



Figure 28. Block diagram for PHAST.

3.3 Ignition of a Flammable Cloud

Given a release of LNG and the formation of a flammable cloud, the hazardous outcomes analyzed in the QRA only occur if there is ignition of the flammable mixture. The timing of the ignition affects the consequence outcome because the flammable cloud stops growing after ignition since the flammable vapor will be burned. For example, immediate ignition of the release may result in a pool fire or jet fire (or both); delayed ignition may result in a pool fire, flash fire, or explosion. For each scenario modeled, PHAST Risk calculates the outcome due to both immediate ignition and delayed ignition. The immediate and delayed ignition probabilities in PHAST Risk are consistent with the guidelines published in the Dutch Purple Book.^{38,39}

Exponent applied the default PHAST Risk ignition probability values for two release types:

- “Stationary” facility ignition probabilities were assigned for lifting operation incidents.
- “Tank wagon” (i.e., rail tank car) ignition probabilities were assigned for the train movement incidents.

³⁸ PHAST Risk Technical Documentation, “MPACT Theory,” DNV Software, page 103 (2010).

³⁹ Chapter 4.7, Ignition, in *Guideline for Quantitative Risk Assessment* (Dutch Purple Book), Publication Series on Dangerous Substances, Ministerie van Verkeer en Waterstaat (2005).