Technical Committee on Liquefied Natural Gas

AGENDA
March 11-12, 2014
Bechtel Oil, Gas, & Chemicals Inc.
3000 Post Oak Blvd.
Room 4D
Houston, TX 77056

1. Chair’s welcome, call to order, and opening remarks at 8:00 a.m.
2. Self-Introduction of Committee Members and Guests
3. Approval of Minutes from the Pre-First Draft Meeting held in October 2013 in Washington DC. See NFPA 59A -2013 document information page to review (www.nfpa.org/59anext).
4. Staff Liaison Report
   A. Committee membership update (For the period Sept 1, 2013 – Feb 7, 2014)

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<td>Joseph Zanoni</td>
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<td>Ian Queen</td>
<td>I (Alt to J. Regan)</td>
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<td>Roger Roue</td>
<td>U (Principal)</td>
<td>Resign</td>
<td>01/02/2014</td>
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(Total Voting Members – 32; SE=31%, U=25%, E=19%, M = 16%, I=9%)

B. Revision Cycle Review and timeline (Attachment A)

5. New Business – Document Revision. Review Public Input (Attachments B, C, D, and E) and develop appropriate First Revisions to NFPA 59A.

6. Old Business

   A. Fire Protection Task Group. The committee established a task group to review other NFPA documents and recommend revisions to the definition and annex material on Fire Protection. Several Public Inputs (formerly proposals) have been submitted by AGA on the subject to update existing standards, identify new standards, and update the requirements in chapter 12. The public inputs are available in Attachment B, C, D, and E. The task group members are: Andrew Kohout – Chair; Dale Edlbeck, Jay Jablonski, Bernard Leong, Ian Queen, James Regan, Kevin Ritz, and Jenna Wilson.

   B. Fire Analysis for Roof Loss Task Group. The committee established a task group to review current fire analysis requirements for roof loss and develop recommendations to differentiate between steel and concrete construction. The task group has developed a draft TIA and is in the process of reviewing it. Task group members are: Charles Hanskat – Chair; John Blanchard, Jeffrey Beale, Don Coers, Frank Katulak, Bernard Leong, and Jim Lewis.
C. Chapter 5 Task Group. The committee established a task group to identify uncertainties in chapter 5, identify the “single leakage source” and recommend additional coverage or requirements to address both. The task group members are Leon Bowdoin (chair); Jeffrey Brightwell, Pat Convery, Brian Eisentroul, Filippo Gavelli, Alan Hatfield, Frank Katulak, Bernard Leong, Pat Outtrim, Ken Paul, Gil Poe, Terry Turpin, and Jenna Wilson.

D. Chapter 13 Task Group. The committee established a task group to review chapter 13, including reviewing the scope, performing a gap analysis, and recommend additional requirements or refinements based on the analysis, recognizing that not all LNG facilities are under federal jurisdiction. The members of the task group are Jeffrey Beale (chair); Alan Hatfield, Dick Hoffmann, Frank Katulak, Glenn Mahnken, Ken Paul, Pat Outtrim, and Kevin Ritz.

E. Chapter 15 Task Group. The committee established a task group to review chapter 15, perform a gap analysis and specifically check the pipe frequencies units and thresholds in Table 15.6.1. The task group should complete the gap analysis before the First Draft meeting in March 2014. The task group should also recommend revisions to clarify the requirements for executing a quantitative risk assessment. The task group members are: Filippo Gavelli (chair); Leon Bowdoin, Pat Convery, Pat Outtrim, Gil Poe, Terry Turpin, and Jenna Wilson.

F. Referenced Standards. The committee asked NFPA staff to investigate whether NFPA would allow the inclusion of edition dates directly into the mandatory text. NFPA staff submitted the request to Standards Administration for consideration. NFPA Standards Administration declined the request because such inclusion would invite too many opportunities for errors to be made, and could lead to potential conflicts within NFPA documents if an occurrence is not updated. It was also noted that there is some question about whether documents incorporated by reference in NFPA standards must meet the same public availability requirements as documents directly incorporated into regulations.

G. Offshore LNG Facilities Standard. NFPA staff submitted a memo to the Standards Council requesting that the work item be closed. The Standards Council will act on the request in their March 3-4, 2014 meeting.

H. Code Fund Project. NFPA staff submitted a code fund research request on the development of a source term model for input into DEGADIS. Research Foundation awards will be announced late first quarter 2014.

I. Compressed Natural Gas. On behalf of the LNG committee, NFPA staff submitted a request to the Industrial and Medical Gases technical committee to expand and clarify coverage of Compressed Natural Gas in NFPA 55. NFPA staff will update the committee on the IMG committee efforts.

J. NFPA 56. Applicability of NFPA 56, Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems to NFPA 59A.
7. Other Items.

A. Small, non-storage LNG Plants. Dresser-Rand has developed a small scale, modularized, LNG manufacturing plant producing 6,000 gallons per day. The applications for this type of small scale LNG are anticipated to continue to grow. The designs and installations of the smaller plants are intended to be minimal in size, and offer the benefit of redeployment to other locations rather than being of permanent nature. Review for the next revision of NFPA-59A presents an opportunity to address potential siting rules, minimum inspection requirements for small bore LNG piping, operational requirements for manning small scale facilities, etc. Dresser-Rand would be open to attend the upcoming March meeting in Houston and discuss its equipment for the board’s consideration in developing the next revision of the specification.

8. Date/Location of Next Meeting. (The Second Draft meeting must take place between Nov 15, 2014 and May 1, 2014.)

Attachment A:
Revision Cycle Timeline
2015 FALL REVISION CYCLE

*Public Input Dates may vary according to standards and schedules for Revision Cycles may change. Please check the NFPA Website for the most up-to-date information on Public Input Closing Dates and schedules at www.nfpa.org/document# (i.e. www.nfpa.org/101) and click on the Next Edition tab.

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Approved____ October 30, 2012 ______  Revised____ December 4, 2013 ______
Attachment B: Editorial Public Inputs
## Public Input No. 65-NFPA 59A-2013 [ Section No. 2.3.1 ]

### 2.3.1 ACI Publications.
American Concrete Institute, P.O. Box 9094, Farmington Hills, MI 48333.

### Statement of Problem and Substantiation for Public Input

Updated to latest edition of referenced standard

### Submitter Information Verification

**Submitter Full Name:** Michael Bellman  
**Organization:** American Gas Association

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### Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.

---

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Public Input No. 66-NFPA 59A-2013 [ Section No. 2.3.2 ]

2.3.2 ALPEMA Publications.
Brazed Aluminum Plate-Fin Heat Exchanger Manufacturer's Association, IHS (secretariat), 321 Inverness Drive South, Englewood, CO 80112.


Statement of Problem and Substantiation for Public Input

Updated to latest edition of referenced standard

Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
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Submittal Date: Tue Dec 24 08:09:28 EST 2013

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Public Input No. 67-NFPA 59A-2013 [ Section No. 2.3.3 ]

2.3.3 API Publications.
American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005-4070.
API 6D, Specification for Pipeline Valves, 2007 with Erata 1-6 (2011) and Addendums 1, 2 (2011), and 3 (2012).

Statement of Problem and Substantiation for Public Input
Updated to identify list of current erata's and addendums

Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address: 
City: 
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Submittal Date: Tue Dec 24 08:12:30 EST 2013

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Origin (from sources other than the submitter)
These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 68-NFPA 59A-2013 [ Section No. 2.3.5 ]

2.3.5 ASME Publications.
American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.

Statement of Problem and Substantiation for Public Input

Updated to latest edition of standard

Submitter Information Verification

Submitter Full Name: Michael Bellman
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Submittal Date: Tue Dec 24 08:16:16 EST 2013

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Public Input No. 69-NFPA 59A-2013 [ Section No. 2.3.6 ]

2.3.6 ASTM Publications.
ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

Statement of Problem and Substantiation for Public Input

Updated to reflect latest editions of standards

Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
2.3.8 CSA Publications.
Canadian Standards Association, 5060 Spectrum Way, Mississauga, ON, L4W 5N6, Canada.

**Statement of Problem and Substantiation for Public Input**

Updated to reflect latest editions of standards

**Submitter Information Verification**

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address:
City:
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Submittal Date: Tue Dec 24 08:20:05 EST 2013

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**Origin (from sources other than the submitter)**

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Public Input No. 71-NFPA 59A-2013 [ Section No. 2.3.9 ]

2.3.9 IEEE Publications.
Institute of Electrical and Electronics Engineers, Three Park Avenue, 17th Floor, New York, NY 10016-5997.

Statement of Problem and Substantiation for Public Input

Updated to reflect latest edition of standard

Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address:
City:
State:
Zip:
Submittal Date: Tue Dec 24 08:21:50 EST 2013

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
2.3.12 Other Publications.


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**Statement of Problem and Substantiation for Public Input**

Updated to reflect guideline number

**Submitter Information Verification**

**Submitter Full Name**: Michael Bellman

**Organization**: American Gas Association

**Street Address**: 

**City**: 

**State**: 

**Zip**: 

**Submittal Date**: Tue Dec 24 08:23:41 EST 2013

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**Origin (from sources other than the submitter)**

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 181-NFPA 59A-2014 [ Section No. 3.3.17 ]

3.3.17  Maximum Allowable Working Pressure (MAWP).
The maximum gauge pressure permissible at the top of completed equipment, a container, or a vessel in its operating position for a design temperature.

Statement of Problem and Substantiation for Public Input

This definition is extracted into NFPA 115. In NFPA 115, Sections 3.3.33, 8.4.2.2 and 9.4.2.2 use the abbreviation MAWP. Other definitions in NFPA 115, such as section 3.3.17, Laser Safety Personnel (LSP), add the abbreviation to the definition of the term because the abbreviation is used in the code text. Adding this to the definition for Maximum Allowable Working Pressure would clarify the use of the abbreviation in the code text.

Submitter Information Verification

Submitter Full Name: Jim Muir
Organization: Building Safety Division, Clark County Washington
Affiliation: NFPA’s Building Code Development Committee (BCDC)
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jan 01 21:15:46 EST 2014

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Public Input No. 90-NFPA 59A-2013 [Section No. 9.4.1.4]

9.4.1.4
The following pipe joints are prohibited:

1. Expanded joints per ASME B 31.3, paragraph 313.
2. Caulked joints per ASME B 31.3, paragraph 316.

Statement of Problem and Substantiation for Public Input

Proposed edit corrects reference to code and code section.

Submitter Information Verification

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Organization: American Gas Association
Street Address:
City:
State:
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Submittal Date: Tue Dec 24 10:21:18 EST 2013

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 91-NFPA 59A-2013 [ Section No. 9.4.1.5 ]

9.4.1.5
Special components that are unlisted per ASME B 31.3 paragraph 304.7.2, shall be based on design calculations consistent with the design criteria of ASME B 31.3. Calculations shall be substantiated by one or both of the means stated in ASME B paragraphs 31.3 - paragraphs 304.7.2 (a), 304.7.2(b), or both.

Statement of Problem and Substantiation for Public Input

Typographical error - correction of ASME standard title

Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address:
City:
State:
Zip:
Submittal Date: Tue Dec 24 10:23:30 EST 2013

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 92-NFPA 59A-2013 [ Section No. 9.4.3.5 ]

9.4.3.5
Brazing and brazed connections shall be in accordance with subsections 317.2 , 333.1, 333.2, 333.3, and 333.4 of ASME B 31.3.

Statement of Problem and Substantiation for Public Input

Proposed change due to paragraph number changes in section 33 of ASME B31.3 2012 edition

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
12.2.2 *.
The evaluation shall determine the following:

1. The type, quantity, and location of equipment necessary for the detection and control of fires, leaks, and spills of LNG, flammable refrigerants, or flammable gases
2. The type, quantity, and location of equipment necessary for the detection and control of potential nonprocess and electrical fires
3. The methods necessary for protection of the equipment and structures from the effects of fire exposure
4. Requirements for fire protection water systems
5. * Requirements for fire-extinguishing and other fire control equipment
6. The equipment and processes to be incorporated within the ESD system, including analysis of subsystems, if any, and the need for depressurizing specific vessels or equipment during a fire emergency
7. The type and location of sensors necessary to initiate automatic operation of the ESD system or its subsystems
8. The availability and duties of individual plant personnel and the availability of external response personnel during an emergency
9. * The personal protective equipment, special training, and qualification needed by individual plant personnel as specified by NFPA 600, Standard on Industrial Fire Brigades, for their respective emergency duties
10. Requirements for other fire protection equipment and systems

Statement of Problem and Substantiation for Public Input

Proposed change clarifies that the protective equipment mentioned in 12.2.2 (9) is personal protective equipment and not physical fire protection equipment such as fire trucks, fires hoses, etc.

