DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 420

[Docket No. FAA–2011–0105; Notice No. 11–03]

RIN 2120–AJ73

Explosive Siting Requirements

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: The FAA proposes to abandon its separation requirements at launch sites for storing liquid oxygen, nitrogen tetroxide, hydrogen peroxide in concentrations equal to or below 91 percent, and refined petroleum-1 (RP–1) unless they are within an intraline distance of another incompatible energetic liquid, or will be co-located on a launch vehicle. The FAA's current separation requirements for storing these energetic liquids unnecessarily duplicate the requirements of other regulatory regimes. The FAA also proposes to reduce the separation distances required for division 1.1 explosives and liquid propellants with trinitrotoluene (TNT) equivalents of less than or equal to 450 pounds. The revised separation requirements reflect protection against fragment hazards, the main hazard at these quantities. The FAA would impose a new formula for determining distances to public areas containing a member of the public in the open. Finally, the FAA would reduce the separation distances for division 1.3 explosives as well. The proposed rule would increase flexibility for launch site operators in site planning for the storage and handling of explosives.

DATES: Send your comments on or before May 17, 2011.

ADDRESSES: You may send comments identified by Docket Number FAA–2011–0105 using any of the following methods:

- *Federal eRulemaking Portal:* Go to *http://www.regulations.gov* and follow the online instructions for sending your comments electronically.
- *Mail:* Send comments to Docket Operations, M–30; U.S. Department of Transportation, 1200 New Jersey Avenue, SE., Room W12–140, West Building Ground Floor, Washington, DC 20590–0001.
- *Hand Delivery or Courier:* Take comments to Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- *Fax:* Fax comments to Docket Operations at 202–493–2251.

For more information on the rulemaking process, *see* the **SUPPLEMENTARY INFORMATION** section of this document.

Privacy: We will post all comments we receive, without change, to *http://www.regulations.gov*, including any personal information you provide. Using the search function of the docket Web site, anyone can find and read the electronic form of all comments received into any of our dockets, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the **Federal Register** published on April 11, 2000 (65 FR 19477–78), or you may visit *http://DocketsInfo.dot.gov*.

Docket: To read background documents or comments received, go to *http://www.regulations.gov* at any time and follow the online instructions for accessing the docket or Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: For technical questions concerning this proposed rule contact Charles Huet, Commercial Space Transportation, Federal Aviation Administration, 800 Independence Avenue, SW., Washington, DC 20591; telephone (202) 267–7427; facsimile (202) 267–3686, e-mail *charles.huet@faa.gov.* For legal questions concerning this proposed rule contact Laura Montgomery, AGC 200, Senior Attorney for Commercial Space Transportation, Office of the Chief Counsel, Federal Aviation Administration, 800 Independence Avenue, SW., Washington, DC 20591; telephone (202) 267–3150; facsimile (202) 267–7971, e-mail *laura.montgomery@faa.gov.*

SUPPLEMENTARY INFORMATION: Later in this preamble under the Additional Information section, we discuss how you can comment on this proposal and how we will handle your comments. Included in this discussion is related information about the docket, privacy, and the handling of proprietary or confidential business information. We also discuss how you can get a copy of related rulemaking documents.

Authority for This Rulemaking

The Commercial Space Launch Act of 1984, as codified and amended in Title 49 of the United States Code (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 FAA, through delegations, 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. 49 U.S.C. 70104, 70105. 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.

Authority for this particular rulemaking is derived from 49 U.S.C. 70105, which requires that the FAA issue a license to operate a launch site consistent with public health and safety. *See* also 49 U.S.C. 322(a), 49 U.S.C. 70101(a)(7). Section 70101(a)(7) directs the FAA to regulate only to the extent necessary, in relevant part, to protect the public health and safety and safety of property.

Background

In 2000, the FAA issued regulations governing the storing and handling of explosives as part of its regulations governing the licensing and operation of a launch site. *Licensing and Safety Requirements for Operation of a Launch Site; Final Rule,* 65 FR 62812 (Oct. 19, 2000) (Launch Site Rule). The FAA has requirements for obtaining a license to operate a launch site in Title 14, Code of Federal Regulations (14 CFR) part 420. Part of the application for a license requires an applicant to provide the FAA with an explosive site plan that complies with the explosive siting requirements of part 420. The plan must show how a launch site operator will separate explosive hazard facilities from the public. The plan must identify the location of the explosives and how the public is safeguarded. The explosive siting requirements of part 420 mandate how far apart a launch site operator should site its explosive hazard facilities based on the quantities of energetic materials housed in each facility. Distances vary based on the quantities at issue, the storing or handling of the energetic materials at a given facility, and whether or not the distance being calculated is a distance to a public area.

Since the original rulemaking, the FAA's experience with the requirements has led it to propose changes. At the time it promulgated the original requirements, the FAA anticipated that any new launch sites would be devoted to expendable launch vehicles, and, therefore, relied on the siting requirements of the Department of Defense (DOD) Explosive Siting Board's (DDESB) *DOD Ammunition and Explosive Safety Standard,* 6055.9–STD (1997) (1997 DOD Standard).[1] Instead, for the most part, the FAA has issued a number of licenses for the operation of launch sites at existing airports, such as Mojave Air and Space Port. At these airports, the presence of jet fuels regulated under existing requirements creates conditions requiring the FAA to reconcile its launch vehicle liquid propellant requirements with the presence of other industrial chemicals, such as aircraft fuels. Based on experience with these launch sites and on research on other regimes that address explosive materials, the FAA proposes to make changes to its own requirements.

Changes to definitions would be changes of general effect. Additionally, the FAA proposes to increase the flexibility it has in applying its explosive siting requirements by recognizing that approaches other than those mandated by part 420 may provide a level of safety equivalent to part 420. The FAA also proposes to dispense with separation distance requirements for storing liquid oxidizers and Class I, II and III flammable and combustible liquids. When oxidizers are isolated from incompatible energetic liquids and compliant with the design and operational requirements of other regulatory regimes, they do not pose a risk of fire or explosion. Isolating the storing of liquid oxidizers from a fuel source minimizes the risk associated with chemical explosion due to the mixing of the two. In accordance with current DDESB and National Fire Protection Association (NFPA) practice, the FAA proposes to dispense with the hazard groups of tables E–3 through E–6 of appendix E of part 420 as a means of classification because the NFPA classification system is more commonly used. A number of those changes are editorial, but the FAA also proposes to identify the minimum separation distances to public areas and public traffic routes for quantities between less than half a pound and 450 pounds of division 1.1 explosives and liquid propellants with TNT equivalency. The FAA would impose a new formula for determining distances to public areas containing a member of the public in the open. The FAA also proposes to change its separation requirements for division 1.3 explosives.

I. Changes of General Effect

The FAA proposes to clarify an existing definition and to add four new ones. We would clarify the meaning of "explosive hazard facility." We would define "energetic liquid," "liquid propellant," "maximum credible event," and "public traffic route."

The FAA proposes to define "energetic liquids" to mean a liquid, slurry, or gel, consisting of, or containing an explosive, oxidizer, fuel, or combination, that may undergo, contribute to, or cause rapid exothermic decomposition, deflagration, or detonation. "Energetic liquids" would thus include liquid fuels and oxidizers, monopropellant, hybrid, and liquid bipropellant systems.

The FAA would define "liquid propellants" to mean a monopropellant or incompatible energetic liquids co-located for purposes of serving as propellants on a launch vehicle or a related device,[2] such as an attitude control propulsion system. A monopropellant serves as a liquid propellant only if located on a launch vehicle. When not located on a launch vehicle a monopropellant is treated as a fuel or an oxidizer. Part 420 does not define "liquid propellant," but refers to liquid fuel and oxidizers as liquid propellants whether stored in a storage tank and segregated from each other, or co-located as part of a launch vehicle assembly. In applying this term, the FAA has had to address uncertainty and confusion regarding its meaning. When part 420 was issued, most launch operations took place at federal launch ranges. There are now launch sites located at airports that house many of the same energetic liquids. The term "liquid propellant" as it applies to storing liquid fuel and oxidizer, such as kerosene and liquid oxygen, causes confusion. Kerosene has found a use in some new developmental launch vehicles as a liquid fuel, but is traditionally known for its use as a jet fuel. Liquid oxygen is commonly used as the oxidizer for launch vehicles, but is also widely used in the medical field and other industrial purposes. The labeling of these materials as liquid propellants, is, therefore, no longer suitable because of their multiple uses. To remove the confusion, the FAA would classify what it has been generically referring to as liquid propellants as energetic liquids, and would limit the use of the term "liquid propellant" to its more precise usage, namely, incompatible energetic liquids co-located for purposes of propulsion or operating power in rockets and related devices. With this definition, liquid fuels and oxidizers that are not yet part of a vehicle assembly or a propulsion unit would not be referred to as a liquid propellant, thus removing the ambiguity caused by the current characterization of too many energetic liquids as liquid propellants.

Limiting the use of the term would be more consistent with typical uses of the term "liquid propellants." Explosive siting experts typically consider the term to mean incompatible energetic liquids that are co-located for purposes of serving as propellants on a launch vehicle. In other words, the same energetic liquid is a propellant if on a rocket, but not if in a storage tank. This special meaning is not obvious, but is understood by those persons who work on these issues. The FAA proposes to confine use of the term to § 420.69, which governs launch pads where solid explosives and energetic liquids are all within intraline distances of each other because they are used as fuels for a launch vehicle.

The FAA proposes to clarify that an "explosive hazard facility" means not only a facility, as identified in the present definition, but a location at a launch site where solid explosives, energetic liquids, or other explosives are stored or handled. Part 420 currently defines an "explosive hazard facility" as a facility at a launch site where solid propellant, liquid propellant, or other explosives are stored or handled. There are circumstances where it is not always clear what satisfies this definition. For example, under this definition, explosive hazard facility could be misinterpreted to only apply to buildings or storage sites. Clarifying that an explosive hazard facility is not only a facility, but is also any other location, would more clearly include hazardous

[1] The DDESB updated the DOD Standard in 2004. *Notice of Revision of Department of Defense 6055.9–STD Department of Defense Ammunition and Explosives Safety Standards,* 70 FR 24771 (May 11, 2005) (2004 DOD Standard). DOD released a new edition in 2008, but the 2004 changes are the ones relevant to this rulemaking. The new standard bases its separation distances on Occupational Safety and Health Administration (OSHA) and National Fire Protection Association (NFPA) standards for classes I through III flammable and combustible liquids and liquid oxygen, and on NFPA standards for classes 2 and 3 liquid oxidizers. The 2004 DOD Standard contains less restrictive requirements for explosive division 1.1 solid explosives with a net explosive weight of less than 450 pounds, and for energetic liquids with a TNT equivalency of less than 450 pounds.

