National Fire Protection (NFPA) 59A Committee Perspective

May 18, 2016 | Presenter: Jay Jablonski, Chairman NFPA 59A

Agenda

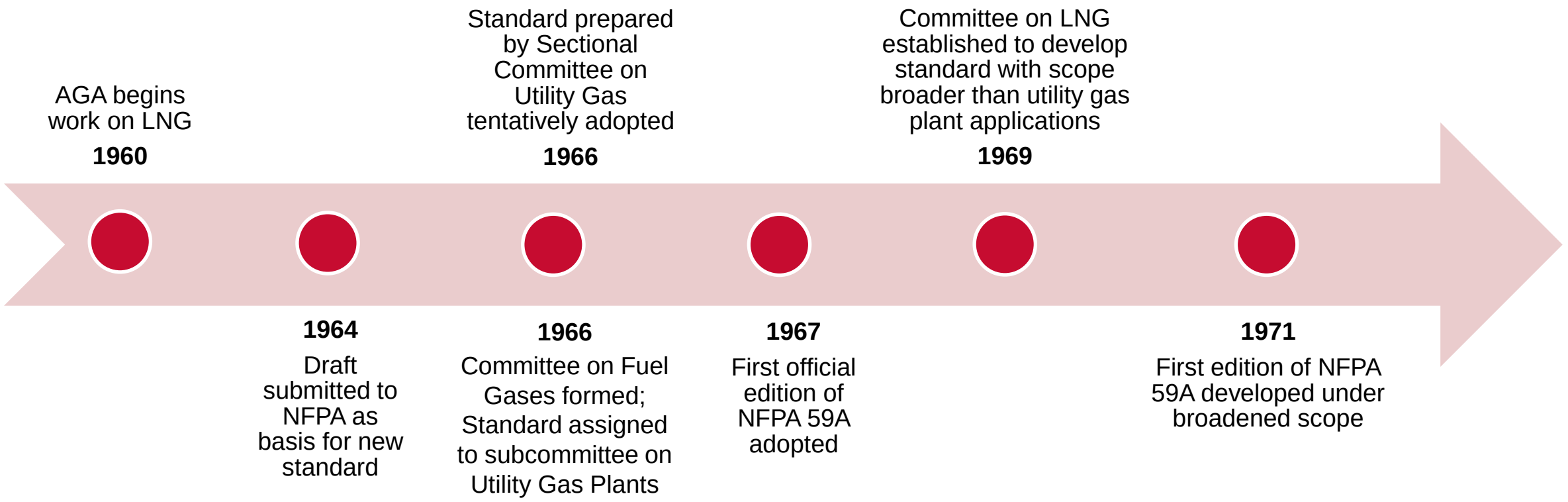
Background of NFPA 59A

Overview of substantive changes since 2001 edition

PHMSA adoption of newer editions of NFPA 59A

Next Edition

Background


AGA begins work on LNG
1960
1964
Draft submitted to NFPA as basis for new standard
Standard prepared by Sectional Committee on Utility Gas tentatively adopted
1966
1966
Committee on Fuel Gases formed; Standard assigned to subcommittee on Utility Gas Plants
1967
First official edition of NFPA 59A adopted
Committee on LNG established to develop standard with scope broader than utility gas plant applications
1969
1971
First edition of NFPA 59A developed under broadened scope

LNG Tanks at the port of Barcelona

Purpose

To provide minimum fire protection, safety, and related requirements for the location, design, construction, security, operation, and maintenance of LNG plants.

Scope and Applications

Applies to:

1) Facilities that liquefy natural gas
2) Facilities that store, vaporize, transfer, and handle LNG
3) The training of all personnel involved with LNG
4) The design, location, construction, maintenance, and operation of all LNG facilities.