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Origin (from sources other than the submitter)

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Attachment C:
AGA Public Inputs
Components/Facility/Plants
Public Input No. 64-NFPA 59A-2013 [ New Section after 3.3.15 ]

LNG Facility
A collection of components used to store, condition, liquefy, or vaporize natural gas.

Statement of Problem and Substantiation for Public Input

Adding the definition to extend the build-up from Components => Facility => Plant, all of which are used extensively in the document

Related Public Inputs for This Document

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Public Input No. 75-NFPA 59A-2013 [Section No. 3.3.4]

3.3.4 Components.
A part, or a system of parts, that functions as a unit in an LNG plant and could include, but is not limited to, piping, processing equipment, containers, control devices, impounding systems, electrical systems, security devices, fire control equipment, and communication equipment.

Statement of Problem and Substantiation for Public Input

Consistent use of "facility" in place of plant

Related Public Inputs for This Document

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
3.3.16 LNG Plant.

A facility whose components can be used to store, condition, liquefy, or vaporize natural gas An LNG facility or system of LNG facilities functioning as a unit.

Statement of Problem and Substantiation for Public Input

Alignment with 49CFR Part 193 definition

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4.3.2
A control center shall have the following capabilities and characteristics:

(1) It shall be located apart from or be protected from other LNG facilities' components so that it is operational during a controllable emergency.

(2) Each remotely actuated control system and each automatic shutdown control system required by this standard shall be operable from the control center.

(3) Each control center shall have personnel in attendance while any of the components under its control are in operation, unless either the control is being performed from another control center that has personnel in attendance or the facility has an automatic emergency shutdown system.

(4) If more than one control center is located at an LNG plant, each control center shall have more than one means of communication with every other center.

(5) Each control center shall have a means of communicating a warning of hazardous conditions to other locations within the plant frequented by personnel.

Statement of Problem and Substantiation for Public Input

Use of the term "components" makes this section consistent with 4.4.2 (1) and provides the control center with the same level of protection during controllable emergencies. Section 4.4.2 (1) relates to spacing of the auxiliary generators from components during controllable emergencies.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
5.2.4

Soil and general investigations of the site shall be made to determine the design basis for the facility Plant.

Statement of Problem and Substantiation for Public Input

Renaming facility to Plant for consistent use

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Shop-built containers designed and constructed in accordance with the ASME Boiler and Pressure Vessel Code and their support system shall be designed for the dynamic forces associated with horizontal and vertical accelerations as follows:

For horizontal force, \( V \):

\[
V = Z_c \times W
\]

For design vertical force, \( P \):

\[
P = \frac{2}{3} Z_c \times W
\]

where:

\( Z_c \) = seismic coefficient equal to 0.60 \( S_{DS} \), where \( S_{DS} \) is the maximum design spectral acceleration determined in accordance with the provisions of ASCE 7, using an importance factor, \( I \), of 1.0, for the site class most representative of the subsurface conditions where the LNG facility, LNG Plant, is located. \( W \) = total weight of the container and its contents.

Statement of Problem and Substantiation for Public Input

Standardize the use of Plant and facilities according to definitions.

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Origin (from sources other than the submitter)

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Public Input No. 86-NFPA 59A-2013 [Section No. 8.4.5.3]

8.4.5.3
If the facility, the Plant, is attended, manual operation of the automatic shutoff valve shall be from a point at least 50 ft (15 m) from the vaporizer, in addition to the requirements in 8.4.5.2.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
8.4.6.2
If the facility, the Plant, is attended, manual operation of the automatic shutoff valve shall be from a point at least 50 ft (15 m) from the vaporizer, in addition to the requirements of 8.4.6.1.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

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Public Input No. 88-NFPA 59A-2013 [Section No. 9.2.2.1]

9.2.2.1
For purposes of design, all piping of the LNG facility, LNG Plant, shall be classified into one of the following three seismic categories:

1. Category I — All piping supported by the LNG container and piping up to the emergency shutdown valve(s) and firewater piping
2. Category II — All flammable gas or LNG process piping
3. Category III — All other piping not included in Categories I and II

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 98-NFPA 59A-2013 [Section No. 12.6.1.4]

12.6.1.4
For facility, For Plant hazard areas where minimal class “A” fire hazards are present, the selection of potassium bicarbonate–based dry chemical extinguishers is recommended.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
12.7 Maintenance of Fire Protection Equipment.

Facility operators shall prepare and implement a maintenance program for all plant
fire protection equipment based upon prescriptive requirements within this standard and listed within
fire protection equipment standards identified within this standard.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

New text provides guidance as to which standards to follow relative to maintenance of fire protection
equipment.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and
approved by the AGA Operations Safety Regulatory Action Committee.
12.8.1 *  
Protective clothing that will provide protection against the effects of exposure to LNG shall be available and readily accessible at the facility Plant.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
12.9.1.1 *
A security assessment covering hazards, threats, vulnerabilities, and consequences shall be prepared for the LNG facility Plant.

Statement of Problem and Substantiation for Public Input

Added asterisk to identify new annex material
Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
12.9.2
The facility operator shall provide a security system with controlled access that is designed to prevent entry by unauthorized persons.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
At LNG facilities, there shall be a protective enclosure including a peripheral fence, building wall, or natural barrier enclosing major facility components, such as the following:

1. LNG storage containers
2. Flammable refrigerant storage tanks
3. Flammable liquid storage tanks
4. Other hazardous materials storage areas
5. Outdoor process equipment areas
6. Buildings housing process or control equipment
7. Offshore loading and unloading facilities

The LNG facility shall be enclosed either by a single continuous enclosure or by multiple independent enclosures.

Where the enclosed area exceeds 1250 ft² (116 m²), at least two exit gates or doors shall be provided.
Public Input No. 104-NFPA 59A-2013 [ Section No. 12.9.3 [Excluding any Sub-Sections] ]

At LNG facilities, there shall be a protective enclosure including a peripheral fence, building wall, or natural barrier enclosing major facility components, such as the following:

(1) LNG storage containers
(2) Flammable refrigerant storage tanks
(3) Flammable liquid storage tanks
(4) Other hazardous materials storage areas
(5) Outdoor process equipment areas
(6) Buildings housing process or control equipment
(7) Onshore loading and unloading facilities

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
12.9.3.1

The LNG facility, LNG Plant, shall be enclosed either by a single continuous enclosure or by multiple independent enclosures.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
12.9.4 LNG facilities. LNG Plants shall be illuminated in the vicinity of protective enclosures and in other areas as necessary to promote security of the facility.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
13.3.14.1

Shop-built containers designed and constructed in accordance with the ASME Boiler and Pressure Vessel Code and their support systems shall be designed for the dynamic forces associated with horizontal and vertical accelerations as follows:

For horizontal force:

\[ V = Z_c \times W \]

For vertical force:

\[ P = \frac{2}{3} Z_c \times W \]

where:

\[ Z_c \] = seismic coefficient equal to 0.60 \( S_{DS} \) where \( S_{DS} \) is the maximum design spectral acceleration determined in accordance with the provisions of ASCE 7, Minimum Design Loads for Buildings and Other Structures, using an importance factor, \( I \), of 1.0 for the site class most representative of the subsurface conditions where the LNG facility Plant is located.

\( W \) = total weight of the container and its contents

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
13.18.1 Basic Operations Requirements.

Each facility shall meet the following requirements:

1. Have written procedures covering operation, maintenance, and training
2. Keep up-to-date drawings of plant or facility equipment, showing all revisions made after installation
3. Revise the plans and procedures as operating conditions or facility equipment require
4. Establish a written emergency plan
5. Establish liaison with appropriate local authorities such as police, fire department, or municipal works and inform them of the emergency plans and their role in emergency situations
6. Analyze and document all safety-related malfunctions and incidents for the purpose of determining their causes and preventing the possibility of recurrence

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
13.18.2.5
Each operations manual shall include purging procedures that, when implemented, minimize the presence of a combustible mixture in plant facility piping or equipment when a system is being placed into or taken out of operation.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
13.18.3.1 Each facility shall have a written manual of emergency procedures that shall include the types of emergencies that are anticipated from an operating malfunction, structural collapse of part of the facility, personnel error, forces of nature, and activities carried on adjacent to the facility, including the following:

1. Procedures for responding to controllable emergencies, including notification of personnel and the use of equipment that is appropriate for handling of the emergency and the shutdown or isolation of various portions of the equipment and other applicable steps to ensure that the escape of gas or liquid is promptly cut off or reduced as much as possible.

2. Procedures for recognizing an uncontrollable emergency and for taking action to ensure that harm to the personnel at the facility and to the public is minimized.

3. Procedures for the prompt notification of the emergency to the appropriate local officials, including the possible need to evacuate persons from the vicinity of the facility.

4. Procedures for coordinating with local officials in the preparation of an emergency evacuation plan that sets forth the steps necessary to protect the public in the event of an emergency.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
13.18.3.2 *
When local officials are contacted in an emergency, procedures shall include the method of
notification of the following:

1. The quantity and location of fire equipment throughout the facility Plant
2. Potential hazards at the facility Plant
3. Communication and emergency control capabilities of the facility Plant
4. The status of each emergency

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and
approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 115-NFPA 59A-2013 [ Section No. 13.18.4.1 ]

13.18.4.1
Each facility operator shall carry out periodic inspection, tests, or both on a schedule that is included in the maintenance plan on identified components and its support system in service in the facility, to verify that the components are maintained in accordance with the equipment manufacturer's recommendations and the following:

1. The support system or foundation of each component shall be inspected at least annually to ensure that the support system or foundation is sound.

2. Each emergency power source at the facility Plant shall be tested monthly to ensure that it is operational and tested annually to ensure that it is capable of performing at its intended operating capacity.

3. When a safety device serving a single component is taken out of service for maintenance or repair, the component shall also be taken out of service, except where the safety function is provided by an alternative means.

4. Where the operation of a component that is taken out of service could cause a hazardous condition, a tag bearing the words "Do Not Operate," or equivalent, shall be attached to the controls of the component, or the component shall be locked out.

5. Stop valves for isolating pressure or vacuum-relief valves shall be locked or sealed open and shall be operated only by an authorized person.

6. No more than one pressure or vacuum relief valve stop valve shall be closed at one time on an LNG container.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Control systems that are used as part of the fire protection system at the facility, the Plant, shall be inspected and tested in accordance with the applicable fire codes and standards and conform to the following criteria:

1. Monitoring equipment shall be maintained in accordance with NFPA 72, National Fire Alarm and Signaling Code, and NFPA 1221, Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems.


3. Portable or wheeled fire extinguishers suitable for gas fires, preferably of the dry-chemical type, shall be available at strategic locations, as determined in accordance with Chapter 12, within an LNG facility and on tank vehicles, and shall be maintained in accordance with NFPA 10, Standard for Portable Fire Extinguishers.

4. Fixed fire extinguishers and other fire-control systems that are installed shall be maintained in accordance with NFPA 11, Standard for Low-, Medium-, and High-Expansion Foam; NFPA 12, Standard on Carbon Dioxide Extinguishing Systems; NFPA 12A, Standard on Halon 1301 Fire Extinguishing Systems; NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems; and NFPA 17, Standard for Dry Chemical Extinguishing Systems.

