

tool in the latest edition of NFPA 59A, the standard also includes quantitative risk criteria for fixed LNG facilities. NFPA 59A explicitly applies to LNG plants and stationary facilities; it does not apply to LNG transportation or portable LNG containers. Thus, the quantitative risk criteria proposed in the standard are not directly applicable to rail shipping of LNG. However, these risk criteria were used as one basis for quantitative risk criteria for rail shipping of LNG that were used in this analysis.

1.1.2 Individual Risk Criteria

NFPA 59A identifies three “Zones” representing ranges of quantitative risk criteria for evaluating IR. Each risk zone reflects general types of public occupancies recommended to be permitted. As the magnitude of the calculated risk increases, the type of occupancy becomes more restrictive. The quantitative risk criteria for IR of LNG plants are reproduced in Table 1. The occupancies not permitted in Zone 3, as described in Table 1, are referred to as “sensitive targets,” consistent with the FRA guidance document.¹¹ The FRA has requested that FECR identify Zone 3 occupancies that are located within 500 feet of the proposed rail shipping routes. These are provided in tabular form and identified on aerial images in Appendix G.

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 the table is a result of the compilation of the outcomes calculated from an event tree of many potential fire and explosion events.

Based on Zone 3 being the most restrictive zone, any IR values less than (b) (4) are not of concern for the analysis in this report and 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 QRA¹² and do not account for the factors typically considered in a transportation risk analysis. However, the commonly acceptable level of IR for transportation risks on sensitive populations is 10^{-6} , which is the upper threshold for Zone 3.¹³

¹¹ Guidance for Preparing an Application under Title 49 Code of Federal Regulations Section 174.63 for Approval by the Federal Railroad Administration to Transport Liquefied Natural Gas by Rail in Portable Tanks.

¹² “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).

¹³ 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).