[2] A related device would include an engine undergoing engine testing or static firing.

areas such as launch pads and static firing areas with explosives or propellant present.

The FAA proposes to define "maximum credible event" to mean a hypothesized worst-case event, including an accident, explosion, fire, or agent release that is likely to occur from a given quantity and disposition of explosives, chemical agents, or reactive material. A "maximum credible event" is one with a reasonable probability of occurring, taking into account the propagation of the predicted explosion, burn rate, and physical protection such as barriers located around the explosive materials.

Although the FAA cites "public traffic route distance" in § 420.65, there is no definition for the term in the current rule. "Public traffic route" means any road or other mode of transportation on a launch site that serves the general public, and the FAA now proposes to codify that working definition. A "public traffic route" is a public area, but one that may permit shorter separation distances than other public areas due to the ability of a launch site operator to close off the public traffic route and the sporadic presence of members of the public.

II. Section 420.63 Map Scale and Equivalent Level of Safety

Section 420.63 contains general requirements applicable to the preparation of an explosive siting plan, the explosive siting requirements for a launch site located on a federal range, and provision for establishing an equivalent level of safety for explosive siting issues not otherwise addressed by part 420. The FAA proposes only editorial changes to its explosive siting requirements at § 420.63, with two exceptions. The first is that the FAA proposes an explosive site map using a scale sufficient to show distance and structural relationships. The other substantive change would be proposed paragraph (d), which would allow a launch site operator to propose a different separation distance if able to clearly and convincingly demonstrate level of safety equivalent to that required by part 420.

The FAA proposes to require an explosive site map using a scale sufficient to show whether distances and structural relationships satisfy the requirements of this part. The FAA has had difficulty reviewing explosive site maps provided by some launch operators because they employed scales where 1 inch equaled 1500 feet or more. As a result, the maps lacked the fidelity necessary to determine compliance with part 420. The FAA intends by this proposal to ensure the scale is appropriate to the site while still being able to determine compliance.

Proposed § 420.63(d) would permit a launch site operator to separate each explosive hazard facility by distances other than those required by part 420 if the launch site operator could clearly and convincingly demonstrate a level of safety equivalent to that required by this part. Section 420.63(c) currently provides that for explosive siting issues not otherwise addressed by the regulations, a launch site operator must clearly and convincingly demonstrate a level of safety equivalent to that otherwise required by part 420. This has meant that there has been confusion over whether the FAA would permit a demonstration of an equivalent level of safety for explosive materials that part 420 already addresses. Proposed paragraph (d) is necessary to clarify that the FAA intended to permit alternative means of demonstrating an equivalent level of safety to what part 420 addressed as well as to what part 420 did not address. In the discussion accompanying the rulemaking promulgating part 420, the FAA noted that it would allow alternatives to the quantity-distance (Q–D) requirements in the form of, for example, hardening of structures or barricades, if the launch site operator demonstrated that such an approach clearly and convincingly provided an equivalent level of safety. *See Launch Site Rule,* 65 FR at 62821; *Licensing and Safety Requirements for Operation of a Launch Site;* Proposed Rule, (Launch Site NPRM), 64 FR 34316, 34322 (Jun. 25, 1999). However, as finally codified, § 420.63(c) states only that it applies to explosive siting issues not otherwise addressed by the requirements of part 420. Thus, allowing a launch site operator, under proposed paragraph (d), to demonstrate an equivalent level of safety for any explosive siting requirement of part 420 would resolve the apparent discrepancies between the explanatory preamble and § 420.63(c).

III. Proposed § 420.66 and Storage of Energetic Liquids That Are Otherwise Regulated and Are Isolated From Each Other

A. Energetic Liquids That Would Not Be Subject to FAA Regulation for Storage

Section 420.67 addresses both storing and handling of energetic liquids. This is confusing and the FAA proposes to separate storing and handling into two separate sections, relying on proposed § 420.66 for storing and § 420.67 for the handling of energetic liquids. The FAA proposes to reduce its requirements for appropriate separation distances to address only the highly hazardous energetic liquids. The FAA would dispense with separation distance requirements for the storing of liquid oxidizers and RP–1 when they are sufficiently isolated from each other that a mishap associated with one material would not affect the other. This means the FAA would no longer impose separation requirements for RP–1 or for the oxidizers, liquid oxygen, nitrogen tetroxide, and hydrogen peroxide in concentrations below 91 percent. These energetic liquids are all currently governed by § 420.67(b) and tables E–3 through E–6 of Appendix E of this part.

The FAA bases this proposal on two factors: first, when isolated from incompatible materials, energetic liquids such as liquid oxygen and RP–1 do not pose a threat of chemical explosion due to accidental mixing, and, second, other federal and local requirements address fire prevention for most industrial chemicals. There are situations where these energetic liquids may contribute to the risks associated with explosions, and the FAA will continue to regulate them in that context under § 420.63(c).

For example, part 420 treats liquid oxygen as an explosive hazard because, when combined with incompatible materials, chemical explosion may occur. However, when stored as required by intraline distance requirements with appropriate mitigation measures to prevent contact with incompatible materials, such an effect should not result. The FAA proposes to reclassify liquid oxygen because current separation requirements always treat liquid oxygen as an explosive hazard, even when stored in the appropriate intraline distance away from the incompatible materials.

When the FAA promulgated part 420, it focused almost entirely on safety measures for expendable launch vehicles, including the safety issues surrounding storing and handling of energetic liquids, such as liquid propellants. The FAA modeled its separation requirements for table E–3's Hazard Groups I through III liquid propellants on the requirements employed at the federal launch ranges, where the majority of FAA licensed launches took place. Accordingly, the FAA followed the 1997 DOD Standard. Consequently, the FAA did not take into account the pervasive use by federal, state and local jurisdictions of requirements that address the storage of these classes of materials. Nor did the commercial space regulations account for the airport requirements governing fuels. *See e.g.,* 14 CFR 139.321

(requiring each certificate holder to establish standards for protecting against fire and explosion in storing, dispensing and otherwise handling fuel on an airport); *Aircraft Fuel Storage, Handling, and Dispensing on Airports, Advisory Circular* (AC) No. 150/5230–4A (Jun. 18, 2004) (2004 AC for Aircraft Fuel). This 2004 AC for Aircraft Fuel accepts NFPA 407, Standard for Aircraft Fuel Servicing, as it pertains to fire safety in the safe storage, handling, and dispensing, of fuels used in aircraft on airports certificated under 14 CFR part 139. The federal Occupational Safety and Health Administration (OSHA) regulates the storing and handling of energetic liquids to provide for worker safety. OSHA provides procedural and design requirements for the materials at issue. *See* 29 CFR 1910.101, 1910.104, 1910.106 and 1910.119. OSHA regulates RP–1 under 29 CFR 1910.106 with separation distance, procedural, and design requirements, as well as with OSHA process safety management requirements for more than 10,000 pounds of RP–1 under 29 CFR 1910.119(a)(1)(ii). OSHA also regulates any quantity of liquid oxygen that is stored in "cylinders, portable tanks, rail tankcars or motor vehicle cargo tanks" by incorporating *Compressed Gas Association (CGA) Pamphlet P–1* (1965) by reference in 29 CFR 1910.101(b). OSHA regulations for liquid oxygen address design, operational, and separation distance requirements. *See* 29 CFR 1910.104. For stationary tanks, OSHA regulates storage of liquid oxygen in quantities in excess of 13,000 cubic feet for a connected system or more than 25,000 cubic feet for an unconnected system at a normal temperature and pressure. 29 CFR 1910.104(b)(1). OSHA process safety management requirements apply to storage of more than 7500 pounds of hydrogen peroxide that is more than 52 percent concentration by weight or more than 250 pounds of nitrogen tetroxide. 29 CFR 1910.119 App A. The process safety management requirements include design and operational procedure requirements, but do not impose explicit separation requirements. The employer must guarantee the mechanical integrity of the system, including the pressure vessels and storage tanks, piping systems, emergency shutdown systems, controls, and pumps. 29 CFR 1910.119(j). In the initial construction, the employer must ensure these systems are adequate for their functions and must maintain the components. 29 CFR 1910.119(j)(6). To some extent, the OSHA requirements protect the public as an ancillary benefit. *See* 29 CFR 1910.5(d) (clarifying that although a standard may on its face protect persons who are not employees, the standard only applies in the employment context).

Additionally, state and local codes use standards devised by organizations, such as the CGA, the International Code Council, the International Fire Code Institute, and NFPA. Several states where launch sites are located implement some form of the requirements recommended by these organizations. The exceptions are California, Florida and Texas.

B. Historical Background

The issue of overlapping requirements was first brought to light by the FAA's experience in regulating the East Kern Airport District (EKAD), the launch site operator of Mojave Air and Space Port. Before Mojave acquired launch customers, it operated as an airport. Consequently, it followed the FAA airport and local fire codes, including the requirements of NFPA. With the advent of reusable launch vehicles, EKAD confronted a host of siting issues, including the storing and handling of liquid oxygen, kerosene, and isopropyl alcohol.

In 2004, the FAA waived EKAD's compliance with § 420.67, which governs the storage and handling of liquid propellants, including liquid oxygen and kerosene, and permitted EKAD to comply with DOD 6055.9–STD instead. *Commercial Space Transportation; Waiver of Liquid Propellant Storage and Handling Requirements for Operation of a Launch Site at the Mojave Airport in California,* 69 FR 41327 (Jul. 8, 2004) (Waiver to Section 420.67 or Waiver Notice). As conditions for granting a waiver, the FAA required EKAD to follow positive measures used by OSHA and the NFPA for spill containment and control for isolated storage of energetic liquids. *Id.* at 41328, par. F. The FAA also required using OSHA or NFPA guidance referenced in the DDESB requirements for storing and handling conventional flammable energetic liquids and liquid oxidizers, where no significant blast and fragment hazards were expected. *Id.* Minimum blast and fragment distances apply, according to DOD 6055.9–STD, C9.5.6.1, to NFPA and OSHA Class I–III flammable and combustible liquids and to conventional oxidizers such as liquid oxygen.

In December 2007, in response to EKAD's request, the FAA again waived explosive siting storage requirements for EKAD by issuing new license terms and conditions. This time, the FAA stated that, for the storage of liquid oxygen, kerosene and isopropyl alcohol, EKAD had to comply with NFPA Standard No. 55 (2005 ed.) and No. 33 (2008 ed.) for separation distances and spill containment. EKAD License Order No. LSO 04–009A (Rev. 1) (Dec. 20, 2007).