Statement of Problem and Substantiation for Public Input

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Organization: American Gas Association
Street Address:
City:
State:
Zip:
Submittal Date: Tue Dec 24 11:25:48 EST 2013
(F) LNG storage plants, storage facilities, and, in particular, the storage container and its foundation shall be externally inspected after each major meteorological disturbance to ensure that the structural integrity of the plant, the facility, is intact.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

Related Public Inputs for This Document

<table>
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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 118-NFPA 59A-2013 [Section No. 13.18.5.2]

13.18.5.2
Each facility-Plant operator shall develop, implement, and maintain a written plan to keep the personnel at the facility-the Plant up to date on the function of the systems, fire prevention, and security at the facility.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.2.1
Each operating company shall develop documented operating, maintenance, and training procedures, based on experience and conditions under which the LNG plant facility is operated.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.2.2 The operating company shall meet the following requirements:

1. Document procedures covering operation, maintenance, and training.
2. Maintain up-to-date drawings, charts, and records of the plant or facility equipment.
3. Revise plans and procedures when operating conditions or plant or facility equipment are revised.
4. Ensure cooldown of components in accordance with 14.3.5.
5. Establish a documented emergency plan.
6. Establish liaison with local authorities such as police, fire department, or municipal works to inform them of the emergency plans and their role in emergency situations.
7. * Analyze and document all safety-related conditions for the purpose of determining their causes and preventing the possibility of recurrence.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 121-NFPA 59A-2013 [Section No. 14.3.1]

14.3.1
All LNG plant LNG facility components shall be operated in accordance with the operating procedures manual.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 122-NFPA 59A-2013 [Section No. 14.3.2]

14.3.2
The operating procedures manual shall be accessible to all plant faculty personnel and shall be kept readily available in the operating control center.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.3.4
The operating manual shall include procedures for the startup and shutdown of all components of the plant facility, including those for initial startup of the LNG plant facility, to ensure that all components operate satisfactorily.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.3.8
The operating manual shall include procedures for the following:

1. Maintaining the vaporization rate, temperature, and pressure so that the resultant gas is within the design tolerance of the vaporizer and the downstream piping.
2. Determining the existence of any abnormal conditions and the response to those conditions in the plant facility.
3. The safe transfer of LNG and hazardous fluids, including prevention of overfilling of containers.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.4.2
The emergency procedures shall include, at a minimum, emergencies that are anticipated from an operating malfunction, structural collapse of part of the LNG plant, personnel error, forces of nature, and activities carried on adjacent to the plant.

Statement of Problem and Substantiation for Public Input
Standardize the use of plant and facility.

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Submitter Information Verification

Submitter Full Name: Michael Bellman
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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.7.1 – *
Each operating company shall have a documented plan that sets out inspection and maintenance program requirements for each component used in its LNG plant LNG facility that is identified as requiring inspection and maintenance.

Statement of Problem and Substantiation for Public Input

Asterisk identifies new annex material related to electrical equipment maintenance recommended practices in NFPA 70B.
Standardize the use of plant and facility.

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**Origin (from sources other than the submitter)**

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.7.2
Each maintenance program shall be conducted in accordance with its documented plan for LNG plant facility components identified in the plan as requiring inspection and maintenance.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 133-NFPA 59A-2013 [ Section No. 14.7.3 ]

14.7.3 Each operating company shall perform the periodic inspections, tests, or both, on a schedule that is included in the maintenance plan on identified components and its support system identified as requiring inspection and maintenance that is in service in its LNG plant facility.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 134-NFPA 59A-2013 [ Section No. 14.7.5 ]

14.7.5

The maintenance manual shall include the following for LNG plant LNG facility components:

(1) The manner of carrying out and the frequency of inspections and tests

(2) A description of any other action, in addition to those referred to in 14.7.5, that is necessary to maintain the LNG plant LNG facility in accordance with this standard

(3) All procedures to be followed during repairs on a component that is operating while it is being repaired, to ensure the safety of persons and property at the LNG plant

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.8.1 – *
Each operating company shall ensure that components in its LNG plant LNG facility that could accumulate combustible mixtures are purged after being taken out of service and before being returned to service.

Statement of Problem and Substantiation for Public Input

Added asterisk to identify annex material currently in A9.8.1 which will be proposed to be renumbered to A14.8.1.
Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.8.8 Repairs.

Repairs that are carried out on components of an LNG plant shall be carried out in a manner that ensures the following:

1. That the integrity of the components is maintained, in accordance with this standard
2. That components operate in a safe manner
3. That the safety of personnel and property during a repair activity is maintained

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Copyright Assignment

Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.8.9 Site Housekeeping.

Each operating company shall do the following:

1. Keep the grounds of its LNG plant free from rubbish, debris, and other materials that could present a fire hazard.

2. Ensure that the presence of foreign material contaminants or ice is avoided or controlled to maintain the operational safety of each LNG plant component.

3. Maintain the grassed area of its LNG plant so that it does not create a fire hazard.

4. Ensure that fire control access routes within its LNG plant are unobstructed and reasonably maintained in all weather conditions.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

Submitter Information Verification

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.8.12.1
LNG storage plants, storage facilities, and, in particular, the storage container and its foundation shall be externally inspected after each major meteorological disturbance to ensure that the structural integrity of the plant/the facility is intact.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.8.13.1 Each operating company shall ensure the following for metallic components of its LNG plant LNG facility that could be adversely affected with respect to integrity or reliability by corrosion during their service life:

1. Protection from corrosion in accordance with Section 9.10
2. Inspection and replacement or repair under a program of scheduled maintenance in accordance with the manual referred to under Section 14.3

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 141-NFPA 59A-2013 [ Section No. 14.8.13.2 ]

14.8.13.2
Each operating company shall ensure that each component of its LNG plant that is subject to interference from an electrical current is protected so that the electrical interference is minimized.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.8.13.11
Components that will not be adversely affected by internal corrosion during the time that the component will be in use in the LNG plant, in LNG facilities, shall be exempt from the requirements of 14.8.13.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
If it is discovered by inspection or otherwise that corrosion is not being controlled at the LNG plant facilities, necessary actions to control or monitor the corrosion shall be taken.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.9.2

The training plan shall include training of permanent maintenance, operating, and supervisory personnel with respect to the following:

1. The basic operations carried out at the LNG plant facility.
2. The characteristics and potential hazards of LNG and other hazardous fluids involved in operating and maintaining the LNG plant facility, including the serious danger from frostbite that can result from contact with LNG or cold refrigerants.
3. Methods of carrying out the duties of maintaining and operating the LNG plant facility as set out in the manual of operating and maintenance procedures referred to in Sections 14.3 and 14.7.
4. LNG transfer procedures.
5. Fire prevention, including familiarization with the fire control plan of the LNG plant, fire fighting, the potential causes of fire in an LNG plant, and the types, sizes, and likely consequences of a fire at an LNG plant.
6. Recognition of situations when it would be necessary to obtain assistance in order to maintain the security of the LNG plant.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.10.1
Each operating company shall maintain for a period of not less than 5 years a record of the date and type of each maintenance activity performed on each component of the LNG plant facility, including a record of the date that a component is taken out of or placed into service.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.10.3
For the life of the LNG facility, each LNG plant owner shall maintain records of each test, survey, or inspection required by this standard in detail sufficient to demonstrate the adequacy of corrosion control measures.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
14.10.4
A record of all training shall be maintained for each employee of an LNG plant facility, and the records shall be maintained for at least 2 years after the date that the employee ceases to be employed at the LNG plant.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
The following factors should be considered in the selection of plant site locations:

1. Provision for minimum clearances as stated in this standard between LNG containers, flammable refrigerant storage tanks, flammable liquid storage tanks, structures, and plant equipment, with respect to both plant property lines and each other.

2. The degree that the plant can, within limits of practicality, be protected against forces of nature.

3. Other factors applicable to the specific site that have a bearing on the safety of plant personnel and the surrounding public.

The review of such factors should include an evaluation of potential incidents and safety measures incorporated in the design or operation of the facility.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 155-NFPA 59A-2013 [ Section No. A.7.3.7.5(3) ]

A.7.3.7.5(3)
It might not be practical to add a cathodic protection system to an existing tank’s outer tank bottom because of integral electrical conductivity of the bottom to the tank or plant or facility ground and lightning protection system. Grounding can make a cathodic protection system ineffective.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
A.12.2.2(9)

Plant fire brigades are not required by this standard. Where the facility, the Plant elects to have a fire brigade, NFPA 600, Standard on Industrial Fire Brigades, is required for protective equipment and training.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
A.15.11.1 When mitigation measures are being chosen, the application of the principles of inherent safety have been proved to be the most effective means of reducing risk to persons outside the boundary of the facility plant. Inherent safety is the use of mitigations that avoid the hazard rather than attempt to control the hazardous event or process. Kletz in Plant Design for Safety: A User friendly Approach (New York: Hemisphere Publishing, 1991) states the basic principles of inherent safety as follows: These principles are based upon a hierarchy starting with intensification and ending with administrative controls and procedures. This hierarchy is explained further below.

1. **Intensification.** Small inventories of hazardous substances reduces the consequences of hazardous events associated with those substances.
2. **Substitution.** Using safer material in place of a hazardous one will decrease the need for added protective equipment.
3. **Attenuation:** Carry out hazardous reactions or processes in less hazardous conditions.
4. **Limitation of effects.** The effects of failures should be reduced through the reduction of inventory sizes and process conditions. This should be accomplished through equipment design rather than by adding protective equipment.
5. **Simplification.** Complexities provide the potential for error, simplification of facility design reduces the potential for failure.
6. **Change early.** Identification of hazards and hazardous scenarios early in the design process minimizes the need for changes after the design is complete and minimizes the potential for sometimes complicated integration of changes late in the design cycle.
7. **Avoid knock-on effects.** Care should be taken to ensure that, as far as reasonably practical, failure should not initiate additional hazardous scenarios and subsequent escalation of effects.
8. **Making status clear.** Equipment in the facility should be located so that observation of the equipment is easy and convenient; additionally the design of equipment should allow for the status of the equipment to be easily observed, for example, valves open or closed, pump running or secured.
9. **Making incorrect assembly impossible.** As far as possible, components should be selected so that improper installation or construction cannot occur.
10. **Tolerance.** The design of the process should be such that it will tolerate some amount of improper operation, installation, or process upset.
11. **Ease of control.** The use of added-on protective equipment to manage risks should be avoided.
12. **Administrative controls/procedures.** Human error is one the most common initiators of hazardous events; accordingly the use of procedural controls to manage risk should be the last option and only when other options are not possible.

**Statement of Problem and Substantiation for Public Input**

Standardize the use of plant and facility.

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A.15.11.2
With regard to the reduction of risk to persons outside the boundaries of the facility Plant, the basic principles illustrated in A.15.11.1 can be simplified into the three-tier hierarchy as follows.

1. **Tier 1: Remove the hazard.** This first tier of mitigation should focus on providing additional separation distance between the LNG- or gas-containing portions of the facility. Revision of the plant layout and orientation should be considered to increase the separation distance. When changes to the plant layout are being considered, the potential effect of prevailing winds and topography should be evaluated. Care should be given to avoiding the potential for dense clouds to form in valleys and troughs — such clouds will remain in place for longer periods of time, thereby increasing the risk of ignition.

2. **Tier 2: Reduce the amount of hazardous substance/prevent the release.** Consideration also should be given to reducing the amount of LNG or gas that can be released during an event. The effect of reducing inventory sizes is that the size of the liquid pool or the length and duration of the jet plume will be reduced and the effects of the ignited pool/ignited jet will be reduced. In this regard, the use of multiple process trains and smaller tanks are an effective way to reduce the impact to the general public from the facility Plant.

3. **Tier 3: Additional procedures or controls to mitigate the risk.** Where it is not possible to remove the hazard or to prevent or reduce the hazardous effects of a release, additional procedures or controls can be used to mitigate the risk. Human error and failure of control devices are the initiators of the majority of hazardous scenarios; accordingly, these elements should be the last choice when selecting mitigation measures to reduce risk.

**Statement of Problem and Substantiation for Public Input**

Standardize the use of plant and facility.

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**Origin (from sources other than the submitter)**

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
A.15.11.3

Some examples of mitigation measures are provided below:

1. **Tier 1: Remove the hazard.**
   - (a) **Plant spacing** - Facility spacing and layout
   - (b) Spill containment

2. **Tier 2: Reduce the amount of hazardous substance/prevent the release.**
   - (a) Design of equipment, including relief valve design, redundancy, and so forth
   - (b) Valve arrangements
   - (c) Safety instrumented systems, including changes to safety integrity levels, ESD logic, alarm management, and so forth
   - (d) Fire and gas systems, including system reliability, F & G logic, response time, detector coverage, and alarm management
   - (e) Fire protection equipment, including passive and active mitigation techniques

3. **Tier 3: Additional procedures or controls to mitigate the risk.**
   - (a) Maintenance and operating procedures
   - (b) Security procedures and equipment
   - (c) Emergency response actions

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**Statement of Problem and Substantiation for Public Input**

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**Origin (from sources other than the submitter)**

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
B.3.1
The SSE ground motion is the “risk-adjusted maximum considered earthquake (MCER) ground motion,” per the
definition in ASCE 7, Minimum Design Loads for Buildings and Other Structures. For most locations, except
possibly those near active faults, the MCER is determined by adjustment from ground motion that has a 2
percent probability of exceedance in a 50-year period to ground motion that achieves targeted risk requirements.
The ASCE 7 adjustment establishes a uniform probability of failure criteria (1 percent chance of collapse in 50
years) for structures designed in accordance with the seismic provisions of ASCE 7. In NFPA 59A, the LNG
facility, LNG Plant, is designed to contain the LNG and prevent catastrophic failure of critical facilities under an
SSE event. This more onerous performance criterion is achieved through design requirements of API 625, API
620 (Appendix L), and ACI 376, which have established response reduction factors to prevent collapse at the
design level ground motion.

