

3.1 Estimating Accident Rates and LOC Probabilities

The sequence of events leading to a loss of containment (LOC) of LNG in the analysis starts with an accident involving one or more ISOs. The rate of mainline train accidents was applied to shipping along the routes. The rate of yard train accidents and dropping of ISO containers during lifts was applied to the rail yards and intermodal facilities. No QRA-ready databases of train accidents and LOC probabilities existed for LNG ISOs. Thus, representative accident/failure frequency and probability values were developed from industry-available databases and FRA rail accident statistics. An accident model was developed to calculate the LOC frequency for rail movements in the QRA. As shown in Figure 22, the train accident rate was first calculated. Then, given an accident, the probability of derailment for various considerations was calculated. Ultimately, the probability of LOC was calculated. Multiplying these three values together yielded the LOC rate for a given scenario. The bases, assumptions, and results are discussed in the following sections.

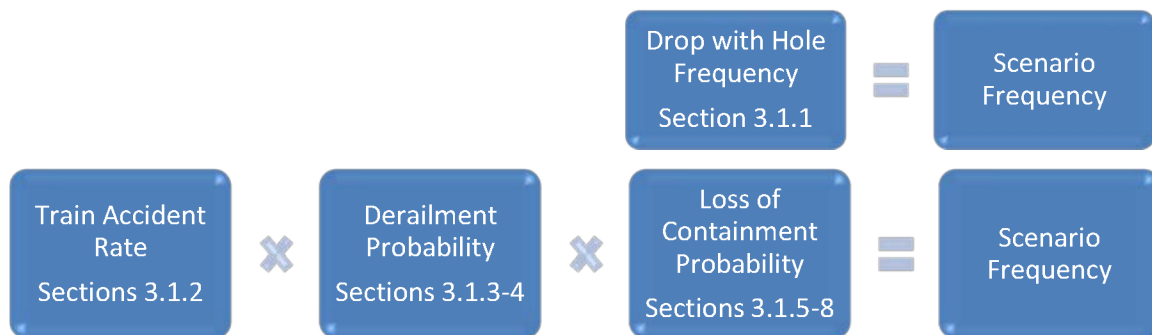


Figure 22. LNG ISO train accident model overview.

3.1.1 Lifting Accident Rates and LOC Probabilities

Lifting of the ISO containers onto rail cars occurs at the Hialeah Yard Intermodal Facility; they are then lifted off at the destination intermodal facility. Given the safety management systems (e.g., training, independent verification of twist-lock engagement, equipment maintenance, etc.) at FECR’s intermodal facilities, the predominant hazard considered during this operation was a dropped ISO container during Lift On/Lift Off operations. No FECR or general U.S. drop rates were available for intermodal operations at rail yards, but international failure rates were available. It is reasonable to assume that an international failure rate would apply to this operation since intermodal freight is shipped internationally. The UK Health and Safety Executive (HSE)¹⁹ estimates a rate of 6×10^{-7} drops per lift will result in a 50 mm (2-inch) diameter hole for ISO tank containers (Table 4), for lifts at a height of less than 5 meters (16.4

¹⁹ *Failure Rate and Event Data for use within Risk Assessments*, UK Health and Safety Executive (June 28, 2012).