Does not apply to:

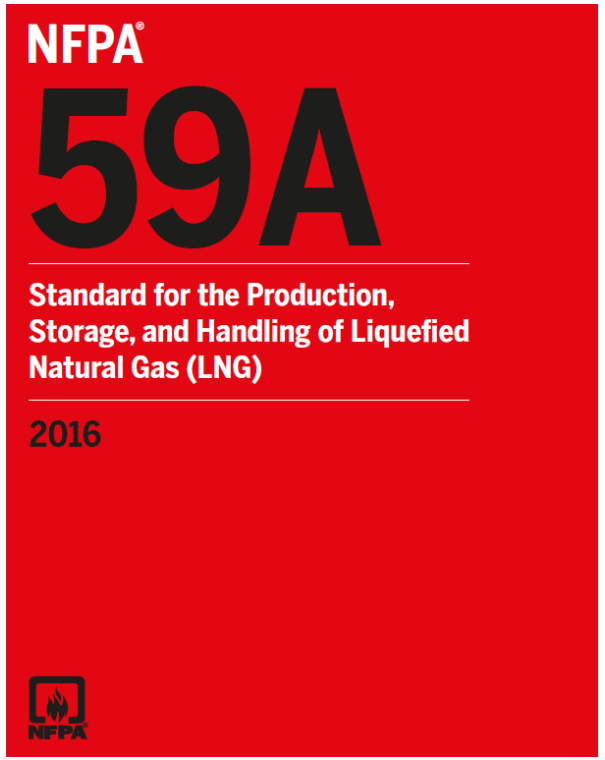
1) Frozen ground containers
2) Portable storage containers stored or used in buildings
3) All LNG vehicular applications, including fueling of LNG vehicles (NFPA 52 and 30A)

Fundamentals of the NFPA Process - Balance

- Technical Committees:
  - Carefully balanced by 9 interest categories
    (1) Applied Research/Testing Laboratory; (2) Consumer;
    (3) Enforcing Authority; (4) Installer/Maintainer; (5) Insurance;
    (6) Labor; (7) Manufacturer; (8) Special Expert; (9) User
- 1/3 Balance Rule:
  - A committee can never have more than 1/3 of its membership from any one interest category
- Consensus Requirement:
  - Minimum 2/3 on all changes
  - Some situations require ¾ majority

Technical Committee on LNG – Current Membership

- Enforcers – 5 (17%)
- Insurance – 3 (10%)
- Manufacturers – 5 (17%)
- Special Experts – 9 (30%)
- Users – 8 (27%)
- Total Principal Voting Members – 30
  - Nominal maximum per committee – 30
- Alternates



Overview of changes since 2001 edition

Significant Changes since 2001 Edition

- Reorganization of the Chapters
- Referenced Publications
- Concrete LNG tanks
- Membrane LNG tanks
- Pipe in pipe or vacuum jacketed pipe/underground pipe
- Reduction in spacing distance for thermal radiation allowed for water sprays
- ASME BPVC issue regarding hydrostatic pressure test and design factors
- Performance (Risk Assessment) Based LNG Plant Siting