ASCE 7 requires the base design level earthquake to be two-thirds of MCER. Setting the importance factor, I,
equal to 1.5 (corresponding to structures containing extra hazardous materials) results in a design level equal to
MCER. Thus SSE = MCER, as required by this standard, is consistent with ASCE 7 provisions for the design
level ground motion. Design of critical facilities to this standard exceeds the design performance requirements of
ASCE 7. The facility is not required to remain operational following the SSE event.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the
AGA Operations Safety Regulatory Action Committee.
Attachment D:
AGA Public Inputs
Annex E
Public Input No. 172-NFPA 59A-2013 [Section No. E.1 [Excluding any Sub-Sections]]

The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document, unless also listed in Chapter 2, for other reasons.

Statement of Problem and Substantiation for Public Input

Deleting this text is contingent with the proposals for removal in E.1.1 and others.

Related Public Inputs for This Document

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Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Mon Dec 30 12:52:11 EST 2013

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
E.1.1  NFPA Publications.
National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 70B, Recommended Practice for Electrical Equipment Maintenance.
NFPA 77, Recommended Practice on Static Electricity, 2007 edition.
NFPA 274, Standard Test Method to Evaluate Fire Performance Characteristics of Pipe Insulation
Adding the reference to NFPA 3 standard is contingent to the proposal in A.12.4.4, and NFPA 70B to be contingent to proposal in A.14.7.1. Redundancy of these publications in both chapter 2 and this list creates confusion. Removal will improve clarity on which documents are "requirements".

Related Public Inputs for This Document

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Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address:
City:
State:
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Submittal Date: Mon Dec 30 12:54:06 EST 2013

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 175-NFPA 59A-2013 [ Section No. E.1.2.1 ]

E.1.2.1 – ACI Publications.
American Concrete Institute, P.O. Box 9094, Farmington Hills, MI 48333.

Statement of Problem and Substantiation for Public Input

Redundancy of these publications in both chapter 2 and this list creates confusion. Removal will improve clarity on which documents are "requirements".

Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Mon Dec 30 13:07:32 EST 2013

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 176-NFPA 59A-2013 [ Section No. E.1.2.3 ]

E.1.2.3   API Publications.
American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005-4070.
API 607, Fire Test for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats, 2010.

Statement of Problem and Substantiation for Public Input

Redundancy of these publications in both chapter 2 and this list creates confusion. Removal will improve clarity on which documents are "requirements".

Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address:
City:
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Submittal Date: Mon Dec 30 13:10:09 EST 2013

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Origin (from sources other than the submitter)

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Redundancy of these publications in both chapter 2 and this list creates confusion. Removal will improve clarity on which documents are "requirements".

Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address:
City:
State:
Zip:
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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 178-NFPA 59A-2013 [ Section No. E.1.2.5 ]

E.1.2.5 ASME Publications.
American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.

Statement of Problem and Substantiation for Public Input

Redundancy of these publications in both chapter 2 and this list creates confusion. Removal will improve clarity on which documents are "requirements".

Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address:
City:
State:
Zip:
Submittal Date: Mon Dec 30 13:14:52 EST 2013

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Attachment E: General Public Inputs
NOTE: This proposal appeared as Comment 59A-5 (Log #30) which was held from the F11 ROC on Proposal 59A-26.

All of the text exists in the current document. See the uploaded Held Comment.

Additional Proposed Changes

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Statement of Problem and Substantiation for Public Input

See the uploaded Held Comment.

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler
Organization: GBH International

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59A-5 Log #30

(3.3.19 Noncombustible Material and 4.6) Final Action: Hold

Submitter: Marcelo M. Hirschler, GBH International
Comment on Proposal No: 59A-26
Recommendation: Revise text to read as follows:

3.3.29 Noncombustible (Material). See 4.6. [101, 2012] A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors, when subjected to fire or heat. Materials that are reported as passing ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C shall be considered noncombustible materials. [101, 2009] [101, 3.3.160.3, 2012]

4.6* Noncombustible Material

4.6.1 A material that complies with any of the following shall be considered a noncombustible material. [101, 4.6.14.1, 2012]

(1) A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors, when subjected to fire or heat. [101, 4.6.14.1(1), 2012]

(2) A material that is reported as passing ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C, shall be considered a noncombustible material. [101, 4.6.14.1(2), 2012]

(3) A material that is reported as complying with the pass/fail criteria of ASTM E 136 when tested in accordance with the test method and procedure in ASTM E 2652, Standard Test Method for Behavior of Materials in a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750 Degrees C, shall be considered a noncombustible material. [101, 4.6.14.1(3), 2012]

A.4.6 The provisions of 4.7 do not require inherently noncombustible materials to be tested in order to be classified as noncombustible materials. [101, A.4.6.14, 2012]


Substantiation: The definition in the ROP for NFPA 59A is being extracted from NFPA 220. In the new edition of NFPA 101 the committee made a change to do two things: (a) comply with the NFPA Manual of Style and ensure there are no requirements in the definition and that the definition is in a single sentence and (b) include two ways of testing for noncombustibility, namely by using ASTM E 136 or by using ASTM E 2652. The proposal recommends that the text still be extracted from NFPA 101 but that the additional text that NFPA 101 placed in section states that definitions need to be in single sentences. The second sentence in the present text is really clarification and is best placed in the annex, although it could also be placed somewhere in the body of the standard, outside of the definitions Sections 4.6.14.1 and 4.6.14.2 also be extracted.

The action, at the ROP, from the NFPA 101 committee on fundamentals can be found in the NFPA ROP for proposals 101-54a and 101-64.

The details of the NFPA 101 action at the ROP stage follow:

NFPA 101-54a Accept:

3.3.160.3* 3.3.160.3 Noncombustible (Material). A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors, when subjected to fire or heat. Materials that are reported as passing ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C, shall be considered noncombustible materials.

A.3.3.160.3 See 4.6.14 for additional information on noncombustible material.

Substantiation: The action taken on Proposal 101-64 adds text on Noncombustible Material as a new 4.6.14 so as to permit the definition of Noncombustible Material to be simplified - removing requirements from the definition.

NFPA 101-64 Accept in Principle;

Add new text to read as follows:

4.6.14 Noncombustible Material

4.6.14.1 A material that is reported as passing ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C, shall be considered a noncombustible material.

4.6.14.2 A material that is reported as complying with the pass/fail criteria of ASTM E 136 when tested in accordance with the test method and procedure in ASTM E 2652, Standard Test Method for Behavior of Materials in a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750 Degrees C, shall be considered a noncombustible material.

4.6.14.3 Where the term limited-combustible is used in this Code, it shall also include noncombustible.

Add ASTM E 2652, Standard Test Method for Behavior of Materials in a Tube Furnace with a Cone-shaped Airflow
Committee Statement: The Committee Meeting Action does what the submitter requested but rewords the title from "Combustibility" to "Noncombustible Material" as the added text speaks specifically to noncombustible materials.

At the ROC stage, NFPA 101 acted as follows (NFPA 101-31):
Replace the text of 4.6.14 as proposed by the action at the ROP Proposal 101-64 with the following:

4.6.14* Noncombustible Material

4.6.14.1 A material that complies with any of the following shall be considered a noncombustible material:
(1)* A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors, when subjected to fire or heat.
(2) A material that is reported as passing ASTM E 136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C*.
(3) A material that is reported as complying with the pass/fail criteria of ASTM E 136 when tested in accordance with the test method and procedure in ASTM E 2652, *Standard Test Method for Behavior of Materials in a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750 Degrees C*, shall be considered a noncombustible material.

4.6.14.2 Where the term limited-combustible is used in this Code, it shall also include noncombustible.

A.4.6.14 The provisions of 4.6.14 do not require inherently noncombustible materials to be tested in order to be classified as noncombustible materials.

A.4.6.14.1(1) Examples of such materials include steel, concrete, masonry and glass.


The complete NFPA 101 action also includes information on a term, limited combustible, not used in NFPA 59A, and that portion is not proposed to be extracted from NFPA 101.

Committee Meeting Action: Hold

Committee Statement: The committee placed the comment on hold to allow time for further study of the NFPA 101 revision and to determine the applicability of ASTM 2652 to materials in NFPA 59A.

Number Eligible to Vote: 31

Ballot Results: Affirmative: 25 Abstain: 1

Ballot Not Returned: 5 Humes, C., Legatos, N., Micciche, P., Pastuhov, A., Roue, R.

Explanation of Abstention:
STANNARD, JR., J.: I have been unable to attend the last meetings of the Committee and have not had an opportunity to review the material. Therefore, I must abstain.
<table>
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<th>Public Input No. 62-NFPA 59A-2013 [ Section No. 2.2 ]</th>
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| 2.2 NFPA Publications.  
NFPA 51B Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, 2009 edition  
NFPA 496, Purged and Pressurized Enclosures for Electrical Equipment, 2008 edition  

**Statement of Problem and Substantiation for Public Input**

Added new standards appropriate for use at LNG facilities, updated existing standards to the latest published editions and indicating annex material for NFPA 385 to identify 49 CFR 172-186 for tank vehicle requirements in the U.S.

**Submitter Information Verification**

Submitter Full Name: Michael Bellman  
Organization: American Gas Association  
Street Address:  
City:  
State:  
Zip:  
Submittal Date: Mon Dec 23 16:11:29 EST 2013
3.3.1 Barrel.
A unit of volume that is equal to 42 gal. US gallons \( (0.159 \text{ m}^3) \).

Statement of Problem and Substantiation for Public Input

Modification to text to clarify "US" verses "Imperial" gallons and using the complete word "gallons" instead of the abbreviation "gal". Used "meter" in place of "m" for clarity, added space between 0.159 and meter.

Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address: 
City:
State: 
Zip: 
Submittal Date: Tue Dec 24 08:26:34 EST 2013

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
3.3.2 Bunkering.
The loading of a ship's bunker or tank with fuel oil for fuel for use in connection with propulsion or auxiliary equipment.

Statement of Problem and Substantiation for Public Input

Extended definition to include other fuels such as LNG

Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address:
City:
State:
Zip:
Submittal Date: Tue Dec 24 09:15:59 EST 2013

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 10-NFPA 59A-2013 [ New Section after 3.3.3 ]

3.3.4 Code.
3.3.4.1 Building Code. The building or construction code adopted by the jurisdiction. [1: 3.3.54.1 ]
3.3.4.2 Electrical Code. The electrical code referenced in Section 2.2.
3.3.4.3 Fire Code. The fire code adopted by the jurisdiction.
3.3.4.4 Mechanical Code. The mechanical or mechanical construction code adopted by the jurisdiction. [1: 3.3.54.3 ]
3.3.4.5 Plumbing Code. The plumbing code referenced in Section 2.2.

Statement of Problem and Substantiation for Public Input

This revision will add the definitions to the document. Most of this definition were taken from NFPA 1. So proposed section 3.3.4.2 and 3.3.4.4 should be extracted from NFPA 1. Section 3.3.4.3 is not in NFPA 1, so it would not need to be extracted.

Submitter Information Verification

Submitter Full Name: Jim Muir
Organization: Building Safety Division, Clark County, Washington
Affiliation: NFPA Building Code Development Committee (BCDC)
Street Address: 
City:
State:
Zip:
Submittal Date: Mon Jul 08 14:38:06 EDT 2013

Copyright Assignment

I, Jim Muir, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

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3.3.5.3.3 Membrane Tank System.
A tank system consisting of a thin metal primary container, membrane, together with thermal insulation and a concrete container jointly forming an integrated, composite structure that provides primary liquid containment, where hydrostatic loads and other loadings on the membrane are transferred via the load-bearing insulation onto the concrete container such that the vapors are contained by the tank roof.

Statement of Problem and Substantiation for Public Input

The thin metal, by itself, is not a container. Thus the refinement of the definition.

Submitter Information Verification

Submitter Full Name: John Blanchard
Organization: CB&I
Street Address:
City:
State:
Zip:
Submittal Date: Thu Dec 19 10:15:54 EST 2013

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Public Input No. 76-NFPA 59A-2013 [ New Section after 3.3.8 ]

Engineering Design
A detailed design governing components, systems within an LNG facility developed from process, mechanical, electrical requirements, conforming to regulatory requirements, and includes all necessary specifications, drawings, and supporting documentation.

