of Potential Impacts: NPRM for Licensing and Safety Requirements for Launch from Non-Federal Launch Sites [Continued]

Part/Section	Summary	Potential Impacts
Part 417 Appendix G, Natural and Triggered Lightning Flight Commit Criteria	Establishes flight commit criteria that protect against natural and triggered lightning during the flight of a launch vehicle.	**No impacts**. The criteria were developed by a Lightning Advisory Panel chartered by NASA & the AF. NASA and the AF have adopted these criteria. These are considered as current practice and would be utilized with/ without the proposed rulemaking.
Part 417 Appendix H, Safety Critical Computing Systems & Software	Establishes safety requirements for all flight and ground systems for computing systems that perform software critical functions.	**No impacts**. Codification of current practice at the Air Force launch ranges. These are considered as current practice and would be utilized with/without proposed rulemaking.