Chapters in NFPA 59A 2016

Chapter 1 – Administration

Chapter 2 – Referenced Publications

Chapter 3 – Definitions

Chapter 4 – General Requirements

Chapter 5 – Plant Siting and Layout

Chapter 6 – Process Equipment

Chapter 7 – Stationary LNG Storage

Chapter 8 – Vaporization Facilities

Chapter 9 – Piping Systems and Components

Chapter 10 - Instrumentation and Electrical Services

Chapter 11 – Transfer Systems for LNG, Refrigerants, and Other Flammable Fluids

Chapter 12 - Fire Protection, Safety, and Security

Chapter 13 - Requirements for Stationary Applications Using ASME Containers

Chapter 14 - Operating, Maintenance, and Personnel Training

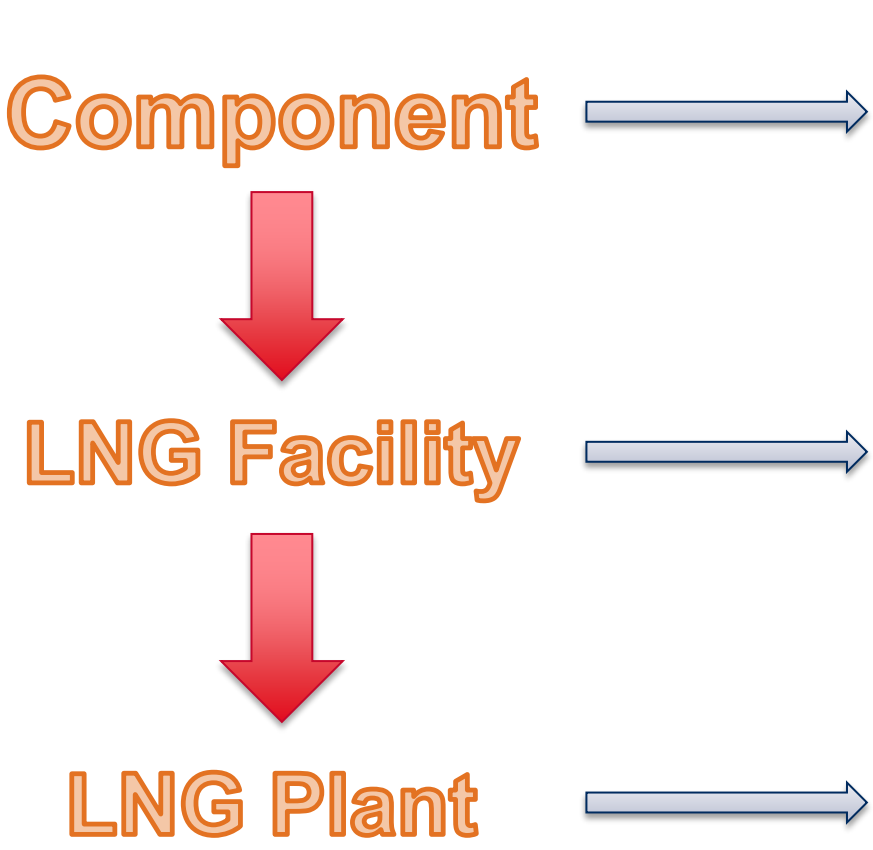
Chapter 15 – Performance (Risk Assessment) Based LNG Plant Siting

Annex Material

Referenced Publications – Chapter 2

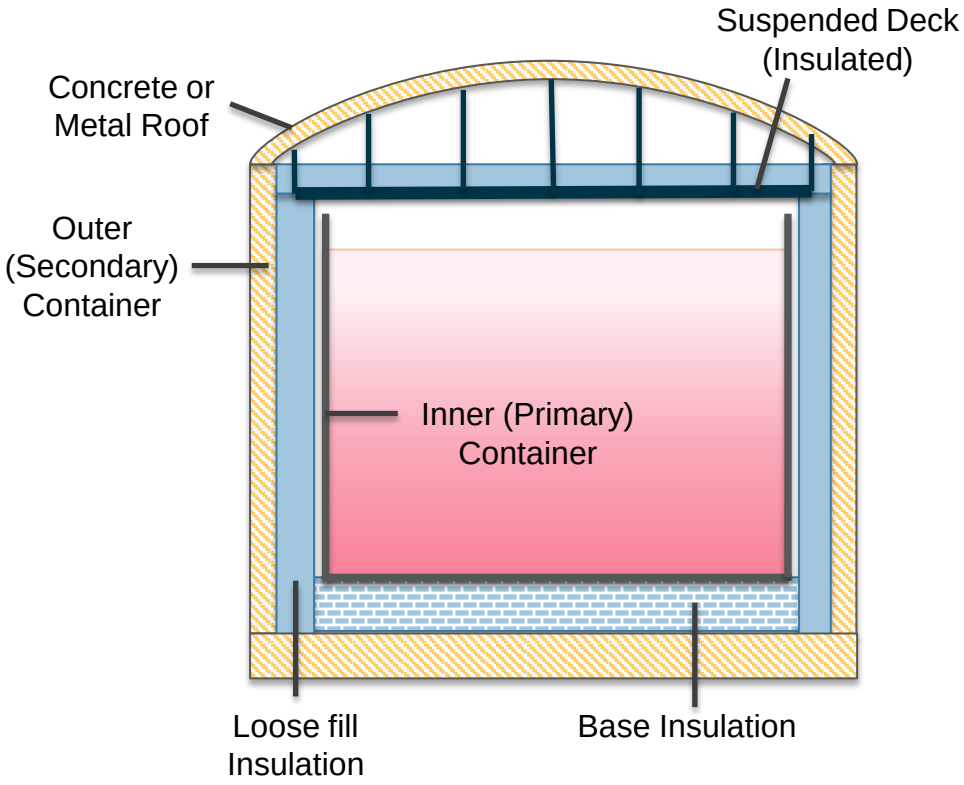
- The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.
- This section is typically updated to include the current publication at the time of the First or Second Draft meetings.
- As an example:
  - The 2016 edition references the 2013 *Boiler Pressure Vessel Code*
  - The 2001 edition references the 1992 *Boiler Pressure Vessel Code*

