calculated risk increases, the type of occupancy becomes more restrictive. The quantitative risk criteria for IR of LNG plants are reproduced in Table 1.

Table 1. Quantitative risk criteria for IR contours around stationary LNG plants as provided by NFPA 59A (2016).

Criterion Annual Frequency (yr^{-1})	Remarks
Zone 1 $IR > 10^{-5}$	Not permitted: Residential, office, and retail Permitted: Occasionally occupied developments (e.g., pump houses, transformer stations)
Zone 2 $10^{-6} \leq IR < 10^{-5}$	Not permitted: Shopping centers, large-scale retail outlets, restaurants, etc. Permitted: Work places, retail and ancillary services, residences in areas of 7,250 to 23,300 persons/$mile^2$ density
Zone 3 $3 \times 10^{-7} \leq IR < 10^{-6}$	Not permitted: Churches, schools, hospitals, major public assembly areas, and other sensitive establishments Permitted: All other structures and activities

For LNG release scenarios, the magnitude of the risk generally increases as the observation point is moved closer to the railroad. The distance to each risk level identified in Section 7 is a result of the compilation of the outcomes calculated from an event tree consisting of many potential fire and explosion events. The resulting IR contours are provided in tabular form as a function of population density and train speed.

Based on NFPA 59A Zone 3 being the most restrictive zone, any IR values that are less than 3×10^{-7} yr^{-1} are not of concern for the analysis in this report, thus these contours are not reported. The IR ranges and associated criteria appear to be based on guidance provided by the Health and Safety Executive in the UK for QRA[9] and do not account for the factors typically considered in a transportation risk analysis. However, the commonly acceptable level of IR for transportation risks for sensitive populations is 10^{-6} yr^{-1}, which is the upper threshold for NFPA 59A Zone 3.[10] IR contours and distance to those contours for both 10^{-6} and 3×10^{-7} yr^{-1} are provided in the results.

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[9] "B.1 Evolution of Land Use Planning Criteria in the UK," in Guidelines for Developing Quantitative Safety Risk Criteria, American Institute of Chemical Engineers, Center for Chemical Process Safety (2009).

[10] See Section 5.4 in reference: Ham JM, M Struckl, AM Heikkila, E Krausmann, C DiMauro, M Christou, JP Nordvik, "Comparison of Risk Analysis Methods and Development of a Template for Risk Characterisation," Institute for the Protection and Security of the Citizen, European Commission, Directorate-General Joint Research Center (2006).