Statement of Problem and Substantiation for Public Input
Proposed new definition clarifies expectations of a minimum engineering design as the term is applied throughout the standard. (chapter 9.7 for example)

Submitter Information Verification
Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Tue Dec 24 09:24:51 EST 2013

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Origin (from sources other than the submitter)
These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 7-NFPA 59A-2013 [ New Section after 3.3.11 ]

NOTE: This proposal appeared as Comment 59A-1 (Log #35) which was held from the F11 ROC on Proposal 59A-15.

3.3.x Fire Protection. Fire protection for the purposes of this code shall be defined in the broad sense to include the prevention, detection, protection, control, suppression, and response to fire and flammable hazards.

Additional Proposed Changes

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</table>

Statement of Problem and Substantiation for Public Input

Fire Protection should not be limited to those above. The NFPA 550 Fire Safety Concepts would be a good and appropriate reference for what fire protection entails. It may also be beneficial to include guidance in the appendix on what the fire protection evaluation methodology should entail, which is not uncommon. NFPA 101 provides design scenarios within the body of the test. The Annex of NFPA 30 and Annex of NFPA 72 also provide guidance on structure and may be used as a basis for guidance in the 59A annex. The ISA provides technical guidance on the placement/location of Fire and Gas Detectors. The fire protection evaluations we have seen vary greatly in quality and would benefit from guidance. A committee should be formed and this should be worked on.

Submitter Information Verification

Submitter Full Name: Andrew Kohout
Organization: Federal Energy Regulatory Commission (FERC)
Street Address:
City:
State:
Zip:
Submittal Date: Wed Jun 12 09:01:55 EDT 2013

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Comment on Proposal No: 59A-15

Recommendation: Revise text to read as follows:

"Fire protection for the purposes of this code shall be defined in the broad sense to include fire prevention, fire detection, protection, control, and suppression, and response to fire and flammable hazards."

Substantiation: Fire Protection should not be limited to those above. The NFPA 550 Fire Safety Concepts would be a good and appropriate reference for what fire protection entails. It may also be beneficial to include guidance in the appendix on what the fire protection evaluation methodology should entail, which is not uncommon. NFPA 101 provides design scenarios within the body of the test. The Annex of NFPA 30 and Annex of NFPA 72 also provide guidance on structure and may be used as a basis for guidance in the 59A annex. The ISA provides technical guidance on the placement/location of Fire and Gas Detectors. The fire protection evaluations we have seen vary greatly in quality and would benefit from guidance. A committee should be formed and this should be worked on.

Committee Meeting Action: Hold

Committee Statement: The committee placed the comment on hold to allow time for a task group to review other NFPA documents and identify appropriate revisions to the ROP definition and annex material.

Number Eligible to Vote: 31

Ballot Results: Affirmative: 25 Abstain: 1

Ballot Not Returned: 5 Humes, C., Legatos, N., Micciche, P., Pastuhov, A., Roue, R.

Explanation of Abstention:

STANNARD, JR., J.: I have been unable to attend the last meetings of the Committee and have not had an opportunity to review the material. Therefore, I must abstain.
A vaporizer that derives heat for vaporization from the combustion of fuel, electric power, or waste heat, such as from boilers or internal combustion engines or process fluids. [52, 2010]

Statement of Problem and Substantiation for Public Input

See substantiation for 58-NFPA 59A-2013

Submitter Information Verification

Submitter Full Name: Brian Eisentrout
Organization: CB&I
Affiliation: Steel Plate Fabricators Association
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Submittal Date: Fri Dec 20 11:53:01 EST 2013

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Public Input No. 58-NFPA 59A-2013 [ Section No. 3.3.29.3 ]

3.3.29.2.3 Process Vaporizer.
A vaporizer that derives its heat from another thermodynamic or chemical process to utilize the refrigeration of the LNG.

Statement of Problem and Substantiation for Public Input

Process vaporizers since they are not considered heated vaporizers do not have any of the shutoff valves required by sections 8.4.4, 8.4.5 and 8.4.6. This is an oversight as the potential for process fluids or LNG to leak are similar between vaporizers and it is prudent to have method of 1. Shutting of the LNG to the vaporizer -8.4.4, 2. shutting off the heat source from a remote location- 8.4.5 and 3. Have a shutoff valve if installed within 50 of an LNG container --8.4.6. By making a process vaporizer a subset of heated vaporizers all the requirements for heated vaporizer apply including those in 8.4.4, 8.4.5 and 8.4.6. Other edits include updating the heated vaporizer definition to include process vaporizers.-paragraph 3.3.29.1 to include process vaporizers, adding "or process fluids." at the end of the definition. 8.5.1 can be revised to delete "or process vaporizers"since the reference to heated vaporizers would include process vaporizers.

Submitter Information Verification

Submitter Full Name: Brian Eisentrout
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Submittal Date: Fri Dec 20 11:34:28 EST 2013

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5.3.2.6

Double and full containment tank systems shall be designed and constructed such that:

(A) in the case of a spill and secondary from a primary container fire, the secondary container wall shall contain the LNG for the duration of the fire.

(B) Full containment tank systems shall be designed for all identified internal and external loads and events while maintaining liquid containment and controlled release of vapor.

(C) Double containment tank systems shall be designed for all identified internal and external loads and events while maintaining liquid containment.

(D) In the case of a fire confined to the inner tank, the secondary container wall, as defined by 5.3.4.2, Chapter 12, and/or Chapter 15, the primary and/or the secondary container shall retain sufficient structural integrity to prevent collapse, which can cause damage to and leakage from the primary container.

(E) For a full containment concrete or steel roof tank, measures to eliminate scenarios which could lead to a full diameter primary or secondary containment fire shall be provided.

The tanks shall also be designed and constructed such that in the case of a fire in the primary or secondary container of an adjacent tank or from containment of a design spill, the secondary container shall retain sufficient structural integrity to prevent collapse, which can cause damage to and leakage from the primary liquid or vapor container.

Statement of Problem and Substantiation for Public Input

The current criteria and that of 5.3.4.2 require design for a fire in a tank without a roof. Full containment tanks are required to be designed to eliminate that possibility. The current NFPA provisions lead to designs that ignore full containment design requirements and invoke an undefined scenario leading to loss of roof.

The proposed change requires identification of all potential fire cases and design to mitigate risk of that fire escalating to a more severe case.

Further: Loss of the entire roof of a full containment tank, especially when constructed of concrete, is not considered credible by other standards. Loss of a roof without causing damage to the primary liquid container is also not credible.

Submitter Information Verification

Submitter Full Name: John Blanchard
Organization: CB&I
Street Address:
City:
State:
Zip:
Submittal Date: Thu Dec 19 10:45:31 EST 2013
5.3.3.4  *
The distances to the radiant heat flux levels of Table 5.3.3.2 shall be calculated in accordance with a model that:

(1) Takes into account the physical phenomena observed in, and has been validated with the data obtained from, available LNG fire experimental data, published in peer-reviewed scientific literature applicable to the physical situation considered

(2) Has been published in peer-reviewed scientific literature

(3) Has a scientific assessment verifying the details of the physics, analysis, and execution process

(4) Has been approved

Statement of Problem and Substantiation for Public Input

The modification would help reduce the burden of project proponents to reestablish the validity of models already accepted by national government agencies such as U. S. Federal agencies (e.g., PHMSA recognition of LNGFIRE3 for pool fire modeling) to satisfy other AHJs. Redundant validation should be avoidable when implementing the requirements of the standard. This approach would also avoid having to reverse new requirements in these sections associated with "peer review" of models, etc., that are obstacles for use of recognized models and current conflicts with 49CFR193 (i.e., its citations of LNGFIRE), such as with non-jurisdictional facilities with respect to 49CFR193

Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address:
City:
State:
Zip:
Submittal Date: Tue Dec 24 09:38:22 EST 2013

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
**5.3.4.2**

Full and double construction LNG containment LNG storage containers of greater than 70,000 gal (265 m³) water capacity shall be separated from adjoining LNG storage containers such that a fire in one container or impoundment will not cause loss of containment from adjacent containers. This shall be accomplished by ensuring that no part of the adjacent storage container roof, walls, or its impoundment structure reaches a temperature at which the strength of the material of the container roof, wall, or its impoundment is reduced to a level where the LNG tank, roof, or impoundment loses its structural integrity. The application of engineering analyses of analyses meeting the requirements of 5.3.3.4 shall be used to determine this temperature by including the following conditions in the analyses:

1. The analyses shall **be performed for** include the following fire scenarios:
   a. For a single or double containment tank system, a fire involving the complete loss of containment of the primary liquid container to an impoundment area that complies with the requirements of 5.3.2.1
   b. A fire over the whole surface of the liquid contained in the tank,
   c. Assuming the roof is completely lost;
   d. For a full containment tank system as defined by 5.3.2.6.

2. The analyses shall account for the following:
   a. The duration of the fire, the radiant heat emission characteristics of the fire, and the physical attributes of the fire under the anticipated atmospheric conditions
   b. The atmospheric conditions producing the maximum separation distances shall be used except for conditions that occur less than 5 percent of the time based on recorded data for the area and using a LNG fire model in accordance with 5.3.3.4
   c. Active or passive systems to reduce thermal heat flux incident on the surface or to limit the surface temperature
   d. The materials, design, and methods of construction of the target LNG tank being analyzed

**Statement of Problem and Substantiation for Public Input**

Full containment tanks, by definition, are required to eliminate the potential for a tank fire case without a roof. However, the current provision 5.3.4.2 (1) b includes a design requirement with the roof "completely lost". This proposed change is related to proposed change to 5.3.2.6 (Public Input No. 51)

**Submitter Information Verification**

Submitter Full Name: John Blanchard  
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Zip:  
Submittal Date: Thu Dec 19 11:16:05 EST 2013
NOTE: This proposal appeared as Comment 59A-12 (Log #6) which was held from the F11 ROC on Proposal N/A.

5.3.4.2

Full and double construction LNG storage containers of greater than 70,000 gal (265 m$^3$) water capacity shall be separated from adjoining LNG storage containers such that a fire in one container or impoundment will not cause loss of containment from adjacent containers. This shall be accomplished by ensuring that no part of the adjacent storage container roof, walls, or its impoundment structure reaches a temperature at which the strength of the material of the container roof, wall, or its impoundment is reduced to a level where the LNG tank, roof, or impoundment loses its structural integrity. The application of engineering analyses shall be used to determine this temperature by including the following conditions in the analyses:

(1) The analyses shall be performed for the following:
   (a) A fire involving the complete loss of containment of a container to an impoundment area that complies with the requirements of 5.3.2.1
   (b) A fire over the whole surface of the liquid contained in the tank, assuming the roof is completely lost. The whole liquid surface fire for the full containment tank made of concrete (both wall and roof) is considered only if specifically required, i.e., very low probability
   (c) Pressure relief valve tail fire

(2) The analyses shall account for the following:
   (a) The duration of the fire, the radiant heat emission characteristics of the fire, and the physical attributes of the fire under the anticipated atmospheric conditions
   (b) The atmospheric conditions producing the maximum separation distances shall be used except for conditions that occur less than 5 percent of the time based on recorded data for the area and using a LNG fire model in accordance with 5.3.3.4
   (c) Active or passive systems to reduce thermal heat flux incident on the surface or to limit the surface temperature
   (d) The materials, design, and methods of construction of the target LNG tank being analyzed

Additional Proposed Changes

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<th>Description</th>
<th>Approved</th>
</tr>
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<td>Held Comment 59A-12</td>
<td>✓</td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Input

For full and double containment container, an analysis is required to ensure that no part of adjacent tank is damaged by thermal radiation by a fire in the container. For this analysis, the section specifies a fire over the whole surface of the liquid contained in the tank assuming the roof is completely collapsed.

As per the definition of full containment container in Chapter 3, full containment container includes containers with secondary container wall and roof made of steel or concrete. However, we believe that this requirement is based on steel roof tank only. The scenario of whole liquid surface fire for the full containment container, which wall and roof is made of concrete, is too conservative scenario and it will result in excessively large spacing between tanks.

