

#### § 417.225

anomalous condition exhibits the potential for a stage or its debris to impact the Earth or reenter the atmosphere during the mission or any future mission of similar launch vehicle capability. Also, either a launch incident or launch accident constitutes a failure.

(c) *Previous flight.* For flight analysis purposes, flight begins at a time in which a launch vehicle normally or inadvertently lifts off from a launch platform. Lift-off occurs with any motion of the launch vehicle with respect to the launch platform.

#### § 417.225 Debris risk analysis.

A flight safety analysis must demonstrate that the risk to the public potentially exposed to inert and explosive debris hazards from any one flight of a launch vehicle satisfies the public risk criterion of § 417.107(b) for debris. A debris risk analysis must account for risk to populations on land, including regions of launch vehicle flight following passage through any gate in a flight safety limit established as required by § 417.217. A debris risk analysis must account for any potential casualties to the public as required by the debris thresholds and requirements of § 417.107(c).

#### § 417.227 Toxic release hazard analysis.

A flight safety analysis must establish flight commit criteria that protect the public from any hazard associated with toxic release and demonstrate compliance with the public risk criterion of § 417.107(b). The analysis must account for any toxic release that will occur during the proposed flight of a launch vehicle or that would occur in the event of a flight mishap. The analysis must account for any operational constraints and emergency procedures that provide protection from toxic release. The analysis must account for all members of the public that may be exposed to the toxic release, including all members of the public on land and on any waterborne vessels, populated offshore structures, and aircraft that are not operated in direct support of the launch.

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#### § 417.229 Far-field overpressure blast effects analysis.

(a) *General.* A flight safety analysis must establish flight commit criteria that protect the public from any hazard associated with far field blast overpressure effects due to potential explosions during launch vehicle flight and demonstrate compliance with the public risk criterion of § 417.107(b).

(b) *Analysis constraints.* The analysis must account for:

(1) The potential for distant focus overpressure or overpressure enhancement given current meteorological conditions and terrain characteristics;

(2) The potential for broken windows due to peak incident overpressures below 1.0 psi and related casualties;

(3) The explosive capability of the launch vehicle at impact and at altitude and potential explosions resulting from debris impacts, including the potential for mixing of liquid propellants;

(4) Characteristics of the launch vehicle flight and the surroundings that would affect the population's susceptibility to injury, such as, shelter types and time of day of the proposed launch;

(5) Characteristics of the potentially affected windows, including their size, location, orientation, glazing material, and condition; and

(6) The hazard characteristics of the potential glass shards, such as falling from upper building stories or being propelled into or out of a shelter toward potentially occupied spaces.

#### § 417.231 Collision avoidance analysis.

(a) *General.* A flight safety analysis must include a collision avoidance analysis that establishes each launch wait in a planned launch window during which a launch operator must not initiate flight, in order to protect any manned or mannable orbiting object. A launch operator must account for uncertainties associated with launch vehicle performance and timing and ensure that any calculated launch waits incorporate all additional time periods associated with such uncertainties. A launch operator must implement any launch waits as flight commit criteria according to § 417.113(b).

(b) *Orbital launch.* For an orbital launch, the analysis must establish any launch waits needed to ensure that