Recently, the FAA waived storage requirements of part 420 for liquid oxygen and RP–1 for the Jacksonville Aviation Authority (JAA) for its operation of portions of Cecil Field as a launch site. JAA, License Order No. LSO 09–012 (Jan. 11, 2010). In its evaluation of the request for a waiver, the FAA noted that DDESB adopted NFPA standards for storing conventional liquid fuels and oxidizers such as liquid oxygen and RP–1. DoD 6055.9–STD (2004). A review of the accident and test data of a number of fuels, oxidizers, and monopropellants against NFPA Hazard Instability Rating system defined by *NFPA 704 (1996) Standard System for the Identification of the Hazards of Materials for Emergency Response,* led DDESB to consider alternative standards for storing liquid propellants, such as liquid oxygen and RP–1. DDESB concluded that the main hazard associated with hydrocarbon fuels such as RP–1 is fire. This means that when it is not co-located with an oxidizer, RP–1 does not pose a threat of a chemical explosion due to accidental mixing with that oxidizer. DDESB also considered an NFPA standard for liquid oxygen based on the NFPA 704 Standard for the Identification of the Fire Hazards of Materials for Emergency Response (1996). Although liquid oxygen is a strong oxidizer and may create a serious fire hazard when combined with combustible materials, liquid oxygen is not flammable when separated and on its own. Accordingly, DDESB found that even an unlimited quantity of liquid oxygen need only maintain a distance of 100 feet between the location of its storage and incompatible energetic liquids, and 50 feet to compatible energetic liquids. In this context, liquid oxygen and RP–1, on their own, did not pose an explosive hazard. Hence, JAA's deviation from the separation standards of tables E–4 and E–5 of appendix E, for liquid oxygen and RP–1 did not jeopardize public safety. The FAA granted the waiver.

C. Reasons for Proposed Changes

The FAA has a number of reasons for proposing to dispense with separation distance requirements for storing liquid oxygen, nitrogen tetroxide, hydrogen peroxide in concentrations equal to or below 91 percent and RP–1. These energetic materials do not create explosive hazards when in isolation,

that is, when not co-located on a launch vehicle as liquid propellants. Additionally, the FAA does not want its launch separation requirements to conflict with other federal requirements, which are more comprehensive in that they contain design and operational requirements as well as separation requirements. Achieving safety is more complicated than merely having adequate separation distances. As has long been the case, safety can be achieved by a combination of separation distances, safety design, operational control requirements, hazard communication, or other mechanism, such as process safety management, so that the risk of a catastrophic incident associated with storing and handling of hazardous materials occurring may be kept to a minimum. As discussed above, OSHA and the FAA's own requirements for airports under 14 CFR part 139 address many of the fire hazards of these energetic materials through these means. The states, as well, impose requirements. The FAA's history of issuing waivers demonstrates that its own separation requirements are not necessary for achieving safety.

The FAA's waivers were based on DDESB standards, which are now incorporating the NFPA standards. DDESB standards themselves do not apply to civilian commercial activities. Nonetheless, the federal regulations that do apply adequately address the FAA's concerns.

D. Proposed Change to Classification System

Part 420, Appendix E, table E–3, currently classifies by hazard group, the following energetic liquids: hydrogen peroxide, hydrazine, liquid hydrogen, liquid oxygen, nitrogen tetroxide, RP–1, unsymmetrical dimethylhydrazine (UDMH) and the combination of UDMH and hydrazine. Each group represents different levels of hazard. Group I, which consists of nitrogen tetroxide and RP–1, is a fire hazard. Group II, which consists of hydrogen peroxide and liquid oxygen, is a group of strong oxidizers that may exhibit vigorous oxidation or rapid combustion in contact with materials, such as organic matter, possibly resulting in serious fires. Group III, which consists of hydrazine, liquid hydrogen, UDMH, and the combination of hydrazine and UDMH, presents hazards from the pressure rupture of a storage container resulting in fire, deflagration, or vapor phase explosions. Either pressure rupture of a container or vapor phase explosion can cause a fragment hazard from the container and any protective structure. In accordance with the current DDESB and NFPA practice, the FAA proposes to dispense with these hazard groups because the more commonly used classification system is that of the NFPA. The NFPA classifies energetic liquids based on instability ratings, as noted above in section III B.

IV. Separation Distance Requirements for Handling of Division 1.1 and 1.3 Explosives Under § 420.65

The FAA proposes clarifying changes to its requirements for the separation distances for handling divisions 1.1 and 1.3 explosives under § 420.65 and accompanying tables E–1 through E–4 of appendix E of this part. The FAA proposes to make editorial changes, abandon the use of linear interpolation, provide more increments for the quantities in its tables, and provide formulas for calculating acceptable distances between explosive hazard facilities. The FAA proposes a number of editorial and organizational changes to improve clarity. The FAA would no longer refer to the solid explosives governed by this section as solid propellants because, technically, the provision applies to more than just solid propellants. Currently, § 420.65 states that it applies to solid propellants, which are used in expendable launch vehicles (ELVs) for propulsion. Solid propellants are division 1.3 explosives. Explosives used in an ELV's flight termination system are division 1.1 explosives. Strictly speaking, the latter are not propellants, so the FAA proposes the title and the language of this section more precisely identify what it governs to avoid misunderstanding.

The FAA proposes to no longer permit the use of linear interpolation under § 420.65(d)(4) for any quantities because it was incorrect for divisions 1.1 and 1.3 explosives and, given the requirements of the provision, it is unclear when it applies. The lack of clarity is evident from the fact that, on the one hand, this section allows a launch site operator to use linear interpolation for the net explosive weight (NEW) quantities between entries in table E–1. On the other hand, the table itself either rigidly provides a distance of 1,250 feet for all NEW quantities of 30,000 pounds or less,[3] or it provides exponential formulas to calculate distances for quantities in excess of 30,000 pounds, thus apparently ruling out the use of linear interpolation for quantities of explosives above and below 30,000 pounds. This makes it unclear when to employ linear interpolation. Because the relationship between quantity and distance is, in fact, exponential rather than linear, the use of linear interpolation is incorrect, even if it were clear where it applied.

The FAA would also reorganize the tables that accompany this section for purposes of greater clarity. Currently, appendix E contains a single table, table E–1, for public area and intraline distances for divisions 1.1 and 1.3 explosives. The table identifies quantities in increments starting with zero to 1,000 pounds, and progresses through quantities between 1,000 and 5,000 pounds, and then advances in increments of 10,000 and 100,000 pounds up to 1,000,000 pounds.

The FAA proposes that table E–1 show the minimum separation distances to public areas and public traffic routes for quantities of division 1.1 explosives with a NEW for quantities less than or equal to 450 pounds. Currently, the minimum distance from an explosive hazard facility to a public area for quantities between zero and 30,000 pounds is 1,250 feet, regardless of whether the quantity is, for example, two pounds or 9,000 pounds. This greater level of precision would provide launch site operators greater flexibility while still maintaining appropriate distances to public areas and public traffic routes. The FAA would also provide formulas to calculate distances for quantities that fall between the entries in the table. The formulas would account for NEW of less than 100 pounds and for quantities between 100 and 450 pounds:

NEW ≤ 0.5 lbs:	d = 236.
0.5 lbs < NEW < 100 lbs:	d = 291.3 + [79.2 × ln(NEW)].
100 lbs ≤ NEW ≤ 450 lbs:	d = − 1133.9 + [389 × ln(NEW)].

Where NEW is in pounds; d is distance in feet, and ln is natural logarithm.

The FAA has allowed licensees to demonstrate an equivalent level of safety by using the formulas proposed here. The formulas account for the fact that fragments are the primary hazard associated with division 1.1 explosives for quantities of 450 pounds or less. Air blast can carry or propel fragments, but it is the fragments that cause the damage to persons. The proposed formula in table E–1 would account for the probability that one hazardous fragment would land within a 600 square feet area for a given quantity of division 1.1 explosive. The relationship is a natural logarithmic function when calculating distance based on NEW. When

[3] Table E–1 uses a dotted line rather than repeating the distance of 1,250 feet. The FAA has been applying this to mean that any quantity below 30,000 pounds has a separation distance of 1,250 feet.

calculating permissible NEW from distance, the inverse function of the natural logarithmic function, or the exponential function, is used.

The relationship is based on data obtained from DDESB TP 16, rev. 2, 2005 *Methodologies for Calculating Primary Fragment Characteristics.* DDESB conducted tests that accounted for hazardous debris fragments based on a fragment that would cause a fatality, namely, one with a kinetic energy at impact of 58 foot-pounds. A kinetic energy of 58 foot-pounds equates to a one percent probability of a person approximately six feet tall and one foot wide being struck by that fragment at a given separation distance from a given NEW. For quantities between 450 and 30,000 pounds, the minimum separation distance of 1,250 feet remains unchanged. For quantities of 30,000 pounds or more, the hazards include blast, fragments, and debris. When public areas are protected from blast effect by a separation distance between 40 $NEW^{1/3}$ and 50 $NEW^{1/3}$, persons in the open are not expected to experience serious injuries arising out of blast effects. *DoD Standard 6055.9—STD* C2.2.5.7.3 (2004). The FAA does not propose to change the methodology for calculating separation distances for quantities greater than 30,000 pounds.

Table E–2 would also contain the public traffic route distances for division 1.1 explosives. In § 420.65(d)(3), the FAA already permits a launch site operator to employ the more lenient public traffic route separation distance, but only for division 1.1 explosives. Although a public traffic route is a public area, this section permits a separation distance of 60 percent of the public area distance. Thus, for convenience, proposed table E–2 would show the distance currently permitted by § 420.65(d)(3).

Table E–2 would also contain a formula by which a launch site operator could determine the maximum NEW it could handle in an explosive hazard facility as would be permitted by the proposed § 420.65(e)(3). The proposed formulas reflect the inverse function of the equations provided by current table E–1. Publishing them would allow a launch site operator to calculate the maximum quantities it could have in an existing explosive hazard facility based on distances. This will increase the flexibility of launch site operators who already have constructed sites, but wish to expand their operations into serving as launch sites.

Proposed table E–3 would contain intraline distance formulas currently contained in table E–1 for division 1.1 solid explosives. For division 1.1 explosives, the FAA would decrease the increments between quantities for greater convenience. Also, the proposed table would provide a formula for calculating separation distances for quantities that fall between table entries.

For division 1.3 explosives, proposed table E–4 would contain minimum separation distances to public areas and public traffic routes, and intraline distances. The distances the FAA proposes reflect the exponential relationship, between the quantity of division 1.3 explosives and the necessary separation distances, rather than the inaccurate linear interpolation relationship currently expressed in the rules. Accordingly, the distances would be smaller than those currently required by table E–1.

