

Working Group #2: Liquefied Natural Gas (LNG) Facility Siting

Summary Report-Out

Roadmapped Research Gaps

Prioritized Gap #1: Exploring barriers and materials that can be used to mitigate thermal radiation extending off-property.

The following questions are provided for the road mapping of each research gap:

1. What is the suggested gap name for this research project?
 - Evaluation of Passive Thermal Radiation Mitigation Measures.
2. What is the suggested objective statement for this gap?
 - This project will evaluate the effectiveness of different passive mitigation measures used to reduce off-site thermal radiation.
3. Can any regulatory, congressional, or National Transportation Safety Board (NTSB) drivers (more than one category can be included) be identified as associated with this gap?
 - Part 193.2057, Subpart B.
4. What key technical details or scope items are necessary and recommended to be incorporated into the research project?
 - Review and identify commonly used passive mitigation measures (walls, shrouding, etc.).
 - Conduct literature review on materials used for passive mitigation measures.
 - Test or evaluate materials.
 - Demonstrate effectiveness of mitigation measures through case studies, lab testing or field testing.
5. Which research output is being suggested from the gap (technology development or general knowledge)?
 - General knowledge.

6. [Answer if relevant] What type of data output or tool/model functionality is required to successfully address the gap?
 - N/A.
7. Does the gap address a related consensus standard (i.e., NFPA 59A) or best practice?
 - Yes, National Fire Protection Association (NFPA) 59A.
8. What are anticipated targets or timeframes to complete this research (months)?
 - 12 – 24 months.

Prioritized Gap #2: Acceptable methods of modeling shrouding or obstructions for liquid leaks.

The following questions are provided for the roadmapping of each research gap:

1. What is the suggested gap name for this research project?
 - Acceptable Methods for Modeling Shrouding or Obstructions for Pressurized Liquid Leaks.
2. What is the suggested objective statement for this gap?
 - This project will provide guidance on modeling shrouding or obstructions for pressurized liquid leaks.
3. Can any regulatory, congressional, or NTSB drivers (more than one category can be included) be identified as associated with this gap?
 - Part 193.2059, Subpart B.
 - NFPA 59A-2001 Section 2.2.3.4.
4. What key technical details or scope items are necessary and recommended to be incorporated into the research project?
 - Evaluate current state of how modeling shrouding and obstructions for pressurized leaks is done.

- Determine appropriate modeling parameters and provide guidance.
5. Which research output is being suggested from the gap (technology development or general knowledge)?
 - General knowledge; guidance to decide appropriate modeling of shrouding.
 6. [Answer if relevant] What type of data output or tool/model functionality is required to successfully address the gap?
 - N/A.
 7. Does the gap address a related consensus standard (i.e., NFPA 59A) or best practice?
 - NFPA 59A-2001, Section 2.2.3.4.
 8. What are anticipated targets or timeframes to complete this research (months)?
 - 12 – 24 months.

Prioritized Gap #3: Impact of cascading explosions within LNG site and understanding relevant threshold limits.

The following questions are provided for the road mapping of each research gap:

1. What is the suggested gap name for this research project?
 - Identification of Potential Cascading Explosions at LNG Facilities.
2. What is the suggested objective statement for this gap?
 - The purpose of this project is to provide guidance on the extent to which cascading explosions within an LNG facility should be considered for siting.
3. Can any regulatory, congressional, or NTSB drivers (more than one category can be included) be identified as associated with this gap?
 - Part 193.2051.

4. What key technical details or scope items are necessary and recommended to be incorporated into the research project?
 - Review ongoing PHMSA research on cascading impacts for overlap.
 - Review literature of current state for evaluating cascading explosions.
 - Consider risk-based approach and prescriptive approach.
5. Which research output is being suggested from the gap (technology development or general knowledge)?
 - General knowledge; guidance on modeling to consider.
6. [Answer if relevant] What type of data output or tool/model functionality is required to successfully address the gap?
 - N/A.
7. Does the gap address a related consensus standard (i.e., NFPA 59A) or best practice?
 - NFPA 59A.
8. What are anticipated targets or timeframes to complete this research (months)?
 - 12 months.

Prioritized Gap #4: Establishing risk tolerability criteria.

The following questions are provided for the road mapping of each research gap:

1. What is the suggested gap name for this research project?
 - Establish Risk Tolerability Criteria for Siting LNG Facilities Using Quantitative Risk Assessment (QRA) Method.
2. What is the suggested objective statement for this gap?
 - The purpose of this project is to provide guidance for rulemaking bodies to select and adopt risk tolerability criteria suitable for siting LNG facilities using QRA method.

3. Can any regulatory, congressional, or NTSB drivers (more than one category can be included) be identified as associated with this gap?
 - Part 193, Subpart B.
4. What key technical details or scope items are necessary and recommended to be incorporated into the research project?
 - Review of international and industry standards.
 - Evaluate/demonstrate the effects of selecting different criteria.
5. Which research output is being suggested from the gap (technology development or general knowledge)?
 - General knowledge.
6. [Answer if relevant] What type of data output or tool/model functionality is required to successfully address the gap?
 - N/A.
7. Does the gap address a related consensus standard (i.e., NFPA 59A) or best practice?
 - NFPA 59A.
8. What are anticipated targets or timeframes to complete this research (months)?
 - 12 months.

Prioritized Gap #5: Validation data for large LNG fires (size of storage tank) not performed over water.

The following questions are provided for the road mapping of each research gap:

1. What is the suggested gap name for this research project?
 - Large LNG Land-Based Pool Fire Data Validation.
2. What is the suggested objective statement for this gap?

- The purpose of this project is to perform experiments to provide data on large land-based LNG pool fires. The data would be used for model evaluation protocol.
3. Can any regulatory, congressional, or NTSB drivers (more than one category can be included) be identified as associated with this gap?
 - Part 193.2057.
 4. What key technical details or scope items are necessary and recommended to be incorporated into the research project?
 - Design and perform experiment.
 - Produce a database of the parameters that could be used for model validation.
 - “Large” refers to size of impoundment tanks (200 – 250 ft diameter).
 5. Which research output is being suggested from the gap (technology development or general knowledge)?
 - General knowledge.
 6. [Answer if relevant] What type of data output or tool/model functionality is required to successfully address the gap?
 - N/A.
 7. Does the gap address a related consensus standard (i.e., NFPA 59A) or best practice?
 - NFPA 59A.
 8. What are anticipated targets or timeframes to complete this research (months)?
 - 24 – 36 months.

List of Prioritized Consolidated Gaps

#	Consolidated Gap
1.	Acceptable methods of modeling shrouding or obstructions for liquid leaks.
2.	Exploring barriers and materials that can be used to mitigate thermal radiation extending off-property.
3.	Impact of cascading explosions within LNG site and understanding relevant threshold limits.
4.	Establishing risk tolerability criteria.
5.	Validation data for large LNG fires (size of storage tank) not performed over water.