Key Definitions and Concepts – Chapter 3



Containers – Chapter 3

- Container Definitions
  - Prestressed Concrete Container
  - Tank System
  - Single Containment Tank System
  - Double Containment Tank System
  - Full Containment Tank System
  - Membrane Containment Tank System



Full Containment Tank System

Plant Siting and Layout – Chapter 5

Provides the criteria for plant and equipment siting including containers, vaporizers, process equipment, loading and unloading facilities.

- Added the Model Evaluation Protocol for vapor dispersion software
- Allows reduced thermal spacing for active and passive systems
- Siting criteria (design spill) revised to address different types of containers
- Building and structure design classifications for seismic, wind, ice and snow – A, B, C
- Additional requirements on Portable LNG facilities
- Concrete design referenced to ACI

Stationary LNG Storage - Chapter 7

- Provides requirements for the design, marking, inspection, testing, and operation of LNG storage tank systems
- Storage tank systems must comply with applicable standards and additional provisions in Chapter 7 of 59A

Design Considerations

- Exposure of materials to LNG
- Wind, flood, & snow loads
- Container insulation
- Markings for containers
- Relief Devices
- Foundations

Stationary LNG Storage Continued

- Metal and Concrete Tank Design, Inspection, and Testing
  - Welding requirements for metal tanks, API 620
  - Concrete design for concrete containers, ACI 376
  - Revised seismic considerations, ASCE 7
  - Inspection
  - Hydrostatic and leak testing
  - ASME Containers (>15 psi) (See also Chapter 13 for up to 100,000 gallon water capacity)

Piping Systems and Components – Chapter 9

- Provides requirements for the design, construction, installation, examination, and inspection for process piping systems and components
- Piping systems must comply with applicable reference standards and additional provisions in 59A
- Includes requirements for:
  - Seismic design
  - Materials of construction
  - Installation and marking
  - Pipe supports
  - Inspection and Testing
  - Purging, Relief Valves, Corrosion Control
  - Cryogenic Pipe-in-Pipe Systems

Performance (Risk Assessment) Based LNG Plant Siting – Chapter 15

- Alternative to siting requirements in Chapter 5
- Must be approved by AHJ
- Includes the calculation of risks to persons outside the boundary of the LNG plant from releases in the plant
- Plants must be designed and located so that they do not pose intolerable risks to surrounding populations and property
- Reassessment of risk required every 5 years or if significant modifications take place
- Must use quantitative risk analysis (QRA) protocol found in one of the specified publications and requires approved by AHJ

PHMSA adoption of newer editions of NFPA 59A

- PHMSA plans to review the 2016 edition of NFPA 59A.
- Their evaluation of the 2016 edition is for incorporation by reference (IBR) into CFR 49 Part 193.
- There are three possible paths for the 2016 edition:
  (1) IBR the edition in total,
  (2) IBR the edition except sections where PHMSA has concerns,
  (3) Do not IBR the edition.
- The shared long term goal is a clean adoption of the 2019 edition.