EN1473 (Installation and equipment for liquefied natural gas - Design of onshore installation) specifies the difference of the credible scenario between steel and concrete. Especially for the full containment tank made of concrete (both wall and roof), the whole liquid surface fire is considered only if specifically required, i.e., very low probability. The deterministic scenario of whole liquid surface fire by collapse of roof does not reflect the actual industry experience and it makes the selection of full containment concrete roof and wall tank not technically justified. Full containment tanks with concrete roof and wall are selected for safety reasons based on LNG industry common practices and as demonstrated by historical data.

Submitter Information Verification
Submitter Full Name: Takashi Niwa
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State:
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Submittal Date: Wed Jun 12 09:44:15 EDT 2013

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5.3.4.2 Full and double construction LNG storage containers of greater than 70,000 gal (265 m³) water capacity shall be separated from adjoining LNG storage containers such that a fire in one container or impoundment will not cause loss of containment from adjacent containers. This shall be accomplished by ensuring that no part of the adjacent storage container roof, walls, or its impoundment structure reaches a temperature at which the strength of the material of the container roof, wall, or its impoundment is reduced to a level where the LNG tank, roof, or impoundment loses its structural integrity.

The application of engineering analyses shall be used to determine this temperature by including the following conditions in the analyses:

1. The analyses shall be performed for the following:
   a. A fire involving the complete loss of containment of a container to an impoundment area that complies with the requirements of 5.3.2.1
   b. A fire over the whole surface of the liquid contained in the tank, assuming the roof is completely lost. The whole liquid surface fire for the full containment tank made of concrete (both wall and roof) is considered only if specifically required, i.e., very low probability.
   c. Pressure relief valve tail fire

2. The analyses shall account for the following:
   a. The duration of the fire, the radiant heat emission characteristics of the fire, and the physical attributes of the fire under the anticipated atmospheric conditions
   b. The atmospheric conditions producing the maximum separation distances shall be used except for conditions that occur less than 5 percent of the time based on recorded data for the area and using a LNG fire model in accordance with 5.3.3.4
   c. Active or passive systems to reduce thermal heat flux incident on the surface or to limit the surface temperature
   d. The materials, design, and methods of construction of the target LNG tank being analyzed.

Substantiation: For full and double containment container, an analysis is required to ensure that no part of adjacent tank is damaged by thermal radiation by a fire in the container. For this analysis, the section specifies a fire over the whole surface of the liquid contained in the tank assuming the roof is completely collapsed.

As per the definition of full containment container in Chapter 3, full containment container includes containers with secondary container wall and roof made of steel or concrete. However, we believe that this requirement is based on steel roof tank only. The scenario of whole liquid surface fire for the full containment container, which wall and roof is made of concrete, is too conservative scenario and it will result in excessively large spacing between tanks.

EN1473 (Installation and equipment for liquefied natural gas - Design of onshore installation) specifies the difference of the credible scenario between steel and concrete. Especially for the full containment tank made of concrete (both wall and roof), the whole liquid surface fire is considered only if specifically required, i.e., very low probability.

The deterministic scenario of whole liquid surface fire by collapse of roof does not reflect the actual industry experience and it makes the selection of full containment concrete roof and wall tank not technically justified. Full containment tanks with concrete roof and wall are selected for safety reasons based on LNG industry common practices and as demonstrated by historical data.

Committee Meeting Action: Hold

Committee Statement: The comment is put on hold because it is new material and would benefit from public review in the next full revision cycle. The committee recognizes the need to differentiate the susceptibility of failure between concrete and steel roofs in the next full revision cycle.

Number Eligible to Vote: 31

Ballot Results: Affirmative: 24 Negative: 1 Abstain: 1

Ballot Not Returned: 5 Humes, C., Legatos, N., Micciche, P., Pastuhov, A., Roue, R.

Explanation of Negative:

BOWDOIN, JR., L.: I believe the submitter has made a valid argument to revise 5.3.4.2 and that the committee should accept this submission as written.

Explanation of Abstention:

STANNARD, JR., J.: I have been unable to attend the last meetings of the Committee and have not had an
LNG and flammable refrigerant loading and unloading connections shall be located in accordance with API Standard RP 752 Management of Hazards Associated with Location of Process Plant Buildings and API Standard RP 753 Management of Hazards Associated with Location of Process Plant Portable Buildings from uncontrolled sources of ignition, process areas, storage containers, control buildings, offices, shops, and other occupied or important plant structures unless the equipment is directly associated with the transfer operation.

Statement of Problem and Substantiation for Public Input

Lessons learned from BP Texas City Incident and adds reference to industry standards on placement of buildings etc.

Submitter Information Verification

Submitter Full Name: Kelly Nicolello
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Submittal Date: Tue Sep 24 19:39:11 EDT 2013

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### Statement of Problem and Substantiation for Public Input

While the classification system and the reference to the ASCE risk category system fill a needed void for the definition of design standards for the different elements of an LNG facility. The use of Roman numerals for both the design classification and the risk category used by ASCE-7 for design creates confusion. The classification uses increasing Roman numerals for reducing hazard while the ASCE-7 uses decreasing numerals for reducing the hazard. To eliminate potential confusion the following changes are suggested. Change Category to Classification in the title of 5.4.1 and change the title of 5.4.1.1 from Classification I to Classification A, 5.4.1.2 Change Classification II to Classification B, 5.4.1.3 Change Classification III to Classification C, 5.4.2.1 change Classification I to Classification A, 5.4.2.2 change Classification II to Classification B, 5.4.2.3 Change classification II to Classification C. TO be consistent with the design requirements for storage tank systems, the critical piping associated with tank systems should be designed for the same level as the tank system, Classification A includes design the OBE and SSE but mistakenly omitted reference to ALE (Aftershock Level Earthquake)> Reference to ALE needs to be inserted in the Clause 5.4.2.1

### Submitter Information Verification

**Submitter Full Name:** Brian Eisentrout  
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**Street Address:**  
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**Submittal Date:** Thu Dec 19 17:45:30 EST 2013

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5.4.2 Buildings and Structures Design.

Buildings and structures shall be designed for seismic, wind, ice and snow in accordance with 5.4.2.1 through 5.4.2.3.

5.4.2.1 Classification I.

Seismic design shall use the operating basis earthquake (OBE) and safe shutdown earthquake (SSE) ground motions as defined in 7.4.4.3 and 7.4.4.4 for determination of loads to be used per ASCE 7, Minimum Design Loads for Buildings and Other Structures; wind, ice, and snow design shall use an occupancy risk category of IV per ASCE 7.

5.4.2.2 Classification II.

Seismic, wind, ice, and snow design shall use an occupancy risk category of III per ASCE 7.

5.4.2.3 Classification III.

Seismic, wind, ice, and snow design shall use an occupancy risk category of II per ASCE 7.

Statement of Problem and Substantiation for Public Input

ASCE 7 changed the term from "occupancy" to "risk" category.

Submitter Information Verification

Submitter Full Name: John Blanchard
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Submittal Date: Thu Dec 19 11:47:43 EST 2013

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Public Input No. 57-NFPA 59A-2013 [ Sections 5.4.2.1, 5.4.2.2, 5.4.2.3 ]

Sections 5.4.2.1, 5.4.2.2, 5.4.2.3

5.4.2.1 Classification I
Seismic design shall use the operating basis earthquake (OBE), and safe shutdown earthquake (SSE) ground and aftershock level earthquake (ALE) ground motions as defined in 7.4.4.3, 7.4.4.4, and 7.4.4.4 for determination of loads to be used per ASCE 7, *Minimum Design Loads for Buildings and Other Structures*; wind, ice, and snow design shall use an occupancy category of IV per ASCE 7.

5.4.2.2 Classification II
Seismic, wind, ice, and snow design shall use an occupancy category of III per ASCE 7.

5.4.2.3 Classification III
Seismic, wind, ice, and snow design shall use an occupancy category of II per ASCE 7.

Statement of Problem and Substantiation for Public Input

See 56-NFPA59A-2013 for substantiation

Submitter Information Verification

Submitter Full Name: Brian Eisentrout
Organization: CB&I
Affiliation: Steel Plate Fabricators Association
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Submittal Date: Fri Dec 20 10:39:14 EST 2013

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5.4.4 If rooms containing LNG and flammable fluids are located within or attached to buildings in which such fluids are not handled (e.g., control centers, shops), the common walls shall be limited to no more than two, shall be designed to withstand a static pressure of at least 100 psf (4.8 kPa), shall be designed for fire and explosion control in accordance with the following:

1. Deflagration venting shall be provided in accordance with NFPA 68, Standard on Explosion Protection by Deflagration Venting.

2. Common walls shall have no doors or other communicating openings, and shall.

3. Wall and ceiling construction, other than venting panels, shall have a fire resistance rating of at least 1 hour.

Statement of Problem and Substantiation for Public Input

The current design criteria calling for 100 psf static design load are incomplete - they do not address the amount of deflagration venting area. Following the current design could result in inadequate explosion control for the affected rooms. NFPA 68 criteria address both static resistance of the common walls and the needed venting area for exterior walls.

Submitter Information Verification

Submitter Full Name: Glenn Mahnken
Organization: FM Global
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Submittal Date: Thu Jan 02 09:32:48 EST 2014

Copyright Assignment

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Section 5.9.1 - Portable LNG Facilities

Temporary portable LNG equipment shall not remain in-service more than (180) days at the portable installation where:

(a) Portable installations in-service more than 180 days shall meet one of the following requirements:

(i) Approval by the AHJ to remain for a period exceeding 180 days, or

(ii) Comply with all of the applicable requirements of Chapter 13 for stationary applications using ASME containers and the security requirements in 12.9.

(b) LNG transport vehicles complying with U.S. Department of Transportation (DOT) requirements shall be used as the supply container.

(c) All portable LNG equipment shall be operated by at least one person qualified by experience and training in the safe operation of these systems in accordance with requirements in 14.9.3, and 14.9.4 based on the written training plan requirements in 14.9.1, and 14.9.2.

(d) All other operating personnel, at a minimum, shall be qualified by training in accordance with requirements in 14.9.1, and 14.9.2.

(e) All personnel training shall be documented in accordance with records requirements in 14.10.4.

(f) Each operator shall provide and implement a written plan for initial training in accordance with requirements in 14.9.1, 14.9.2 to instruct all designated operating and supervisory personnel including but not limited to the characteristics and hazards of LNG used or handled at the site, including low LNG temperature, flammability of mixtures with air, odorless vapor, boil-off characteristics, and reaction to water and water spray; the potential hazards involved in operating activities; and how to carry out the emergency procedures that relate to personnel functions and to provide detailed instructions on mobile LNG operations.

(g) Provisions shall be made to minimize the possibility of accidental discharge of LNG at locations endangering adjoining property or important process equipment and structures or reaching surface water drainage.

(h) Portable or temporary containment means shall be permitted to be used.

(i) The operation shall be continuously attended to monitor the operation whenever LNG is present at the facility.

(j) If the facility or the operation causes any restriction to the normal flow of vehicular traffic, in addition to the monitoring personnel required in 5.9.1 (10), flag persons shall be continuously on duty to direct such traffic.

(k) Provision shall be made to minimize the possibility of accidental ignition in the event of a leak.

(l) Fire protection systems shall comply with 12.2.1, 12.3.1, 12.3.3, 12.3.5, 12.3.9, 12.4.1, 12.4.2, 12.6.1, 12.7, 12.8.1, 12.9.1, 12.9.2.

(m) Portable or wheeled fire extinguishers recommended by their manufacturer for gas fires shall be available at strategic locations and shall be provided and maintained in accordance with NFPA 10, Standard for Portable Fire Extinguishers.


(o) The site shall be continuously attended, and provisions shall be made to restrict public access to the site whenever LNG is present.

Statement of Problem and Substantiation for Public Input

The Supplemental Gas Committee sees the utilization of the facilities as an expanding area of activity and believes that the requirements associated with temporary portable LNG facilities need to be further clarified and to identify those requirements which are important for the safety of general public near these facilities and the operating personnel charged with the safety of these facilities. The proposal only identifies existing design, construction, testing, locating, operating, maintenance, fire protection, and personnel training requirements already located throughout the standard but clearly associates them to a temporary portable LNG facility. The only new requirement proposed is to identify a limit on how long a temporary portable facility can be located at any one site, beyond which, the owner/operator must apply all the requirements of Chapter 13 instead.

Submitter Information Verification

Submitter Full Name: Michael Bellman
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Submittal Date: Mon Dec 30 13:30:51 EST 2013

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Origin (from sources other than the submitter):
These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee.
6.3 * Pumps and Compressors.

6.3.1 Pumps and compressors shall be constructed of materials selected for compatibility with the design temperature and pressure conditions.

