

on a hazard analysis form with numbers and letters provided for multiple entries against an individual line item. A line item consists of a hardware or operation description and a hazard.

(4) *Hazard analysis data.* A hazard analysis form must contain or reference all information necessary to understand the relationship of a system, subsystem, component, or operation with a hazard cause, control, and verification.

(e) *Hazard analysis supporting data.* A ground safety analysis report must include data that supports the hazard analysis. If such data does not fit onto the hazard analysis form, a launch operator must provide the data in a supporting data chapter. This chapter must contain a table of contents and may reference other documents that contain supporting data.

PARTS 418–419 [RESERVED]

PART 420—LICENSE TO OPERATE A LAUNCH SITE

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Subpart A—General

§ 420.1 Scope.

This part prescribes the information and demonstrations that must be provided to the FAA as part of a license application, the bases for license approval, license terms and conditions, and post-licensing requirements with which a licensee shall comply to remain licensed. Requirements for preparing a license application are contained in part 413 of this subchapter.

§ 420.3 Applicability.

This part applies to any person seeking a license to operate a launch site or to a person licensed under this part. A person operating a site that only supports amateur rocket activities, as defined in 14 CFR 401.5, does not need a license under this part to operate the site.

§ 420.5 Definitions.

For the purpose of this part.

Ballistic coefficient means the weight of an object divided by the quantity product of the coefficient of drag of the object and the area of the object.

Compatibility means the chemical property of materials that may be located together without increasing the

probability of an accident or, for a given quantity, the magnitude of the effects of such an accident.

Debris dispersion radius (D_{\max}) means the estimated maximum distance from a launch point that debris travels given a worst-case launch vehicle failure and flight termination early in flight. For an expendable launch vehicle, flight termination is assumed to occur at 10 seconds into flight.

Downrange area means a portion of a flight corridor beginning where a launch area ends and ending 5,000 nautical miles from the launch point, or where the IIP leaves the surface of the Earth, whichever is shorter, for an orbital launch vehicle; and ending with an impact dispersion area for a guided sub-orbital launch vehicle.

E,F,G coordinate system means an orthogonal, Earth-fixed, geocentric, right-handed system. The origin of the coordinate system is at the center of an ellipsoidal Earth model. The E-axis is positive directed through the Greenwich meridian. The F-axis is positive directed through 90 degrees east longitude. The EF-plane is coincident with the ellipsoidal Earth model's equatorial plane. The G-axis is normal to the EF-plane and positive directed through the north pole.

E,N,U coordinate system means an orthogonal, Earth-fixed, topocentric, right-handed system. The origin of the coordinate system is at a launch point. The E-axis is positive directed east. The N-axis is positive directed north. The EN-plane is tangent to an ellipsoidal Earth model's surface at the origin and perpendicular to the geodetic vertical. The U-axis is normal to the EN-plane and positive directed away from the Earth.

Effective casualty area (A_c) means the aggregate casualty area of each piece of debris created by a launch vehicle failure at a particular point on its trajectory. The effective casualty area for each piece of debris is the area within which 100 percent of the unprotected population on the ground are assumed to be a casualty, and outside of which 100 percent of the population are assumed not to be a casualty. An effective casualty area accounts for the characteristics of the debris piece, including its size, the path angle of its

trajectory, impact explosions, and debris skip, splatter, and bounce. An effective casualty area also accounts for the size of a person.

Explosive means any chemical compound or mechanical mixture that, when subjected to heat, impact, friction, detonation or other suitable initiation, undergoes a rapid chemical change that releases large volumes of highly heated gases that exert pressure in the surrounding medium. The term applies to materials that either detonate or deflagrate.

Explosive division means the division within hazard class 1 of an explosive as defined in the United Nations Organization classification system for transport of dangerous goods, and as determined in accordance with 49 CFR part 173, subpart C.

Explosive equivalent means a measure of the blast effects from explosion of a given quantity of material expressed in terms of the weight of trinitrotoluene (TNT) that would produce the same blast effects when detonated.

Explosive hazard facility means a facility at a launch site where solid propellant, liquid propellant, or other explosives are stored or handled.

Flight azimuth means the initial direction in which a launch vehicle flies relative to true north expressed in degrees-decimal-degrees.

Flight corridor means an area on the Earth's surface estimated to contain the hazardous debris from nominal flight of a launch vehicle, and non-nominal flight of a launch vehicle assuming a perfectly functioning flight termination system or other flight safety system.

Guided suborbital launch vehicle means a suborbital rocket that employs an active guidance system.

Hazard class means the class of an explosive as defined by the United Nations Organization classification system for transport of dangerous goods, and as determined in accordance with 49 CFR part 173, subpart C.

Impact dispersion area means an area representing an estimated three standard deviation dispersion about a nominal impact point of an intermediate or final stage of a suborbital launch vehicle.

Impact dispersion factor means a constant used to estimate, using a stage apogee, a three standard deviation dispersion about a nominal impact point of an intermediate or final stage of a suborbital launch vehicle.

Impact dispersion radius (R_i) means a radius that defines an impact dispersion area.

Impact range means the distance between a launch point and the impact point of a suborbital launch vehicle stage.

Impact range factor means a constant used to estimate, when multiplied by a stage apogee, the nominal impact point of an intermediate or final stage of a suborbital launch vehicle.

Instantaneous impact point (IIP) means an impact point, following thrust termination of a launch vehicle. IIP may be calculated with or without atmospheric drag effects.

Instantaneous impact point (IIP) range rate means a launch vehicle's estimated IIP velocity along the Earth's surface.

Intraline distance means the minimum distance permitted between any two explosive hazard facilities in the ownership, possession or control of one launch site customer.