Proposed § 420.65(d)(3) would require a launch site operator to separate each public area containing any member of the public in the open by a distance equal to $-1133.9 + [389 * \ln(NEW)]$ where the NEW is greater than 450 pounds and less than 600,000 pounds. Under current part 420, the FAA does not distinguish between public areas that are buildings, where people are sheltered, and those where people are out in the open. For a net explosive weight up to 30,000 pounds, fragments rather than blast can injure people in the open. *DoD Standard 6055.9—STD* C2.2.5.7.3 (2004). Even at 1,250 feet, the distance mandated by current § 420.65(c) and (d) and current table E–1, a person may be injured by fragments. *Id.* This proposed formula also applies to liquid propellants where explosive equivalent weights apply so that a launch site operator may employ proposed table E–2. This will result in greater distances for some public areas than are required under current rules, but should not result in increased distances for siting buildings. The proposed requirement would impose a constraint on operations more than on siting facilities.

This new requirement would not affect the siting of facilities in relationship to public traffic routes such as roads. The facility could still be sited at sixty percent of the distance to a public area. However, if there were people in the open on a public road during an operation involving division 1.1 explosives or liquid propellants, the members of the public would have to be kept at the distance mandated by the formula. Depending on the net explosive weight, the distance could be less than or greater than the public area or public traffic route distances. The FAA does not consider persons in moving vehicles to be in the open.

The FAA also proposes to permit launch site operators to determine permissible NEW or TNT equivalent weight for existing facilities under proposed paragraph (e). Not all launch sites are built from the ground up. As experience over the past few years demonstrates, airports may apply for a license to operate a launch site. On occasion, the operator will want to use existing facilities for handling of division 1.1 explosives or liquid propellants. The FAA would provide a formula for the operator to calculate the maximum quantity permitted. The formula provided in table E–1 is based on fragment hazard tests that DDESB conducted, which can be found in DDESB TP 16, rev. 2. The formula provided in table E–2 is based on current table E–1 for blast overpressure equations. The operator would have to measure the distance from the explosive hazard facility using the measuring requirements of proposed § 420.70.

V. Separation Distance Requirements for Storage of Hydrogen Peroxide, Hydrazine, and Liquid Hydrogen and Any Energetic Liquids Incompatible With and Stored Within an Intraline Distance of Any of Them

Through proposed § 420.66, the FAA will continue to impose storage requirements for hydrazine, liquid hydrogen, and hydrogen peroxide in concentrations of greater than 91 percent because of concerns regarding a greater risk for a chemical explosion associated with these energetic liquids, but will not address quantities below 100 pounds for liquid hydrogen and hydrazine. Under current requirements, table E–3 shows that all three of these energetic liquids belong to Hazard Group III, which means that table E–4 applies. Under the proposed requirements, the distances would not change in proposed table E–8. The FAA recognizes that OSHA addresses liquid hydrogen and hydrazine, but the FAA is not going to rely on OSHA for quantities of liquid hydrogen above 100 pounds because OSHA requires no more than 100 feet for outdoor storage of quantities up to 30,000 gallons. Part 420 separation distances vary depending on quantity. Likewise, OSHA addresses hydrazine, but the separation distances for quantities in excess of 100 pounds remain of concern to the FAA for public safety purposes in that they pose a threat of catastrophic consequences. Even in storage, accidents can happen with these materials. NFPA standards, which are incorporated by other regulators as discussed above, address the storage of hydrogen peroxide in high concentrations, but the FAA will keep

its requirements for this energetic liquid. The NFPA standards are silent regarding separation distances for quantities above 10,000 pounds.

The FAA proposes to create a new § 420.66 to govern the storage of these materials for greater clarity. Current § 420.67, which governs the storage and handling of liquid propellants, already contains most of these requirements. The FAA proposes to relocate the rules governing measurement to proposed § 420.70.

Proposed § 420.66 would apply to hydrogen peroxide in concentrations of greater than 91 percent, hydrazine, liquid hydrogen, or any energetic liquid that is incompatible with and is stored within an intraline distance of any of them. As with the current requirements, a launch site operator would first determine the total quantity of energetic liquids it would store on its launch site. As with the current rule, a launch site operator must convert each of the energetic liquid's quantity from gallons to pounds. The formula would remain unchanged, but we propose to add, in proposed table E–6, conversion factors for additional energetic liquids not currently addressed by table E–3 of the current rule. The FAA obtained the conversion factors for ethyl alcohol,[4] and red fuming nitric acid from the 2004 DDESB standard. The FAA will continue to require that a launch site operator determine distances for compatible energetic liquids in the same manner as the current rule, but would increase flexibility in siting with respect to those public areas that are public traffic routes. For co-located incompatible energetic liquids where explosive equivalents apply, under proposed § 420.67(c)(2), the FAA proposes to permit using a public traffic route distance for incompatible energetic liquids that are within an intraline distance of each other. This would provide incompatible energetic liquids the same treatment accorded to division 1.1 solid explosives. Section 420.65(d)(3) permits division 1.1 solid explosives to be separated from public traffic routes by a distance of 60 percent of the public area distance. In light of the fact that the explosion of incompatible energetic liquids can be expressed in an explosive equivalent of division 1.1 explosives, there appears to be no reason not to offer these energetic liquids the same opportunity to employ a shorter distance to public traffic routes.

Currently, table E–5 prescribes separation distances for hydrogen peroxide without specifying the concentration levels to which it applies. Proposed table E–7 would contain separation distances for high concentrations of hydrogen peroxide (greater than 91 percent) in quantities above 10,000 pounds. Because the current distances encompass hydrogen peroxide at lower concentrations, the distances proposed would be greater than those currently required. This reflects the 2004 DOD Standard. As noted in the section discussing storage requirements, OSHA imposes process safety management requirements in quantities greater than 7500 pounds and in concentrations of greater than 52 percent by weight.

Proposed table E–8 would contain the requirements of current table E–6 for hydrazine and liquid hydrogen. The FAA proposes to dispense with separation requirements for quantities of liquid hydrogen and hydrazine of less than 100 pounds because OSHA regulates these materials in quantities below 100 pounds. OSHA's regulation of liquid hydrogen includes separation distance, design, and operational procedure requirements. The requirements apply to storage of all liquid hydrogen *except* portable containers of less than 150 liters (39.63 gallons). 29 CFR 1910.103(a)(2)(ii). Requirements for separation distances may be found at 29 CFR 1910.103(c)(2)(ii)(b). Design requirements may be found at 29 CFR 1910.103(c)(1) and operational constraints at 29 CFR 1910.103(c)(4). OSHA regulates hydrazine with separation distance, design, and operational procedure requirements. OSHA provides separation distance requirements for outdoor containers of hydrazine. 29 CFR 1910.106(a)(27), (d)(6)(i) and (d)(6)(ii)(b). OSHA applies design and testing requirements. 29 CFR 1910.106(b)(7), 1910.106(c)(6), and 1910.106(d)(2)–(5). Operational procedure requirements may be found at 29 CFR 1910.106(b)(1)(iv)(a), 1910.106(b)(1)(v)(a), and 1910.106(b)(5)(vi). The FAA remains concerned about and will continue its regulation of the greater quantities because of their potential for catastrophic events.

Currently, § 420.67(b) requires a launch site operator to determine hazard and compatibility groups and separate liquid propellants from each other and from each public area using the distances identified in tables E–4 though E–7 of Appendix E of this part. The only substantive change the FAA now proposes to this paragraph arises out of the FAA's proposal to dispense with the hazard compatibility groups of table E–3. As noted in the discussion of the storage of liquid propellants, the FAA proposes to dispense with classifying certain liquid propellants as members of Hazard Groups I, II or III. Currently, table E–3 identifies what hazard group a material belongs to, and tables E–4, E–5 and E–6 impose separation distances for each of those hazard groups. These classifications would be unnecessary because the hazard groups only apply to storage distances, and, once we focus only on certain energetic liquids, we no longer would require these broad classifications.

VI. Separation Distances for the Handling of Incompatible Energetic Liquids That Are Co-Located

At times, incompatible energetic liquids must be co-located and even mixed to fulfill their intended functions as liquid propellants. Most obviously, many launch vehicles' performance come from the propulsion power provided by liquid bipropellant systems consisting of a liquid fuel and oxidizer. Engine tests also require the handling of energetic liquids when in close enough proximity to create a hazard of an explosion occurring. Once liquid propellants are co-located for these or other operational purposes, different separation distances to the public apply than for the storage of energetic liquids. If incompatible energetic liquids are co-located, the handling distances of § 420.67 apply for determining intraline and public area distances. The FAA also notes that although it proposes to dispense with requirements for NFPA Class I–III flammable and combustible liquids for storage, it will still require that a launch site operator account for them when determining separation distances for combinations.

Section 420.67 would narrow in scope. Currently, it applies as written to liquid propellants at a launch site. In practice, this has meant that when a launch operator is located at an airport, requirements that were originally intended for launch vehicles and engine testing applied to jet fuels and other energetic liquids for which there were already requirements. Section 420.67(a) would limit its applicability to rocket engines. Specifically, it would apply where incompatible energetic liquids are co-located in a launch or reentry vehicle tank or other vessel, such as a propulsion unit, on the vehicle. This would include such obvious applications as a vehicle on a launch

[4] Although ethyl alcohol and JP–10 are in the family of Class I–III flammable and combustible liquids, which the FAA proposes to stop addressing in part 420, if either are within an intraline distance of the incompatible hydrogen peroxide, separation distances would apply under proposed § 420.66(a)(4).

pad or runway. It would also include engine firing, for test or other purposes. In short, § 420.67 would apply to rocket engines at a launch site because the FAA wishes to confine its launch site regulations to energetic liquids used for space and not aviation applications.

For the reasons provided in the discussion of § 420.65, the FAA proposes to provide tables and formulas for quantities up to 450 pounds rather than requiring a distance of 1,250 feet for all quantities up to 30,000 pounds. As clarified in proposed § 420.67(d)(4), which would clarify and expand upon current § 420.67(b)(5), for explosive hazard facilities of a single customer, a launch site operator must use the greater intraline distance to separate the facilities from each other.[5] For example, a launch site operator may plan to have a customer who will use a launch pad and a runway for horizontal take-off of a launch vehicle. These two explosive hazard facilities need only be separated by an intraline distance, but it must be the distance that reflects the larger quantity. Thus, if an expendable launch vehicle at a launch pad required a distance of 1,250 feet, while a horizontal take-off vehicle required a distance of only 700 feet, the runway and the launch pad would have to be located 1,250 feet from each other.

