

Working Group 5

LNG Safety

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Facilitator: Senth White, DOT/PHMSA

Attendance Breakdown

Approximate total attendance	29 persons
Federal – State Regulators	4 persons
LNG – Large Scale	8 persons
LNG – Small Scale	4 persons
Standard Developing Organizations	2 persons
Researchers	6 persons
Academics	2 persons
Service Providers	2 persons
Government – Canada	1 person

Top 3 Identified R&D Gaps

Gap #1 – Identify and evaluate, for technical relevance, inspection and maintenance frequencies required in CFR 49 Part 193 – General Knowledge

Gap #2 – Efficacy and treatment of hazard mitigation measures for siting (active – passive) – Technology

Gap #3 – Data collection of failures from LNG facilities – General Knowledge

Gap #4 – Develop a risk based approach and criteria for hazard detection layout – General Knowledge

Gap #5 – Developing an evaluation protocol for non-LNG release hazards – modeling – Standards

Associated Details

(Gap #1)

Identify and evaluate, for technical relevance, inspection and maintenance frequencies required in CFR 49 Part 193 – **General Knowledge**

1. Creation and Dissemination of General Knowledge

- a. What pipeline type(s) or part of LNG operations does the new knowledge target? LNG operations (export facilities, peak shavers, mid-scale, small-scale, etc.)
- b. What operating environment(s) does the new knowledge target? All LNG facilities subject to 49 CFR Part 193.
- c. What technical details or scope items are necessary and recommended? A comprehensive review of 49 CFR Part 193. This review would look at the existing prescribed frequencies for LNG facility operations and maintenance in Part 193 and determine if those frequencies are fit-for-purpose based on the facility type and potential increased safety risks to facilities from these frequencies.
- d. Can any targets or timeframes be identified to complete this research? 1-1.5 years

Associated Details

(Gap #2)

Efficacy and treatment of hazard mitigation measures for siting
(active – passive) – **Technology**

1. New or Improved Technology

- a. What pipeline type(s) or part of LNG operations does the technology target? LNG operations (export facilities, peak shavers, mid scale, etc.)
- b. What pipeline operating environment(s) must the technology operate in? Any operator of a Part 193-regulated LNG facility or project.
- c. What are any functionality and or performance requirements? A comprehensive review of the mitigation measures available to use for siting, both passive and active designs, which can result in smaller exclusion zones distances and a reduction in potential adverse public safety impacts. This research should quantify those mitigation measures, identify how they can be used in exclusion zone calculations, and give ranges on how exclusion zones can be reduced when using these mitigation measures. This research should be a literature review of existing experimental and/or field-scale testing, no new testing should be performed for this research.
- d. What technical or regulatory roadblocks or barriers prevent the technology deployment? This mitigative technology is already available, but its effectiveness has not been quantified for regulatory use.
- e. What are anticipated targets or timeframes to complete this research? 1 year

Associated Details

(Gap #3)

Data collection of failures from LNG facilities – **General Knowledge**

3. Creation and Dissemination of General Knowledge

- a. What pipeline type(s) or part of LNG operations does the new knowledge target? LNG operations (export facilities, peak shavers, mid scale, etc.)
- b. What operating environment(s) does the new knowledge target? LNG facilities which may elect to use a risk-based approach to demonstrate compliance with the siting requirements in Part 193.
- c. What technical details or scope items are necessary and recommended? There is a lack of information related to failures specific to LNG. The failure rate data currently used as the basis for determining the design spills and hazard calculations required by Part 193 are derived from petrochemical industry data sources.
- d. Can any targets or timeframes be identified to complete this research? 2+ years

Associated Details

(Gap #4)

Develop a risk based approach and criteria for hazard detection layout –
General Knowledge

1. Creation and Dissemination of General Knowledge

- a. What pipeline type(s) or part of LNG operations does the new knowledge target? LNG operations (export facilities, peak shavers, mid scale, etc.)
- b. What operating environment(s) does the new knowledge target? All LNG facilities which use hazard detection devices
- c. What technical details or scope items are necessary and recommended? This research should look at available consensus standards and develop an approach and criteria for optimal placement of hazard detection devices (gas, fire, low temp, etc.) which is risk based.
- d. Can any targets or timeframes be identified to complete this research? 1-1.5 years

Associated Details

(Gap #5)

Developing an evaluation protocol for non-LNG release hazards – modeling – **Standards**

1. New or Revised Consensus Standards (standards, guidelines or recommend practices)

- a. Does the need address safety or specification related consensus standards? Yes
- b. Which standard developing organization and which consensus standard name and number is affected? 49 CFR Part 193 – LNG Facilities: Federal Safety Standards.
- c. What scope items should be completed to help improve the standard? DOT PHMSA currently requires an evaluation of potential incidents that may affect the public and plant personnel safety, which includes an evaluation of hazards associated with non-LNG (refrigerant) flammable vapor dispersion, overpressure, boiling liquid expanding vapor explosions, and toxic hazards. However, there is no process in place to evaluate the suitability of the software models to calculate these hazards. The research should develop Model Evaluation Protocols to evaluate and validate models for these hazards.
- d. What pipeline type(s) or LNG issue does the need or consensus standard target? LNG Facility Hazard Analysis / Siting Requirements in 49 CFR Part 193 and NFPA 59A (2001).
- e. What operating environment(s) does the consensus standard target? All LNG facilities regulated under 49 CFR Part 193
- f. Can any targets or timeframes be identified to complete this research? 2 years