

The consequence outcomes for the classes of flammable effects are summarized (the flame envelope is defined as the area between the lower flammable limit, LFL, and upper flammable limit, UFL):

- Fireball, pool fire, jet fire—all persons, indoor and outdoor, within the flame envelope are considered fatalities. All persons, indoor and outdoor, exposed to radiation levels exceeding 11,000 BTU/hr/ft<sup>2</sup> (35 kW/m<sup>2</sup>) are considered fatalities. For smaller radiation levels, the Probit method is utilized to calculate the probability of fatality.
- Flash fire—all persons, indoor and outdoor, within the flame envelope are considered fatalities. All persons, indoor and outdoor, outside of the flame envelope are not considered fatalities.
- Explosion—all persons, indoor and outdoor, exposed to overpressures exceeding 4.35 psig (0.3 barg) are considered fatalities. All indoors persons exposed to overpressures exceeding 1.45 psig (0.1 barg) are considered have a 2.5% probability of fatality. All other exposures are not considered fatalities. The TNT-equivalency explosion method (efficiency of 10%) is used to calculate the overpressure profile for explosion.

### 3.4.1.1 Representative Hazard Distances

Representative hazard distances for small (0.5-inch leak), large (2-inch leak), and catastrophic rupture of the DOT-113 tank cars are provided in Table 22. The releases are considered to occur at the MAWP of the LNG DOT-113 (90 psig) and saturation temperature for methane (-203 °F), at an elevation of 6-ft. The release distances were calculated in PHAST v6.7 using the hazard thresholds described above.

**Table 22. Representative hazard distances for LNG releases from DOT-113 tank cars.**

Release Scenario	Flash Fire Hazard Distance (ft)	Explosion Overpressure Hazard Distance (ft)	Jet Fire or Fireball Hazard Distance (ft)
<b>Hazard Threshold</b>	<b>Lower Flammability Limit (LFL)</b>	<b>4.35 psig (0.3 barg)</b>	<b>11,100 BTU/hr-ft<sup>2v</sup> (35 kW/m<sup>2</sup>)</b>
<b>0.5-inch</b>	52.4	46.6	78.7
<b>2-inch</b>	293	339	275
<b>Catastrophic Rupture</b>	482	757	356

The hazard distances presented here represent the worst-case potential outcome, assuming the flammable clouds are allowed to fully develop (i.e. ignition occurs once the flammable clouds reach their maximum extent). These distances do not reflect the risk from the releases as the