6.3.2 Valving shall be installed so that each pump or compressor can be isolated for maintenance.

6.3.3 Where pumps or centrifugal compressors are installed for operation in parallel, each discharge line shall be equipped with a check valve.

6.3.4 Pumps and compressors shall be provided with a pressure-relieving device on the discharge to limit the pressure to the maximum design pressure of the casing and downstream piping and equipment, unless they are designed for the maximum discharge pressure of the pumps and compressors.

6.3.5 Each pump shall be provided with a vent, relief valve, or both that will prevent overpressuring of the pump case during the maximum possible rate of cooldown.

6.3.6 Compression equipment that handles flammable gases shall be provided with vents from all points where gases normally can escape. Vents shall be piped outside of buildings to a point of safe disposal.

Statement of Problem and Substantiation for Public Input

Added asterisk to indicate new annex material proposed

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
A 6.3
Where applicable and not in conflict with NFPA 59A or other regulatory requirements, the use of API 617 Centrifugal Compressors for Petroleum, Chemical, and Gas Service Industries, and API 618 Reciprocating Compressors for Petroleum, Chemical, and Gas Service Industries may provide guidance when selecting and specifying these types of compressors.

Statement of Problem and Substantiation for Public Input

New annex material identifies well known industry standards on compressors to aid operators in the selection and specification of this equipment.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
All LNG tank systems shall be designed for both top and bottom filling unless other means are provided to prevent stratification in accordance with API 625 Tank Systems for Refrigerated Liquefied Gas Storage, Sections 6, 4.5 and 7.5.4.2. For active management of rollover prevention see 14.6 of this standard and API 625 7.5.4.3.

Statement of Problem and Substantiation for Public Input

Proposed change identified both design (passive) and active management of rollover prevention found in API 625.

Submitter Information Verification

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
A.7.3.1.3

Operating requirements for prevention of stratification are located in Section 14.6. Additional details on rollover and rollover prevention can be found in the AGA publication, Introduction to LNG for Personnel Safety.

Statement of Problem and Substantiation for Public Input

Proposed deletion of original text as link to 14.6 was proposed to reside within 7.3.1.3. New proposed text recognizes additional information on the conditions which contribute to rollover and actions to mitigate the risk.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 82-NFPA 59A-2013 [ Section No. 7.3.4.1 ]

7.3.4.1
Each storage tank system shall be identified by the attachment in an accessible location of a corrosion-resistant nameplate as defined in API 625 Storage Tanks for Refrigerated Liquified Gases, Section 11.

Statement of Problem and Substantiation for Public Input

Provides specific location of nameplate data requirements in API 625.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
7.3.5 Container Drying, Purging and Cooldown.
7.3.5.1 Before an LNG tank system is put into service, it shall be dried, purged and cooled in accordance with 14.3.5 and 14.5.5 and tank systems shall include the provisions within API 625 *Tank Systems for Refrigerated Liquified Gas Storage* and/or ACI 376, *Code Requirements for Design and Construction of Concrete Structures for the Containment of Refrigerated Liquefied Gases*, as applicable to the type of tank construction.

Statement of Problem and Substantiation for Public Input

While current text is accurate, the title of API 625 has been added similar to ACI 376 as shown originally and that container drying is also required.

Submitter Information Verification

**Submitter Full Name:** Michael Bellman  
**Organization:** American Gas Association

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**Origin (from sources other than the submitter)**

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
7.3.6.4 – *

Each pressure and vacuum safety relief valve for LNG tank systems shall be able to be isolated from the tank systems for maintenance or other purposes by means of a manual full-opening stop valve.

(A) The stop valve(s) shall be lockable or sealable in the fully open position.

(B) Pressure and vacuum relief valves shall be installed on the LNG tank system to allow each relief valve to be isolated individually while maintaining the required relieving capacity.

(C) Where only one relief device is required, either a full-port opening three-way valve connecting the relief valve and its spare to the container or two relief valves separately connected to the container, each with a valve, shall be installed.

(D) No more than one stop valve shall be closed at one time.

(E) Safety relief valve discharge stacks or vents shall be designed and installed to prevent an accumulation of water, ice, snow, or other foreign matter and shall discharge vertically upward.

Statement of Problem and Substantiation for Public Input

Added asterisk to identify new annex material which provides guidance on management of isolation valves beneath pressure and vacuum relief valves during maintenance to help ensure the system is protecting and the isolation valve is in the appropriate position.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
A 7.3.6.4

The operation of Isolation valves beneath pressure relief valves should be managed to minimize the risk of an isolation valves not returned to the appropriate position after valves are cycled for relief valve maintenance or any other purposes. See ASME Boiler Pressure Vessel Code, Section VIII, Division I, UG-135 and the mandatory Appendix "M-5".

Statement of Problem and Substantiation for Public Input

The proposed new annex material identifies code/standard guidance on application of management/administrative controls for isolation valve beneath pressure and vacuum relief valves during maintenance to help ensure the system the valve is protecting is in the appropriate position.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
8.5.1
The relief valve capacity of heated or process vaporizers shall be selected to provide discharge capacity of 110 percent of rated vaporizer natural gas flow capacity without allowing the pressure to rise more than 10 percent above the vaporizer maximum allowable working pressure.

Statement of Problem and Substantiation for Public Input

See the substantiation for 58-NFPA59A-2013

Submitter Information Verification

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Pipe Marking.

Markings on pipe shall comply with the following:

1. Markings shall be made with a material compatible with the pipe material.
2. Materials less than \( \frac{1}{4} \) in. (6.4 mm) in thickness shall not be die stamped.
3. Marking materials that are corrosive to the pipe material shall not be used.

Statement of Problem and Substantiation for Public Input

Proposed move of asterisk to header 9.4.4 from 9.4.4(2) as the annex material in A9.4.4(2) is more appropriately applied to all of 9.4.4. A separate proposal has been submitted to renumber annex material from A9.4.4(2) to A9.4.4.

Related Public Inputs for This Document

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<td>Public Input No. 156-NFPA 59A-2013 [Section No. A.9.4.4(2)]</td>
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Under some conditions, marking materials that contain carbon or heavy metals can corrode aluminum. Marking materials that contain chloride or sulfur compounds can corrode some stainless steels.

Statement of Problem and Substantiation for Public Input

Change annex number from A.9.4.4(2) to A.9.4.4 based on acceptance of proposal for 9.4.4 to change asterisk location.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 125-NFPA 59A-2013 [ New Section after 9.8 ]

9.9 Cleaning of Piping Systems

9.9.1 Flammable gas shall not be used for internal cleaning of piping. \[56:6.1.1.1\]

9.9.2 Pigs in accordance with NFPA 56, Section 6.5, shall be permitted for internal cleaning of piping, if appropriate for the service.

A.9.9 NFPA 56, Standard for Fire and Explosion Prevention during Cleaning and Purging of Flammable Gas Piping Systems, although not required for LNG facilities, contains additional safeguards for fire and explosion prevention during piping system cleaning activities.

Statement of Problem and Substantiation for Public Input

A new section (9.9, with renumbering of subsequent sections) is proposed because 59A does not currently address the hazards associated with internal cleaning of piping, in particular the use of high pressure flammable gas ("gas blows") to remove debris. This practice has resulted in extensive property damage, deaths and injuries to personnel in the electric utility industry. NFPA 56 was established by the NFPA to help prevent recurrence of similar accidents and prohibits gas blows, but excludes LNG facilities from its scope. The regulatory codes (49 CFR 192, 193), and ASME B31.3 also do not address pipe cleaning hazards.

(1) The proposed new 9.9.1 will increase safety at LNG facilities by prohibiting gas blows for pipe cleaning.

(2) The proposed new 9.9.2 allows pigs propelled with flammable gas to be used for internal cleaning if in accordance with NFPA 56.

(3) The new proposed new Annex (A.9.9) advises users that additional safeguards for prevention of fires and explosions during pipe cleaning activities are available in NFPA 56, while also clarifying that they are not mandatory in LNG facilities.

Submitter Information Verification

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Public Input No. 94-NFPA 59A-2013 [Section No. 9.8.1]

9.8.1 - --
Systems shall be purged of air or gas.

Statement of Problem and Substantiation for Public Input

This is an operating/maintenance function and is already addressed in 14.8.1 and should not reside in a design/engineering requirement. 9.8.2 as currently shown is appropriate for Chapter 9 which is design/engineering/installation related. The annex reference for 9.8.1 will be proposed to move to 14.8.1 and retain the exiting annex text as 9.8.1

Related Public Inputs for This Document

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Statement of Problem and Substantiation for Public Input

Current annex text related to 9.8.1 is more appropriate for chapter 14 related to operating/maintenance activities. Existing 9.8.1 was proposed for deletion and Asterisk was proposed to be added to 14.8.1.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 126-NFPA 59A-2013 [ Section No. A.9.8.1 ]

A.9.8.1
The AGA publication *Purging, Principles and Practices* can be used as a guide. NFPA 56, *Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems*, while not mandatory for LNG facilities, contains additional safeguards for purging activities.

Statement of Problem and Substantiation for Public Input

This proposed revision informs users that NFPA 56 contains additional safeguards for prevention of fire and explosion during purging of flammable gas piping. While NFPA 56 is not mandatory for LNG facilities, some users of 59A may voluntarily choose to implement some or all of NFPA 56 to help improve safety.

Submitter Information Verification

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Submittal Date: Fri Dec 27 16:25:24 EST 2013

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Fixed electrical equipment and wiring installed within the classified areas specified in Table 10.7.2 shall comply with Table 10.7.2 and Figure 10.7.2(a) through Figure 10.7.2(f) and shall be installed in accordance with NFPA 70, National Electrical Code, for hazardous locations.

Table 10.7.2 Electrical Area Classification

<table>
<thead>
<tr>
<th>Part</th>
<th>Location</th>
<th>Division</th>
<th>Extent of Classified Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>LNG storage containers with vacuum breakers</td>
<td>2</td>
<td>Entire container interior</td>
</tr>
<tr>
<td></td>
<td>Inside containers</td>
<td>2</td>
<td>Entire room</td>
</tr>
<tr>
<td>B</td>
<td>LNG storage container area</td>
<td>1</td>
<td>Open area between a high-type dike and the container wall where dike wall height exceeds distance between dike and container walls. [See Figure 10.7.2(c).]</td>
</tr>
<tr>
<td></td>
<td>Indoors</td>
<td>1</td>
<td>Within 15 ft (4.5 m) in all directions from container walls and roof plus area inside a low-type diked or impounding area up to the height of the dike impoundment wall [See Figure 10.7.2(b).]</td>
</tr>
<tr>
<td></td>
<td>Outdoor aboveground containers (other than small containers)</td>
<td>2</td>
<td>Within any open space between container walls and surrounding grade or dike [See Figure 10.7.2(d).]</td>
</tr>
<tr>
<td></td>
<td>Outdoor belowground containers</td>
<td>2</td>
<td>Within 15 ft (4.5 m) in all directions from roof and sides [See Figure 10.7.2(d).]</td>
</tr>
<tr>
<td>C</td>
<td>Nonfired LNG process areas containing pumps, compressors, heat exchangers, pipelines, connections, small containers, and so forth</td>
<td>2</td>
<td>Entire room and any adjacent room not separated by a gastight partition and 15 ft (4.5 m) beyond any wall or roof ventilation discharge vent or louver</td>
</tr>
<tr>
<td></td>
<td>Indoors with adequate ventilation</td>
<td>2</td>
<td>Within 15 ft (4.5 m) in all directions from this equipment and within the cylindrical volume between the horizontal equator of the sphere and grade [See Figure 10.7.2(a).]</td>
</tr>
<tr>
<td></td>
<td>Outdoors in open air at or above grade</td>
<td>2</td>
<td>Within 15 ft (4.5 m) in all directions from this equipment and within the cylindrical volume between the horizontal equator of the sphere and grade [See Figure 10.7.2(a).]</td>
</tr>
<tr>
<td>D</td>
<td>Pits, trenches, or sumps</td>
<td>2</td>
<td>Entire pit, trench, or sump</td>
</tr>
<tr>
<td>U</td>
<td>located in or adjacent to Division 1 or 2 areas</td>
<td>1</td>
<td>Entire pit, trench, or sump</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>E</td>
<td>Discharge from relief valves</td>
<td>1</td>
<td>Within 5 ft (1.5 m) in all directions from point of discharge</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Beyond 5 ft (1.5 m) but within 15 ft (4.5 m) in all directions from point of discharge</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Operational bleeds, drips, vents, or drains</td>
<td>1</td>
<td>Within 5 ft (1.5 m) in all directions from point of discharge</td>
</tr>
<tr>
<td></td>
<td>Indoors with adequate ventilation C</td>
<td>2</td>
<td>Beyond 5 ft (1.5 m) and entire room and 15 ft (4.5 m) beyond any wall or roof ventilation discharge vent or louver</td>
</tr>
<tr>
<td></td>
<td>Outdoors in open air at or above grade</td>
<td>1</td>
<td>Within 5 ft (1.5 m) in all directions from point of discharge</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Beyond 5 ft (1.5 m) but within 15 ft (4.5 m) in all directions from point of discharge</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Tank car, tank vehicle, and container loading and unloading</td>
<td>1</td>
<td>Within 5 ft (1.5 m) in all directions from connections regularly made or disconnected for product transfer</td>
</tr>
<tr>
<td></td>
<td>Indoors with adequate ventilation C</td>
<td>2</td>
<td>Beyond 5 ft (1.5 m) and entire room and 15 ft (4.5 m) beyond any wall or roof ventilation discharge vent or louver</td>
</tr>
<tr>
<td></td>
<td>Outdoors in open air at or above grade</td>
<td>1</td>
<td>Within 5 ft (1.5 m) in all directions from connections regularly made or disconnected for product transfer</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Beyond 5 ft (1.5 m) but within 15 ft (4.5 m) in all directions from a point where connections are regularly made or disconnected and within the cylindrical volume between the horizontal equator of the sphere and grade [See Figure 10.7.2(e).]</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Electrical seals and vents specified in 10.7.5 through 10.7.7</td>
<td>2</td>
<td>Within 15 ft (4.5 m) in all directions from the equipment and within the cylindrical volume between the horizontal equator of the sphere and grade</td>
</tr>
<tr>
<td>I</td>
<td>Marine terminal unloading areas [See Figure 10.7.2(f).]</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