Proposed § 420.67(d)(4) would also clarify that for explosive hazard facilities used by different customers, a launch site operator must use the greater public area distance to separate the explosive hazard facilities from each other. This is implicit in the current requirements because different launch operators are the public with respect to each other. Section 420.5 defines the public as persons not involved in supporting a launch, and includes any other launch operator and its personnel. Accordingly, under the existing rules, if the public area distance created by launch operator A's vehicle at one launch pad was 1250 feet and 700 feet for launch operator B's launch pad, the launch pads would have to be separated by the greater distance of 1,250 feet. An explicit requirement would increase clarity.

Under proposed § 420.67(c)(2), the FAA would permit a launch site operator to use the shorter distances of table E–1 for liquid propellants with explosive equivalencies in quantities below or equal to 450 pounds. In promulgating part 420, the FAA created table E–1 to show separation distance requirements for solid explosives. Table E–1 requires a separation distance of 1,250 feet to a public area for division 1.1 explosives in quantities between zero and 30,000 pounds. As discussed earlier, the FAA now proposes to achieve a higher level of fidelity so that for a site where liquid propellants are handled or co-located more accurate separation distances to public areas would be available for liquid as well as solid propellants. The FAA recognized the need for greater fidelity when it waived § 420.67 for XCOR Aerospace's operations on a runway at Mojave Air and Space Port, where it was fueling its vehicle with liquid oxygen and kerosene. Although the XCOR Aerospace waiver applied to the handling of liquid propellants, table E–1 applied because energetic liquids are translated into their "explosive equivalent" in TNT to determine their equivalence in explosive yield. As the FAA explained when it first proposed part 420, if fuels and oxidizers are located within close enough distances of each other, the distance to the public must account for the hazardous consequences of their potential combination. *See* Launch Site NPRM, 64 FR 34335. The combination is measured in terms of explosive equivalency, a measure of the blast effects from explosion of a given quantity of a fuel and oxidizer mixture expressed in terms of the weight of TNT that would produce the same blast effects when detonated. *Id.*

VII. Separation Distance Requirements for Co-Location of Divisions 1.1 and 1.3 Explosives and Liquid Propellants

For launch vehicles that require strap-on solid rocket motors and are equipped with flight termination systems, liquid propellants are in close proximity to class 1.1 or class 1.3 explosives. Section 420.69 applies on those occasions.

The FAA proposes to revise its requirements for separation distances for co-located division 1.1 and 1.3 explosives and liquid propellants. The distances to public areas and public traffic routes will be shorter to correct the FAA's error in § 420.69(b). Current § 420.69 requires that a launch site operator determine the separation distances for solid propellant division 1.1 and 1.3 explosives and then determine the separation distances for a liquid propellant combination within an intraline distance. Having determined the separation distance for each, a launch site operator must add the two separation distances together to achieve a minimum distance to a public area. For example, if a launch pad contains 20 pounds of division 1.1 explosives, which generates a public area distance of 529 feet, and liquid oxygen and kerosene with an explosive equivalent of 45,000 pounds, which generates a public area distance of 1,423 feet, the resulting public area distance under current requirements must be the sum of the two distances, which is 1,952 feet.

As the FAA recognized in its discussion of the issue at the time it promulgated this section, a simultaneous explosion of both the solid and liquid propellants, although unlikely, is not improbable. *Launch Site Rule,* 65 FR 62821. Accordingly, the FAA decided the separation distance applicable to the liquid propellants had to be added to the separation distance applicable to the solid propellant under § 420.69(b) and (c). This was a mistake. As with the other approaches to determining correct separation distances, the weights of the various propellants, solid and liquid both, are added before determining the distances. Thus, using the example above, once a launch site operator determines that the total NEW of the solid propellants is 20 pounds and the explosive equivalent of the liquid propellants is 45,000 pounds, the total NEW of 45,020 pounds yields a distance of 1,423 feet rather than the 1,952 feet of current § 420.69. The proposed methodology would apply to both division 1.1 and 1.3 explosives.

VIII. Measuring Requirements

The FAA proposes a new § 420.70 to contain all the measuring requirements for calculating the distances by which explosive hazard facilities must be separated from each other and from the public. Separation distance requirements are currently spread from §§ 420.65 through 420.69. Consolidating those requirements into a single section, § 420.70, would ensure that a launch site operator would need to look in only one place to find the measuring requirements it must meet. The majority of these requirements are already in part 420. They include the requirements for measuring separation distances for solid propellants, currently located in § 420.65(d)(5), and energetic liquids, currently located in § 420.67(b)(1). New measurement requirements would include requiring a launch site operator to employ straight lines, as would be required by proposed § 420.70(b) measuring from taxiways and runways as required by proposed § 420.70(c), and measuring to a public traffic route by using its nearest side as required by proposed § 420.70(c)(2). The FAA is proposing the new requirements because there has been confusion over which points to use as starting points for measurements. These requirements would reduce any such confusion and

[5] This reflects the contents of current § 420.67(a)(2)(iii).

ensure the FAA treats all launch site operators' measurements the same.

Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires that the FAA consider the impact of paperwork and other information collection burdens imposed on the public. According to the 1995 amendments to the Paperwork Reduction Act (5 CFR 1320.8(b)(2)(vi)), an agency may not collect or sponsor the collection of information, nor may it impose an information collection requirement unless it displays a currently valid Office of Management and Budget (OMB) control number.

The FAA has determined that there would be no new information collection associated with the proposed requirement to collect data required for performing launch site location analysis. Approval to collect such information previously was approved by the Office of Management and Budget (OMB) under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) and was assigned OMB Control Number 2120–0644.

International Compatibility

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to conform to International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. This is not an aviation rulemaking, and the FAA has determined that there are no ICAO Standards and Recommended Practices that correspond to these proposed regulations.

Regulatory Evaluation, Regulatory Flexibility Determination, International Trade Impact Assessment, and Unfunded Mandates Assessment

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 (Pub. L. 96–354) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (Pub. L. 96–39) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, the Trade Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of $100 million or more annually (adjusted for inflation with base year of 1995). This portion of the preamble summarizes the FAA's analysis of the economic impacts of this proposed rule.

Department of Transportation Order DOT 2100.5 prescribes policies and procedures for simplification, analysis, and review of regulations. If the expected cost impact is so minimal that a proposed or final rule does not warrant a full evaluation, this order permits that a statement to that effect and the basis for it be included in the preamble if a full regulatory evaluation of the cost and benefits is not prepared. Such a determination has been made for this proposed rule. The reasoning for this determination follows.

The FAA proposes to dispense with separation distance requirements for storing liquid oxidizers and Class I, II and III flammable and combustible liquids because they are unnecessarily conservative as explained earlier. The FAA proposes to dispense with the hazard groups of tables E–4 through E–6 of appendix E of part 420 as a means of classification. This would allow for closer siting of explosives without degrading safety. Safety would not be degraded because of the operational controls and design requirements of other standards. In addition, the FAA proposes to identify the minimum separation distances to public areas and public traffic routes for quantities between less than half a pound and 450 pounds of division 1.1 explosives and liquid propellants with TNT equivalency.

Because of these changes launch sites might be able to use the infrastructure of existing airport facilities and, therefore, the proposed rule would be cost relieving. The proposed rule would also allow for the development of more launch sites where the more conservative siting requirements of the current regulation might constrain their development.

Certain proposed changes would add clarity to the current regulations and result in reduced ambiguity and confusion. For instance, clarifying the meaning of explosive hazard facility to state that it can be a location as well as a facility avoids the possibility of misinterpreting the current definition to apply only to buildings or storage sites. The proposed rule would remove ambiguities over the labeling of materials to different users of the same material. The rule would also clarify that the FAA intended to permit alternative means of demonstrating an equivalent level of safety to what part 420 addressed as well as to what part 420 did not address. These changes are expected to be cost neutral.

The proposed rule would add a requirement to § 420.63 that the explosive site map be at a scale sufficient to determine compliance with part 420. The FAA is proposing this to avoid a reiterative process to obtain a map at an appropriate scale. Situations have arisen where the FAA has received maps that were difficult to read. As a result, considerable time was expended determining distances between elements on the map. In this respect, the proposal can be cost relieving. The rule could require some operators to redraw existing maps. However, we expect that with programs like AutoCAD and Geographic Information System (GIS) software, the cost to change the scale will be minimal. We don't believe that anyone would be required to redraw an existing map by hand due to this requirement. The FAA calls for comments regarding whether this provision will be cost relieving, and if not, provide sufficient documentation such that we can provide an accurate cost estimate.

Under current part 420, the FAA does not distinguish between public areas that are buildings, where people are sheltered, and those where people are out in the open. This proposal would result in greater distances for some public areas than are required under current rules, but should not result in increased distances for siting buildings. The operational constraints themselves should not increase costs because a launch site operator currently must ensure under § 420.55 that its customers schedule their hazardous operations so as not to harm members of the public. A site operator may incur minimal costs in performing these new calculations and updating its procedures to reflect any changes in distances. The FAA calls for comments on whether this new requirement will impose costs.

By dispensing with the current separation distance requirements for certain energetic liquids and reducing separation distance requirements for divisions 1.1 and 1.3 explosives and liquid propellants the rule would be cost relieving. The FAA proposes this 1) for energetic liquids that are fire hazards rather than explosive hazards because when sufficiently isolated from each other, these liquids do not pose a

chemical explosion hazard; and 2) for liquids that are already addressed by other federal requirements.

Because this proposed rule would relieve launch sites from storage requirements for most energetic liquids and reduce the separation distances requirements for divisions 1.1 and 1.3 explosives and liquid propellants, the expected outcome would be reduced cost. The possible benefits would be the proposal might encourage the development of more launch sites. By encouraging existing launch sites to more effectively use their infrastructure and by allowing colocation of launch sites with some existing airports, the proposed rule would provide benefits and be cost relieving. There might also be cost savings if the FAA issues fewer waivers as a result of this rule.

The FAA has, therefore, determined this proposed rule is not a "significant regulatory action" as defined in section 3(f) of Executive Order 12866, and is not "significant" as defined in DOT's Regulatory Policies and Procedures.

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (Pub. L. 96–354) (RFA) establishes "as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration." The RFA 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 rule will have a significant economic impact on a substantial number of small entities. If the agency determines that it will, the agency must prepare a regulatory flexibility analysis as described in the RFA.

However, if an agency determines that a rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the RFA provides that the head of the agency may so certify and a regulatory flexibility analysis is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

The proposed rule does not impose costs on industry because it provides options to launch sites with regards to explosive siting but does not require launch site operators to increase the distances around where they have sited explosives and because other requirements are consistent with industry practice. Consequently, the FAA certifies that the rule will not have a significant economic impact on a substantial number of small entities.