Possible Issues

There are a number of issues that exist between NFPA 59A and PHMSA

- Concerns with the Quantitative Risk Assessment. Failure rate database is limiting and may make siting very difficult.
  - The selection of failure rate data is very important in the risk assessment analysis.
- Lack of inclusion of certain hazards: toxic and toxic refrigerants, and flammable refrigerants from explosion perspective.
  - 59A typically focused on the fire and explosion hazards.
- Need to review how/if PHMSA's LNG FAQs are now addressed in 2016.
  - Ideally the FAQs would be covered by 59A

Possible Issues Continued

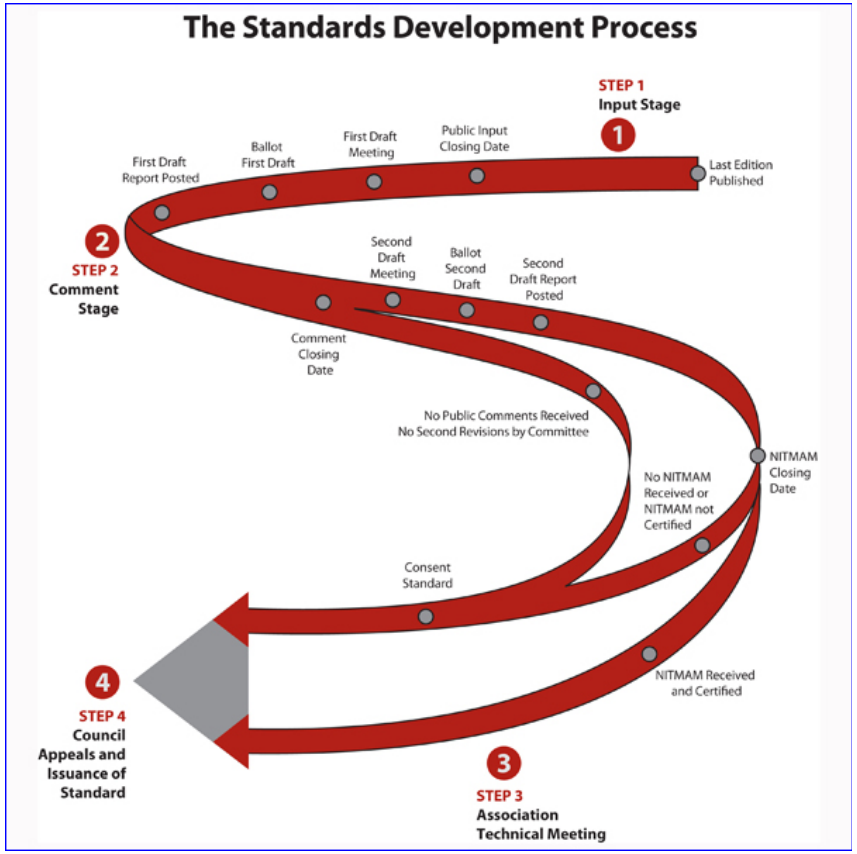
- Natural hazard frequency in the 2013 edition is 100 years.
  - Federal agencies must follow 1:500 year.
  - For wind it must be 1:10,000 years.
- Changes in impoundment siting/types of models that can be used.
  - There has been significant changes in dispersion and fire models.
- Shop Built Container Design
  - Changes in design requirements
- Clarification of ASME B31.3 applicability to LNG plants

Possible Issues Continued

- Impact of moving consideration of ‘other’ hazards from the body of the standard, 2.1.1(d), to an Annex (now in A.5.2)
  - Would sites not consider these other hazards if not in the body of the standard?
- There is a concern that ‘Small Scale’ siting is not adequately addressed in 59A, but needs risk based siting

Next Edition of NFPA 59A

- NFPA 59A is in the Fall 2018 Revision Cycle
- Public Input Closes in **January 2017**
  - Input accepted from the public or other committees for consideration to develop the First Draft
  - NFPA accepts Public Input on documents via their online submission system.
  - http://www.nfpa.org/codes-and-standards/standards-development-process/submitting-public-input-and-comments
- Publish First Draft Sept. 2017
- Public Comment Closes Nov. 2017



Thank you very much for your attention.

Jay Jablonski