

**§417.105 Launch personnel qualifications and certification.**

(a) *General.* A launch operator must employ a personnel certification program that documents the qualifications, including education, experience, and training, for each member of the launch crew.

(b) *Personnel certification program.* A launch operator's personnel certification program must:

(1) Conduct an annual personnel qualifications review and issue individual certifications to perform safety related tasks.

(2) Revoke individual certifications for negligence or failure to satisfy certification requirements.

**§417.107 Flight safety.**

(a) *Flight safety system.* For each launch vehicle, vehicle component, and payload, a launch operator must use a flight safety system that satisfies subpart D of this part as follows, unless §417.125 applies.

(1) *In the vicinity of the launch site.* For each launch vehicle, vehicle component, and payload, a launch operator must use a flight safety system in the vicinity of the launch site if the following exist:

(i) Any hazard from a launch vehicle, vehicle component, or payload can reach any protected area at any time during flight; or

(ii) A failure of the launch vehicle would have a high consequence to the public.

(2) *In the downrange area.* For each launch vehicle, vehicle component, and payload, a launch operator must provide a flight safety system downrange if the absence of a flight safety system would significantly increase the accumulated risk from debris impacts.

(b) *Public risk criteria.* A launch operator may initiate the flight of a launch vehicle only if flight safety analysis performed under paragraph (f) of this section demonstrates that any risk to the public satisfies the following public risk criteria:

(1) A launch operator may initiate the flight of a launch vehicle only if the risk associated with the total flight to all members of the public, excluding persons in waterborne vessels and aircraft, does not exceed an ex-

pected average number of 0.00003 casualties ( $E_c \leq 30 \times 10^{-6}$ ) from impacting inert and impacting explosive debris, ( $E_c \leq 30 \times 10^{-6}$ ) for toxic release, and ( $E_c \leq 30 \times 10^{-6}$ ) for far field blast overpressure. The FAA will determine whether to approve public risk due to any other hazard associated with the proposed flight of a launch vehicle on a case-by-case basis. The  $E_c$  criterion for each hazard applies to each launch from lift-off through orbital insertion, including each planned impact, for an orbital launch, and through final impact for a suborbital launch.

(2) A launch operator may initiate flight only if the risk to any individual member of the public does not exceed a casualty expectation ( $E_c$  of 0.000001 per launch ( $E_c \leq 1 \times 10^{-6}$ ) for each hazard.

(3) A launch operator must implement water borne vessel hazard areas that provide an equivalent level of safety to that provided by water borne vessel hazard areas implemented for launch from a Federal launch range.

(4) A launch operator must establish aircraft hazard areas that provide an equivalent level of safety to that provided by aircraft hazard areas implemented for launch from a Federal launch range.

(c) *Debris thresholds.* A launch operator's flight safety analysis, performed as required by paragraph (f) of this section, must account for any inert debris impact with a mean expected kinetic energy at impact greater than or equal to 11 ft-lbs and, except for the far field blast overpressure effects analysis of §417.229, a peak incident overpressure greater than or equal to 1.0 psi due to any explosive debris impact.

(1) When using the 11 ft-lbs threshold to determine potential casualties due to blunt trauma from inert debris impacts, the analysis must:

(i) Incorporate a probabilistic model that accounts for the probability of casualty due to any debris expected to impact with kinetic energy of 11 ft-lbs or greater and satisfy paragraph (d) of this section; or

(ii) Count each expected impact with kinetic energy of 11 ft-lbs or greater to a person as a casualty.

(2) When applying the 1.0 psi threshold to determine potential casualties