

all of the safety official's concerns are addressed prior to launch.

**§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 expected 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.