Trade Impact Assessment

The Trade Agreements Act of 1979 (Pub. L. 96–39), as amended by the Uruguay Round Agreements Act (Pub. L. 103–465), prohibits Federal agencies from establishing standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Pursuant to these Acts, the establishment of standards is not considered an unnecessary obstacle to the foreign commerce of the United States, so long as the standard has a legitimate domestic objective, such the protection of safety, and does not operate in a manner that excludes imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards. This rule would have only a domestic impact.

Unfunded Mandates Assessment

Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) 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 an expenditure of $100 million or more (in 1995 dollars) 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." The FAA currently uses an inflation-adjusted value of $143.1 million in lieu of $100 million.

This proposed rule does not contain such a mandate; therefore the requirements of Title II do not apply.

Executive Order 13132, Federalism

The FAA has analyzed this proposed rule under the principles and criteria of Executive Order 13132, Federalism. We determined that this action would not have a substantial direct effect on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government, and, therefore, would not have federalism implications.

Environmental Analysis

FAA Order 1050.1E identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act in the absence of extraordinary circumstances. The FAA has determined this proposed rulemaking action qualifies for the categorical exclusion identified in paragraph 310f and involves no extraordinary circumstances.

Regulations That Significantly Affect Energy Supply, Distribution, or Use

The FAA has analyzed this NPRM under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). We have determined that it is not a "significant energy action" under the executive order, because it is not a "significant regulatory action" under Executive Order 12866 and DOT's Regulatory Policies and Procedures, and it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

Additional Information

Comments Invited

The FAA invites interested persons to participate in this rulemaking by submitting written comments, data, or views. We also invite comments relating to the economic, environmental, energy, or federalism impacts that might result from adopting the proposals in this document. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data. To ensure the docket does not contain duplicate comments, please send only one copy of written comments, or if you are filing comments electronically, please submit your comments only one time.

We will file in the docket all comments we receive, as well as a report summarizing each substantive public contact with FAA personnel concerning this proposed rulemaking. Before acting on this proposal, we will consider all comments we receive on or before the closing date for comments. We will consider comments filed after the comment period has closed if it is possible to do so without incurring expense or delay. We may change this proposal in light of the comments we receive.

Proprietary or Confidential Business Information

Do not file in the docket information that you consider to be proprietary or confidential business information. Send or deliver this information directly to the person identified in the **FOR FURTHER INFORMATION CONTACT** section of this document. You must mark the information that you consider proprietary or confidential. If you send the information on a disk or CD ROM, mark the outside of the disk or CD ROM and also identify electronically within the disk or CD ROM the specific information that is proprietary or confidential.

Under 14 CFR 11.35(b), when we are aware of proprietary information filed with a comment, we do not place it in the docket. We hold it in a separate file to which the public does not have access, and we place a note in the docket that we have received it. If we receive a request to examine or copy this information, we treat it as any other request under the Freedom of Information Act (5 U.S.C. 552). We process such a request under the DOT procedures found in 49 CFR part 7.

Availability of Rulemaking Documents

You can get an electronic copy of rulemaking documents using the Internet by—

1. Searching the Federal eRulemaking Portal (*http://www.regulations.gov*);

2. Visiting the FAA's Regulations and Policies web page at *http://www.faa.gov/regulations_policies* or

3. Accessing the Government Printing Office's web page at *http://www.gpoaccess.gov/fr/index.html*.

You can also get a copy by sending a request to the Federal Aviation Administration, Office of Rulemaking, ARM–1, 800 Independence Avenue, SW., Washington, DC 20591, or by calling (202) 267–9680. Make sure to identify the docket or notice number of this rulemaking.

You may access all documents the FAA considered in developing this proposed rule, including economic analyses and technical reports, from the internet through the Federal eRulemaking Portal referenced in paragraph (1).

List of Subjects in 14 CFR Part 420

Environmental protection, Reporting and recordkeeping requirements, Space transportation and exploration.

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend Chapter III of Title 14, Code of Federal Regulations, as follows:

PART 420—LICENSE TO OPERATE A LAUNCH SITE

1. The authority citation for part 420 continues to read as follows:

Authority: 49 U.S.C. 70101–70121.

2. Amend § 420.5 by revising the definition of *Explosive hazard facility* and by adding the definitions of *Energetic liquid, Liquid propellant, Maximum credible event,* and *Public traffic route,* in alphabetical order to read as follows:

§ 420.5 Definitions.

* * * * *

Energetic liquid means a liquid, slurry, or gel, consisting of, or containing an explosive, oxidizer, fuel, or combination of the above, that may undergo, contribute to, or cause rapid exothermic decomposition, deflagration, or detonation.

* * * * *

Explosive hazard facility means a facility or location at a launch site where solid explosives, energetic liquids, or other explosives are stored or handled.

* * * * *

Liquid propellant means a monopropellant or incompatible energetic liquids co-located for purposes of serving as propellants on a launch vehicle or a related device.

Maximum credible event means a hypothesized worst-case accidental explosion, fire, or agent release that is likely to occur from a given quantity and disposition of explosives, chemical agents, or reactive material.

* * * * *

Public traffic route means any public highway or railroad that the general public may use.

* * * * *

3. Revise § 420.63 to read as follows:

§ 420.63 Explosive siting.

(a) Except as otherwise provided by paragraph (b) of this section, a licensee must ensure the configuration of the launch site follows its explosive site plan, and the licensee's explosive site plan complies with the requirements of §§ 420.65 through 420.70. The explosive site plan shall include:

(1) A scaled map that shows the location of all explosive hazard facilities at the launch site and that shows actual and minimal allowable distances between each explosive hazard facility and all other explosive hazard facilities, each public area, including the launch site boundary and any public traffic route;

(2) A list of the maximum quantity of energetic liquids, solid propellants and other explosives to be located at each explosive hazard facility, including the class and division for each solid;

(3) A description of each activity to be conducted in each explosive hazard facility; and

(4) An explosive site map using a scale sufficient to show whether distances and structural relationships satisfy the requirements of this part.

(b) A licensee operating a launch site located on a federal launch range does not have to comply with the requirements in §§ 420.65 through 420.70 if the licensee complies with the federal launch range's explosive safety requirements.

(c) For explosive siting issues not addressed by the requirements of §§ 420.65 through 420.70, a launch site operator must clearly and convincingly demonstrate a level of safety equivalent to that otherwise required by this part.

(d) A launch site operator may separate an explosive hazard facility from another explosive hazard facility or a public area by a distance different from one required by this part only if the launch site operator clearly and convincingly demonstrates a level of safety equivalent to that required by this part.

4. Revise § 420.65 to read as follows:

§ 420.65 Separation distance requirements for handling division 1.1 and 1.3 explosives.

(a) A launch site operator must determine the maximum total quantity of division 1.1 and 1.3 explosives by class and division, in accordance with 49 CFR part 173, Subpart C, to be located in each explosive hazard facility where division 1.1 and 1.3 explosives will be handled.

(b) When division 1.1 and 1.3 explosives are located in the same explosive hazard facility, the total quantity of explosive must be treated as division 1.1 for determining separations distances; or, a launch site operator may add the net explosive equivalent weight of the division 1.3 items to the net weight of division 1.1 items to determine the total quantity of explosives.

(c) A launch site operator must separate each explosive hazard facility where division 1.1 and 1.3 explosives are handled from all other explosive hazard facilities, all public traffic routes, each public area, including the launch site boundary, by a distance no less than that provided for each quantity and explosive division in appendix E of this part as follows:

(1) For division 1.1 explosives, the launch site operator must use tables

E–1, E–2, and E–3 of appendix E of this part to determine the distance to each public area and public traffic route and each intraline distance.

(2) For division 1.3 explosives, the launch site operator must use table E–4 of appendix E of this part to determine the distance to each public area, public traffic route, and intraline distance.

(d) A launch site operator must:

(1) Employ no less than the applicable public area distance to separate an explosive hazard facility from each public area, including the launch site boundary.

(2) Employ no less than an intraline distance to separate an explosive hazard facility from all other explosive hazard facilities used by a single customer.

(3) Separate each public area containing any member of the public in the open by a distance equal to $-1133.9 + [389 * \ln(NEW)]$ where the NEW is greater than 450 pounds and less than 600,000 pounds.

(e) A launch site operator may:

(1) For a division 1.1 explosive only, employ no less than the public traffic route distance of tables E–1 and E–2 of appendix E of this part, to separate an explosive hazard facility from a public area that consists only of a public traffic route.

(2) Use the applicable equation provided by tables E–1, E–2, E–3, and E–4 of appendix E of this part to determine the separation distance for NEW quantities that fall between table entries.

(3) Use a distance to calculate maximum permissible NEW using the applicable equation of tables E–1, E–2, E–3, and E–4 of appendix E of this part.

5. Add § 420.66 to read as follows:

§ 420.66 Separation distance requirements for storage of hydrogen peroxide, hydrazine, and liquid hydrogen and any incompatible energetic liquids stored within an intraline distance.

(a) *Separation of energetic liquids and determination of distances.* A launch site operator must separate each explosive hazard facility from each other explosive hazard facility and each public area in accordance with the minimum separation distance determined under this section for each explosive hazard facility storing:

(1) Hydrogen peroxide in concentrations of greater than 91 percent;

(2) Hydrazine;

(3) Liquid hydrogen; or

(4) Any energetic liquid that is:

(i) Incompatible with any of the energetic liquids of paragraphs (a)(1) through (3) of this section; and

(ii) Stored within an intraline distance of any of them.

(5) A launch site operator must measure each distance as required by § 420.70.

(b) *Quantity.* A launch site operator must determine the minimum separation distance between each explosive hazard facility and all other explosive hazard facilities and each public area and public traffic route as follows:

(1) For each explosive hazard facility, a launch site operator must determine the total quantity of all energetic liquids in paragraphs (a)(1) through (4) of this section. The quantity of energetic liquid in a tank, drum, cylinder, or other container is the net weight in pounds of the energetic liquid in the container. The determination of quantity must include any energetic liquid in associated piping to any point where positive means exist for:

(i) Interrupting the flow through the pipe, or

(ii) Interrupting a reaction in the pipe in the event of a mishap.

(2) A launch site operator must convert the quantity of each energetic liquid from gallons to pounds using the conversion factors provided in table E–6 of appendix E of this part and the following equation:

Pounds of energetic liquid = gallons × density of energetic liquid (pounds per gallon).

