Q20. Should both early and late pool fire results be used in a risk-based approach, where early and late ignitions have been assigned probabilities?

Within the Shannon LNG QRA both 'early' and 'late' ignition of spilled LNG are modelled.

Early ignition of a spill of LNG is considered to give rise to a pool fire. The 'early' pool fire results from PHAST have been used to represent this case. The 'early' pool fire in Phast reflects the steady state condition of a pool fire (normally where the pool diameter reaches a limiting size when LNG spill rate is equal to the LNG burning rate).

Late ignition of a spill of LNG is modelled as ignition of dispersing LNG vapour. This 'late' ignition would result in a flash fire, with the diffusion flame front burning back to the source of the vapour. In the majority of cases this would be a pool of LNG unless it had completely evaporated. The model represents 'late' ignition in this way rather than using 'late' pool fires because the hazard ranges associated with flash fires are similar to, or greater than, those for 'late' pool fires. Use of the flash fire hazard range to represent the late ignition case is therefore more conservative than using the late pool fire hazard range. A set of example hazard ranges is presented in the table below.

Case Description	**Tag**	**Distance to LFL (m)**	**Late Pool Fire, Distance to 7 kW/m²**
F2 Weather			
Catastrophic failure of a full (190,000 m³) tank	T1a_dx	9250	3800
1m hole in tank containing 145,000 m³	T1b_bx	1720	1200
0.3m hole in tank containing 60,000 m³	T1d_ax	560	420
D5 Weather			
Catastrophic failure of a full (190,000 m³) tank	T1a_dx	5450	3900
1m hole in tank containing 145,000 m³	T1b_bx	1800	1350
0.3m hole in tank containing 60,000 m³	T1d_ax	400	450

In conclusion, late ignition of spilled LNG is modelled in the QRA using LNG vapour dispersion hazard ranges rather than those for 'late pool fires' to provide conservatism within the model.