

# 1 Introduction

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Exponent conducted a Quantitative Risk Assessment (QRA) for unit train movement of liquefied natural gas (LNG) in DOT-113 tank cars for Energy Transport Solutions, LLC (ETS). The objective of the study was to determine the level of risk associated with the shipping of the LNG DOT-113 tank cars along mainline track routes.

The following considerations for risk analysis of LNG shipping by rail were addressed through this study:<sup>1</sup>

A detailed risk analysis of the proposed operation along with appropriate mitigating measures. At a minimum, this risk analysis must include:

- a. Risks to the public and railroad workers from the proposed transportation of LNG, considering volumes transported, routes, operations on main lines, types of trains used, and any other relevant risk factors.
- b. Analysis of the specific structural characteristics (e.g., susceptibility, strength, ability to withstand exposure to heat) of the portable tanks proposed to be used, the number of tanks in a train, train speed, and position in train.
- c. Analysis of the thermophysical properties of LNG and its vapor, and expected multifaceted behavior of released LNG (fires, confinement-caused explosions, vapor fires, unconfined vapor cloud explosions, etc.) and the magnitudes of the different types of hazards presented by these properties.
- d. Considerations of the population density along the routes proposed.
- e. Assessment of both societal risks and individual risk to persons in the vicinity of the transportation routes and who may be adversely affected by an accident or incident involving a train transporting LNG.

To address these considerations, the risk of potential major incidents posed to surrounding populations was calculated during the QRA. The risk results have been presented in this report as tabulated distance to Individual Risk (IR) contours and graphically as Societal Risk (SR) through an incident frequency and severity of outcome (FN) curve, both on a per-route mile basis and as the aggregate SR along an example route.

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<sup>1</sup> 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.