(3) Where two or more containers of compatible energetic liquids are stored in the same explosive hazard facility, the total quantity of energetic liquids is the total quantity of energetic liquids in all containers, unless:

(i) The containers are each separated from each other by the distance required by paragraph (c) of this section; or

(ii) The containers are subdivided by intervening barriers that prevent mixing, such as diking. Where two or more containers of incompatible energetic liquids are stored within an intraline distance of each other, paragraph (d) of this section applies.

(c) *Determination of distances for compatible energetic liquids.* A launch site operator must determine separation distances for compatible energetic liquids as follows:

(1) To determine each intraline, public area, and public traffic route distance, a launch site operator must use the following tables in appendix E of this part:

(i) Table E–7 for hydrogen peroxide in concentrations of greater than 91 percent; and

(ii) Table E–8 for hydrazine and liquid hydrogen.

(2) For liquid hydrogen and hydrazine, a launch site operator must use the "intraline distance to compatible energetic liquids" for the energetic liquid that requires the greater distance under table E–8 of appendix E of this part as the minimum separation distance between compatible energetic liquids.

(d) Determination of distances for incompatible energetic liquids. If incompatible energetic liquids are stored within an intraline distance of each other, a launch site operator must determine the explosive equivalent in pounds of the combined liquids as provided by paragraph (d)(2) of this section unless intervening barriers prevent mixing.

(1) If intervening barriers prevent mixing, a launch site operator must separate the incompatible energetic liquids by no less than the intraline distance that tables E–7 and E–8 of appendix E of this part apply to compatible energetic liquids using the quantity or energetic liquid requiring the greater separation distance.

(2) A launch site operator must use the formulas provided in table E–5 of appendix E of this part, to determine the explosive equivalent in pounds of the combined incompatible energetic liquids. A launch site operator must then use the explosive equivalent in pounds requiring the greatest separation distance to determine the minimum separation distance between each explosive hazard facility and all other explosive hazard facilities and each public area and public traffic route as required by tables E–1, E–2 and E–3.

6. Revise § 420.67 to read as follows:

§ 420.67 Separation distance requirements for handling incompatible energetic liquids that are co-located.

(a) *Separation of energetic liquids and determination of distances.* Where incompatible energetic liquids are co-located in a launch or reentry vehicle tank or other vessel, a launch site operator must separate each explosive hazard facility from each other explosive hazard facility and each public area in accordance with the minimum separation distance determined under this section for each explosive hazard facility.

(b) *Quantity.* A launch site operator must determine the minimum separation distance between each explosive hazard facility and all other explosive hazard facilities and each public area and public traffic route as follows:

(1) For each explosive hazard facility, a launch site operator must determine the total quantity of all energetic

liquids. The quantity of energetic liquid in a launch or reentry vehicle tank is the net weight in pounds of the energetic liquid. The determination of quantity must include any energetic liquid in associated piping to any point where positive means exist for:

(i) Interrupting the flow through the pipe, or

(ii) Interrupting a reaction in the pipe in the event of a mishap.

(2) A launch site operator must convert each energetic liquid's quantity from gallons to pounds using the conversion factors provided by table E–6 of appendix E of this part and the following equation:

Pounds of energetic liquid = gallons × density of energetic liquid (pounds per gallon).

(c) Determination of separation distances for incompatible energetic liquids. A launch site operator must determine separation distances for incompatible energetic liquids as follows:

(1) A launch site operator must use the formulas provided in appendix E of this part, table E–5, to determine the explosive equivalent in pounds of the combined incompatible energetic liquids; and

(2) A launch site operator must use the explosive equivalent in pounds to determine the minimum separation distance between each explosive hazard facility and all other explosive hazard facilities and each public area and public traffic route as required by tables E–1, E–2 and E–3 of appendix E of this part.

(d) Separation distance by weight and table. A launch site operator must:

(1) For an explosive equivalent weight from one pound through and including 450 pounds, determine the distance to any public area and public traffic route following table E–1 of appendix E of this part.

(2) For explosive equivalent weight greater than 450 pounds, determine the distance to any public area and public traffic route following table E–2 of appendix E of this part.

(3) A launch site operator must separate each explosive hazard facility from all other explosive hazard facilities of a single customer using the intraline distance provided by table E–3 of appendix E of this part.

(4) For explosive hazard facilities of a single customer, a launch site operator must use the greater intraline distance to separate the facilities from each other. For explosive hazard facilities used by different customers a launch site operator must use the greater public area distance to separate the facilities from each other.

7. Revise § 420.69 to read as follows:

§ 420.69 Separation distance requirements for co-location of division 1.1 and 1.3 explosives with liquid propellants.

(a) A launch site operator must separate each explosive hazard facility from each other explosive hazard facility and each public area in accordance with the minimum separation distance determined under this section for each explosive hazard facility where division 1.1 and 1.3 explosives are co-located with liquid propellants. A launch site operator must determine each minimum separation distance from an explosive hazard facility where division 1.1 and 1.3 explosives and liquid propellants are to be located together, to each other explosive hazard facility and public area as follows:

(b) For liquid propellants and division 1.1 explosives located together, a launch site operator must:

(1) Determine the explosive equivalent weight of the liquid propellants as provided by § 420.67(c);

(2) Add the explosive equivalent weight of the liquid propellants and the NEW of division 1.1 explosives to determine the combined net explosive weight; and

(3) Use the combined NEW to determine the distance to each public area, public traffic route, and each other explosive hazard facility by following tables E–1, E–2, and E–3 of appendix E of this part.

(c) For liquid propellants and division 1.3 explosives located together, a launch site operator must separate each explosive hazard facility where liquid propellants and division 1.3 explosives are located together from other explosive hazard facilities, public area, and public traffic routes using either of the following two methods:

(1) Method 1:

(i) Determine the explosive equivalent weight of the liquid propellants by following § 420.67(c).

(ii) Add to the explosive equivalent weight of the liquid propellants, the net explosive weight of each division 1.3 explosive, treating division 1.3 explosives as division 1.1 explosives.

(iii) Use the combined net explosive weight to determine the distance to public area, public traffic route, and distance to other explosive hazard facilities by following tables E–1, E–2, and E–3 of appendix E of this part.

(2) Method 2:

(i) Determine the explosive equivalent weight of each liquid propellant by following § 420.67(c).

(ii) Add to the explosive equivalent weight of the liquid propellants, the NEW equivalent weight of each division 1.3 explosive to determine the combined net explosive weight.

(iii) Use the combined NEW to determine the minimum separation distance to each public area, public traffic route, and each other explosive hazard facility by following tables E–1, E–2, and E–3 of appendix E of this part.

(d) For liquid propellants, division 1.1 and 1.3 explosives located together, the launch site operator must:

(1) Determine the explosive equivalent weight of the liquid propellants by following § 420.67(c).

(2) Determine the total explosive quantity of each division 1.1 and 1.3 explosive by following § 420.65(b).

(3) Add to the explosive equivalent weight of the liquid propellants to the total explosive quantity of division 1.1 and 1.3 explosives together to determine the combined net explosive weight.

(4) Use the combined net explosive weight to determine the distance to each public area, public traffic route, and each other explosive hazard facility by following tables E–1, E–2, and E–3 of appendix E of this part.

(e) The launch site operator must analyze the maximum credible event (MCE) or the worst case explosion expected to occur. If the MCE shows there will be no simultaneous explosion reaction of the liquid propellant tanks and the solid propellant motors, then the minimum distance between the explosive hazard facility and all other explosive hazard facilities and public areas must be based on the MCE.

8. Add § 420.70 to read as follows:

§ 420.70 Separation distance measurement requirements.

(a) This section applies to all measurements of distances performed under §§ 420.63 through 420.69.

(b) A launch site operator must measure each separation distance along straight lines. For large intervening topographical features such as hills, the launch site operator must measure over or around the feature, whichever is the shorter.

(c) A launch site operator must measure each minimum separation distance from the closest hazard source, such as a container, building, segment, or positive cut-off point in piping, in an explosive hazard facility. When measuring, a launch site operator must:

(1) For a public traffic route distance measure from the nearest side of the public traffic route to the closest point of the hazard source; and

(2) For an intraline distance measure from the nearest point of one hazard source to the nearest point of the next hazard source. The minimum separation

distance must be the distance for the explosive quantity or NEW that requires the greater distance.

9. Revise Appendix E to part 420 to read as follows:

Appendix E to Part 420—Tables for Explosive Site Plan

TABLE E–1—DIVISION 1.1 DISTANCES TO A PUBLIC AREA OR PUBLIC TRAFFIC ROUTE NEW ≤ 450 LBS

NEW (lbs.)	Distance to public area (ft) [1 2]	Distance to public traffic route distance (ft) [2]
≤0.5	236	142
0.7	263	158
1	291	175
2	346	208
3	378	227
5	419	251
7	445	267
10	474	284
15	506	304
20	529	317
30	561	337
31	563	338
50	601	361
70	628	377
100	658	395
150	815	489
200	927	556
300	1,085	651
450	1,243	746

[1] To calculate distance d to a public area from NEW:
NEW ≤ 0.5 lbs: d = 236
0.5 lbs < NEW < 100 lbs: d = 291.3 + [79.2 * ln(NEW)]
100 lbs ≤ NEW ≤ 450 lbs: d = −1133.9 + [389 * ln(NEW)]
NEW is in lbs; d is in ft; ln is natural logarithm.
To calculate maximum NEW given distance d (noting that d can never be less than 236 ft):
0 ≤ d < 236 ft: Not allowed (d cannot be less than 236 ft)
236 ft ≤ d < 658 ft: NEW = exp [(d/79.2) − 3.678]
658 ft ≤ d < 1250 ft: NEW = exp [(d/389) + 2.914]
NEW is in lbs; d is in ft; exp[x] is e^x.
[2] The public traffic route distance is 60 percent of the distance to a public area.

TABLE E–2—DIVISION 1.1 DISTANCE TO PUBLIC AREA AND PUBLIC TRAFFIC ROUTE FOR NEW > 450 LBS

NEW (lbs)	Distance to public area (ft) [1]	Distance to public traffic route (ft)
450 lbs < NEW ≤ 30,000 lbs	1,250	750.
30,000 lbs < NEW ≤ 100,000 lbs	40 * NEW $^{1/3}$	0.60 * (Distance to Public Area).
100,000 lbs < NEW ≤ 250,000 lbs	2.42 * NEW $^{0.577}$	0.60 * (Distance to Public Area).
250,000 lbs < NEW	50 * NEW $^{1/3}$	0.60 * (Distance to Public Area).