Launch area means, for a flight corridor defined in accordance with appendix A of this part, the portion of a flight corridor from the launch point to a point 100 nautical miles in the direction of the flight azimuth. For a flight corridor defined in accordance with appendix B of this part, a launch area is the portion of a flight corridor from the launch point to the enveloping line enclosing the outer boundary of the last debris dispersion circle.

Launch point means a point on the Earth from which the flight of a launch vehicle begins, and is defined by its geodetic latitude, longitude and height on an ellipsoidal Earth model.

Launch site accident means an unplanned event occurring during a ground activity at a launch site resulting in a fatality or serious injury (as defined in 49 CFR 830.2) to any person who is not associated with the activity, or any damage estimated to exceed \$25,000 to property not associated with the activity.

Net explosive weight (NEW) means the total weight, expressed in pounds, of explosive material or explosive equivalency contained in an item.

Nominal means, in reference to launch vehicle performance, trajectory, or stage impact point, a launch vehicle flight where all launch vehicle aerodynamic parameters are as expected, all vehicle internal and external systems perform as planned, and there are no external perturbing influences (e.g., winds) other than atmospheric drag and gravity.

Overflight dwell time means the period of time it takes for a launch vehicle's IIP to move past a populated area. For a given populated area, the overflight dwell time is the time period measured along the nominal trajectory IIP ground trace from the time point whose normal with the trajectory intersects the most uprange part of the populated area to the time point whose normal with the trajectory intersects the most downrange part of the populated area.

Overflight exclusion zone means a portion of a flight corridor which must remain clear of the public during the flight of a launch vehicle.

Populated area means a land area with population.

Population density means the number of people per unit area in a populated area.

Position data means data referring to the current position of a launch vehicle with respect to flight time expressed through the X, Y, Z coordinate system.

Public means people and property that are not involved in supporting a licensed launch, and includes those people and property that may be located within the boundary of a launch site, such as visitors, any individual providing goods or services not related to launch processing or flight, and any other launch operator and its personnel.

Public area means any area outside a hazard area and is an area that is not in the possession, ownership or other control of a launch site operator or of a launch site customer who possesses, owns or otherwise controls that hazard area.

Public area distance means the minimum distance permitted between a

public area and an explosive hazard facility.

Public traffic route distance means the minimum distance permitted between a public highway or railroad line and an explosive hazard facility.

Trajectory means the position and velocity components as a function of time of a launch vehicle relative to an x, y, z coordinate system, expressed in x, y, z, \dot{x} , \dot{y} , \dot{z} .

Unguided sub-orbital launch vehicle means a sub-orbital rocket that does not have a guidance system.

X, Y, Z coordinate system means an orthogonal, Earth-fixed, topocentric, right-handed system. The origin of the coordinate system is at a launch point. The x-axis coincides with the initial launch azimuth and is positive in the downrange direction. The y-axis is positive to the left looking downrange. The xy-plane is tangent to the ellipsoidal earth model's surface at the origin and perpendicular to the geodetic vertical. The z-axis is normal to the xy-plane and positive directed away from the earth.

ϕ_0, λ_0, h_0 means a latitude, longitude, height system where ϕ_0 is the geodetic latitude of a launch point, λ_0 is the east longitude of the launch point, and h_0 is the height of the launch point above the reference ellipsoid. ϕ_0 and λ_0 are expressed in degrees-decimal-degrees.

§§ 420.6–420.14 [Reserved]

Subpart B—Criteria and Information Requirements for Obtaining a License

§ 420.15 Information requirements.

(a) *General*—(1) *Launch site operator.* An applicant shall identify the name and address of the applicant, and the name, address, and telephone number of any person to whom inquiries and correspondence should be directed.

(2) *Launch site.* An applicant shall provide the name and location of the proposed launch site and include the following information:

- (i) A list of downrange equipment;
- (ii) A description of the layout of the launch site, including launch points;
- (iii) The types of launch vehicles to be supported at each launch point;

(iv) The range of launch azimuths planned from each launch point; and

(v) The scheduled operational date.

(3) *Foreign ownership.* Identify foreign ownership of the applicant, as follows:

(i) For a sole proprietorship or partnership, all foreign owners or partners;

(ii) For a corporation, any foreign ownership interest of 10 percent or more; and

(iii) For a joint venture, association, or other entity, any foreign entities participating in the entity.

(b) *Environmental.* An applicant shall provide the FAA with information for the FAA to analyze the environmental impacts associated with the operation of the proposed launch site. The information provided by an applicant must be sufficient to enable the FAA to comply with the requirements of the National Environment Policy Act, 42 U.S.C. 4321 *et seq.* (NEPA), the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA, 40 CFR parts 1500–1508, and the FAA's Procedures for Considering Environmental Impacts, FAA Order 1050.1D. An applicant shall submit environmental information concerning a proposed launch site not covered by existing environmental documentation, and other factors as determined by the FAA.

(c) *Launch site location.* (1) Except as provided by paragraph (c)(2) of this section, an applicant shall provide the information necessary to demonstrate compliance with §§ 420.19–420.29.

(2) An applicant who is proposing to locate a launch site at an existing launch point at a federal launch range is not required to comply with paragraph (c)(1) of this section if a launch vehicle of the same type and class as proposed for the launch point has been safely launched from the launch point.

(d) *Explosive site plan.* (1) Except as provided by paragraph (d)(2) of this section, an applicant shall submit an explosive site plan that complies with §§ 420.63, 420.65, 420.67, and 420.69.

(2) If an applicant plans to operate a launch site located on a federal launch range, and if the applicant is required by the federal launch range to comply with the federal launch range's explosive safety requirements, the applicant