[1] To calculate NEW from distance d to a public area:
1,243 ft < d ≤ 1,857 ft: NEW = $d^3/64{,}000$.
1,857 ft < d ≤ 3,150 ft: NEW = 0.2162 * $d^{1.7331}$.
3,150 ft < d: NEW = $d^3/125{,}000$.
NEW is in lbs; d is in ft.

TABLE E–3—DIVISION 1.1 INTRALINE DISTANCES [1 2 3]

NEW (lbs)	Intraline distance (ft)
50	66
70	74
100	84
150	96
200	105
300	120
500	143
700	160
1,000	180
1,500	206
2,000	227
3,000	260
5,000	308
7,000	344
10,000	388
15,000	444
20,000	489

TABLE E–3—DIVISION 1.1 INTRALINE DISTANCES [1] [2] [3]—Continued

NEW (lbs)	Intraline distance (ft)
30,000	559
50,000	663
70,000	742
100,000	835
150,000	956
200,000	1,053
300,000	1,205
500,000 [3]	1,429
700,000	1,508
1,000,000	1,800
1,500,000	2,060
2,000,000	2,268
3,000,000	2,596
5,000,000	3,078

[1] To calculate intraline distance d from NEW:
$d = 18*NEW^{1/3}$
NEW is in pounds; d is in feet
[2] To calculate maximum NEW from given intraline distance d:
$NEW = d^3/5{,}832$
NEW is in pounds; d is in feet
[3] A NEW greater than 500,000 lbs is not allowed for division 1.1 explosives. Therefore, the parts of the table that list NEW values of more than 500,000 lbs are only applicable to liquid propellants with TNT equivalents equal to those NEW values.

TABLE E–4—DIVISION 1.3 SEPARATION DISTANCES

NEW (lbs)	Distance to public area or public traffic route (ft) [1]	Intraline distance (ft) [2]
≤1000	75	50
1,500	82	56
2,000	89	61
3,000	101	68
5,000	117	80
7,000	130	88
10,000	145	98
15,000	164	112
20,000	180	122
30,000	204	138
50,000	240	163
70,000	268	181
100,000	300	204
150,000	346	234
200,000	385	260
300,000	454	303
500,000	569	372
700,000	668	428
1,000,000	800	500
1,500,000	936	577
2,000,000	1,008	630

[1] To calculate distance d to a public area or traffic route from NEW:
NEW ≤1,000 lbs
$d = 75$ ft
1,000 lbs < NEW ≤ 96,000 lbs
$d = \exp [2.47 + 0.2368 * (\ln(NEW)) + 0.00384 * (\ln(NEW))^2]$
96,000 lbs < NEW ≤1,000,000 lbs,
$d = \exp [7.2297 - 0.5984 * (\ln(NEW)) + 0.04046 * (\ln(NEW))^2]$
NEW > 1,000,000 lbs
$d = 8 * NEW^{1/3}$
NEW is in pounds; d is in feet; exp[x] is e^x; ln is natural logarithm
To calculate NEW from distance d to a public area or traffic route (noting that d cannot be less than 75 ft):
0 ≤ d < 75 ft:
Not allowed (d cannot be less than 75 ft)
75 ft ≤ d ≤ 296 ft
$NEW = \exp [-30.833 + (307.465 + 260.417 * (\ln(d)))^{1/2}]$
296 ft < d ≤ 800 ft
$NEW = \exp [7.395 + (-124.002 + 24.716 * (\ln(d)))^{1/2}]$
800 ft < d
$NEW = d^3/512$
NEW is in lbs; d is in ft; exp[x] is e^x; ln is natural logarithm
[2] To calculate intraline distance d from NEW:
NEW ≤ 1,000 lbs
$d = 50$ ft

1,000 lbs < NEW ≤ 84,000 lbs
d = exp [2.0325 + 0.2488 * (ln(NEW)) + 0.00313 * (ln(NEW))^2]
84,000 lbs < NEW ≤ 1,000,000 lbs
d = exp [4.338 − 0.1695 * (ln(NEW)) + 0.0221 * (ln(NEW))^2]
1,000,000 lbs < NEW
d = 5*NEW$^{1/3}$
NEW is in pounds; d is in feet; exp[x] is e^x; ln is natural logarithm
To calculate NEW from an intraline distance d:
0 ≤ d < 50 ft:
Not allowed (d cannot be less than 50 ft)
50 ft ≤ d ≤ 192 ft
NEW = exp[−39.744 + (930.257 + 319.49 * (ln(d)))$^{1/2}$]
192 ft < d ≤ 500 ft
NEW = exp[3.834 + (−181.58 + 45.249 * (ln(d)))$^{1/2}$]
500 ft < d
NEW = d^3/125
NEW is in pounds; d is in feet; exp[x] is e^x; ln is natural logarithm

TABLE E–5—ENERGETIC LIQUID EXPLOSIVE EQUIVALENTS [1] [2] [3]

Energetic liquids	TNT equivalence Static test stands	TNT equivalence Launch pads
LO_2/LH_2	*See* Note 3	*See* Note 3.
LO_2/LH_2 + LO_2/RP–1	Sum of (see Note 3 for LO_2/LH_2) + (10% for LO_2/RP1).	Sum of (see Note 3 for LO_2/LH_2) + (20% for LO_2/RP1).
LO_2/RP–1	10%	20% up to 500,000 lbs Plus 10% over 500,000 lbs.
IRFNA/UDMH	10%	10%.
N_2O_4/UDMH + N_2H_4	5%	10%.

[1] A launch site operator must use the percentage factors of table E–5 to determine TNT equivalencies of incompatible energetic liquids that are within an intraline distance of each other.
[2] A launch site operator may substitute the following energetic liquids to determine TNT equivalency under this table as follows:
Alcohols or other hydrocarbon for RP–1
H_2O_2 for LO_2 (only when LO_2 is in combination with RP–1 or equivalent hydrocarbon fuel)
MMH for N_2H_4, UDMH, or combinations of the two.
[3] TNT equivalency for LO_2/LH_2 is the larger of:
(a) TNT equivalency of 8 * W$^{2/3}$, where W is the weight of LO_2/LH_2 in lbs; or
(b) 14 percent of the LO_2/LH_2 weight.

TABLE E–6—FACTORS TO USE WHEN CONVERTING ENERGETIC LIQUID DENSITIES

Item	Density (lb/gal)	Temperature (°F)
Ethyl alcohol	6.6	68
Hydrazine	8.4	68
Hydrogen peroxide (90 percent)	11.6	68
Liquid hydrogen	0.59	−423
Liquid oxygen	9.5	−297
Red fuming nitric acid (IRFNA)	12.9	77
RP–1	6.8	68
UDMH	6.6	68
UDMH/Hydrazine	7.5	68

TABLE E–7—SEPARATION DISTANCE CRITERIA FOR STORAGE OF HYDROGEN PEROXIDE IN CONCENTRATIONS OF MORE THAN 91 PERCENT [1, 2, 3,]

Quantity (lbs)	Intraline distance or distance to public area or distance to public traffic route (ft)
10,000	510
15,000	592
20,000	651
30,000	746
50,000	884
70,000	989
100,000	1114
150,000	1275
200,000	1404
300,000	1607

TABLE E–7—SEPARATION DISTANCE CRITERIA FOR STORAGE OF HYDROGEN PEROXIDE IN CONCENTRATIONS OF MORE THAN 91 PERCENT [1, 2, 3,]—Continued

Quantity (lbs)	Intraline distance or distance to public area or distance to public traffic route (ft)
500,000	1905

[1] Multiple tanks containing hydrogen peroxide in concentrations of greater than 91 percent may be located at distances less than those required by table E–7; however, if the tanks are not separated from each other by 10 percent of the distance specified for the largest tank, then the launch site operator must use the total contents of all tanks to calculate each intraline distance and the distance to each public area and each public traffic route.

[2] A launch site operator may use the equations below to determine permissible distance or quantity between the entries of table E–7:

W > 10,000 lbs Distance = 24 * $W^{1/3}$

Where Distance is in ft and W is in lbs.

To calculate weight of hydrogen peroxide from a distance d:

d > 75 ft W = $d^3/13824$

Where distance d is in ft and W is in lbs.

[3] For storage of Class 4 oxidizer inside of a building, the launch site operator must provide sprinkler protection in accordance with NFPA 430.

TABLE E–8—SEPARATION DISTANCE CRITERIA FOR STORAGE OF LIQUID HYDROGEN AND BULK QUANTITIES OF HYDRAZINE

Pounds of energetic liquid	Pounds of energetic liquid	Public area and intraline distance to incompatible energetic liquids	Intraline distance to compatible energetic liquids	Pounds of energetic liquid	Pounds of energetic liquid	Public area and intraline distance to incompatible energetic liquids	Intraline distance to compatible energetic liquids
Over	Not Over	Distance in feet	Distance in feet	Over	Not Over	Distance in feet	Distance in feet
				60,000	70,000	1,200	130
100	200	600	35	70,000	80,000	1,200	130
200	300	600	40	80,000	90,000	1,200	135
300	400	600	45	90,000	100,000	1,200	135
400	500	600	50	100,000	125,000	1,800	140
500	600	600	50	125,000	150,000	1,800	145
600	700	600	55	150,000	175,000	1,800	150
700	800	600	55	175,000	200,000	1,800	155
800	900	600	60	200,000	250,000	1,800	160
900	1,000	600	60	250,000	300,000	1,800	165
1,000	2,000	600	65	300,000	350,000	1,800	170
2,000	3,000	600	70	350,000	400,000	1,800	175
3,000	4,000	600	75	400,000	450,000	1,800	180
4,000	5,000	600	80	450,000	500,000	1,800	180
5,000	6,000	600	80	500,000	600,000	1,800	185
6,000	7,000	600	85	600,000	700,000	1,800	190
7,000	8,000	600	85	700,000	800,000	1,800	195
8,000	9,000	600	90	800,000	900,000	1,800	200
9,000	10,000	600	90	900,000	1,000,000	1,800	205
10,000	15,000	1,200	95	1,000,000	2,000,000	1,800	235
15,000	20,000	1,200	100	2,000,000	3,000,000	1,800	255
20,000	25,000	1,200	105	3,000,000	4,000,000	1,800	265
25,000	30,000	1,200	110	4,000,000	5,000,000	1,800	275
30,000	35,000	1,200	110	5,000,000	6,000,000	1,800	285
35,000	40,000	1,200	115	6,000,000	7,000,000	1,800	295
40,000	45,000	1,200	120	7,000,000	8,000,000	1,800	300
45,000	50,000	1,200	120	8,000,000	9,000,000	1,800	305
50,000	60,000	1,200	125	9,000,000	10,000,000	1,800	310

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George Nield,

Associate Administrator for Commercial Space Transportation.

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