*See Article 500 in NFPA 70, National Electrical Code, for definitions of classes, groups, and divisions. Article 505 may be used as an alternate to Article 500 for classification of hazardous areas using an equivalent zone classification to the division classifications specified in Table 10.7.2. Most of the flammable vapors and gases found within the facilities covered by NFPA 59A are classified as Group D. Ethylene is classified as Group C. Much available electrical equipment for hazardous locations is suitable for both groups.*
Small containers are those that are portable and of less than 200 gal (760 L) capacity.

Ventilation is considered adequate where provided in accordance with the provisions of this standard.

Figure 10.7.2(a) Extent of Classified Area Around Containers.

Figure 10.7.2(b) Dike Height Less Than Distance from Container to Dike (H < x).

Figure 10.7.2(c) Dike Height Greater Than Distance from Container to Dike (H > x).

Figure 10.7.2(d) Container with Liquid Level Below Grade or Below Top of Dike.

Figure 10.7.2(e) Full Containment Container.

Figure 10.7.2(f) Classification of a Marine Terminal Handling LNG.
Statement of Problem and Substantiation for Public Input

All electrical installation must comply with the entire NFPA 70 which include hazardous locations. The additional wording is unnecessary.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 96-NFPA 59A-2013 [ Section No. 12.2.1 ]

12.2.1 *

The extent of such protection shall be determined by an evaluation based on fire protection engineering principles, analysis of local conditions, hazards within the facility Plant, and exposure to or from other property.

*(1) Protection installed as a result of the evaluation in 12.2.2 shall be designed, engineered, installed and tested based upon fire protection equipment standards incorporated by reference by this standard.

Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.
The proposed new text clearly identifies the requirements to design, engineer, install, and test fire protection equipment based upon established consensus standards.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
A 12.2.1 (1)
Where fire protection equipment design, installation is not addressed by an incorporated by reference standard within this standard, publically available standards for the equipment should be considered for use and authorized by the AHJ if required.

Statement of Problem and Substantiation for Public Input

Proposed annex material provides guidance for use of available fire equipment/system standards not currently incorporated by reference by NFPA 59A.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
12.4.2.1
Continuously monitored low-temperature sensors or flammable gas detection systems shall sound an alarm at the plant site and at a constantly attended location if the plant site is not attended continuously.

Statement of Problem and Substantiation for Public Input

This section mentions 'gas detection', "low temperature sensors" are typically RTD (Resistance Temperature Detectors) designed for cryogenic leak detection. Recommend a separate section for leak-detection. This sometimes cause confusion as to where to wire up the RTD's, fire & gas system PLC or directly to the DCS.

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Public Input No. 101-NFPA 59A-2013 [ Section No. 12.8.2 ]

12.8.2

Employees who are involved in emergency response activities beyond the incipient level shall be equipped with protective clothing and equipment and trained in accordance with NFPA 600, Standard on Industrial Fire Brigades.

Statement of Problem and Substantiation for Public Input

Provides clarification that NFPA 600 is applicable to emergency activities above incipient level fire response.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
13.11 Shipment of LNG Containers.
Containers shall be shipped under a minimum internal pressure of 10 psi 10 psig (69 kPa) inert gas.

Statement of Problem and Substantiation for Public Input

Added g to psi for clarity, the original text could reasonably be interpreted as 10 psia or 10 psig regardless of the use of the term internal pressure.

Submitter Information Verification

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 110-NFPA 59A-2013 [ Section No. 13.17 ]

13.17   Gas Detection.

An operating portable flammable gas indicator shall be readily available.

Statement of Problem and Substantiation for Public Input

Remove the word operating, this word implies the portable flammable gas detector is readily available and operating at all times.

Submitter Information Verification

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These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 12-NFPA 59A-2013 [ Section No. 14.2.1 ]

14.2.1  Each operating company shall develop a documented Integrity Management Plan in accordance with 49 CFR Part 192, Subpart O documenting operating, maintenance, and training procedures, based on experience and conditions under which the LNG plant is operated and shall include the requirements listed in 14.2.2.

Statement of Problem and Substantiation for Public Input

Integrity Management Rule (49 CFR Part 192, Subpart O), commonly referred to as the “Gas IM Rule.” The Gas IM Rule specifies how pipeline operators must identify, prioritize, assess, evaluate, repair and validate the integrity of gas transmission pipelines that could, in the event of a leak or failure, affect High Consequence Areas (HCAs) within the United States.

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14.5.5.4.1
Container drying, purging and cooldown shall be in accordance with requirements of 14.5.5 and 7.3.5.

Statement of Problem and Substantiation for Public Input

Proposed new text identifies important details for dry, purging and cooldown requirements within API 625 and ACI 376 referenced in NFPA 59A 7.3.5. New text to be inserted before current 14.5.5.4.1 and current 14..5.5.4.1 through 14.5.5.4.5 to be renumbered.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 128-NFPA 59A-2013 [ Section No. 14.5.5.4 ]

14.5.5.4 Container Drying, Purging Procedures, and Cooldown Procedures.

14.5.5.4.1 Taking an LNG container out of service shall not be regarded as a normal operation.

14.5.5.4.2 The activities of 14.5.5 shall require the preparation of detailed procedures.

14.5.5.4.3 Only experienced, trained personnel shall purge LNG containers.

14.5.5.4.4 Before an LNG container is put into service, the air shall be displaced by an inert gas, by following a written purging procedure.

14.5.5.4.5 Before a container is taken out of service, the natural gas in the container shall be purged from the container with an inert gas, using a written purging procedure.

Statement of Problem and Substantiation for Public Input

Proposed revision specifically recognizes the drying and cooldown process necessary when placing an LNG storage container into service. Additional text will be proposed to detail drying and cooldown requirements.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 130-NFPA 59A-2013 [ Section No. 14.5.5.4.3 ]

14.5.5.4.3
Only experienced, trained personnel shall dry, purge LNG, and cooldown LNG containers.

Statement of Problem and Substantiation for Public Input

Proposed revision recognizes that the drying and cooldown process is critical in successfully placing an LNG container into service and that only experienced and trained personnel should perform the functions.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 138-NFPA 59A-2013 [ Section No. 14.8.10.4 ]

14.8.10.4
Control systems that are used as part of the fire protection system at the LNG plant, LNG facility shall be inspected and tested in accordance with the applicable fire code and conform to the following:

(1) Monitoring equipment shall be maintained in accordance with NFPA 72, National Fire Alarm and Signaling Code, and NFPA 1221, Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems.


(3) * Portable or wheeled fire extinguishers suitable for gas fires shall be available at strategic locations, as determined in accordance with Chapter 12, within an LNG facility and on tank vehicles and shall be maintained in accordance with NFPA 10, Standard for Portable Fire Extinguishers.


Statement of Problem and Substantiation for Public Input

Standardize the use of plant and facility.
Identified standards have maintenance requirements which should be included as part of the fire system maintenance plan.

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Submittal Date: Mon Dec 30 08:21:10 EST 2013
Public Input No. 142-NFPA 59A-2013 [ New Section after 14.8.13.8 ]

**TITLE OF NEW CONTENT**

* Components covered by insulation which are subject to atmospheric corrosion shall be periodically monitored based upon a written corrosion control program.

**Statement of Problem and Substantiation for Public Input**

New proposed text clarifies expectations for managing atmospheric corrosion under insulated components (piping, valves, vessels, etc.). New annex material is also proposed to identify an existing NACE standard practice SP-0198.

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**Origin (from sources other than the submitter)**

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
A 14.8.13.9
NACE SP-0198 Control of Corrosion Under Thermal Insulation and Fireproofing Materials - A Systems Approach, provides guidance upon which a corrosion control monitoring program can be established.

Statement of Problem and Substantiation for Public Input

Identified standard practice adds LNG facility operator in managing corrosion under insulation and can be used in the development of the written plan required by new proposed 14.8.13.9.

Related Public Inputs for This Document

<table>
<thead>
<tr>
<th>Related Input</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Input No. 179-NFPA 59A-2013 [Section No. E.1.2.8]</td>
<td></td>
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</tbody>
</table>

Submitter Information Verification

Submitter Full Name: Michael Bellman
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Street Address: City: State: Zip: Submittal Date: Mon Dec 30 11:54:54 EST 2013

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
15.1.3
The provisions of this chapter are applicable to newly proposed facilities and existing facilities where significant modifications and improvements are proposed. Only the modifications and improvements in existing facilities shall be subject to the requirements of this chapter. Management of Change procedures will be used where changes in procedures, process equipment modifications or improvements are proposed.

Statement of Problem and Substantiation for Public Input

Changes to processes, equipment, maintenance or other such situations often incur unintended consequences. This has been documented in numerous accident investigations and root cause analysis. Management of Change is an effective tool to eliminate or reduce accidents that are a result of changes made without scoping the complete context of the known and unknown results of change.

Submitter Information Verification

Submitter Full Name: Kelly Nicolello
Organization: Western Regional Fire Code Dev
Street Address: 
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Zip: 
Submittal Date: Tue Sep 24 19:43:05 EDT 2013

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15.6.1*
The annual probability of LNG and other hazardous material releases from various equipment, for scenarios identified in Sections 15.4.1 and 15.4.2, shall be based on Table 15.6.1.

Table 15.6.1 Example Component Failure Database

<table>
<thead>
<tr>
<th>Component</th>
<th>Annual Probability of Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Atmospheric Cryogenic Tanks</strong></td>
<td></td>
</tr>
<tr>
<td>(1) Instantaneous failure of primary container and outer shell, release of entire contents (single containment tank)</td>
<td>5E-07</td>
</tr>
<tr>
<td>(2) Instantaneous failure of primary container and outer shell, release of entire contents (double containment tank)</td>
<td>1.25E-08</td>
</tr>
<tr>
<td>(3) Instantaneous failure of primary and secondary container, release of entire contents (full containment tank)</td>
<td>1E-08</td>
</tr>
<tr>
<td><strong>Pressurized Storage (Containers) — instantaneous release of entire contents</strong></td>
<td>5E-07</td>
</tr>
<tr>
<td><strong>Piping — aboveground</strong></td>
<td></td>
</tr>
<tr>
<td>(1) Rupture for nominal diameter &lt;75 mm</td>
<td>1E-06</td>
</tr>
<tr>
<td>(2) Rupture for 75 mm &lt; nominal diameter &lt; 150 mm</td>
<td>3E-07</td>
</tr>
<tr>
<td>(3) Rupture for nominal diameter &gt; 150 mm</td>
<td>1E-07</td>
</tr>
<tr>
<td><strong>Pressure relief valves — outflow at the maximum rate</strong></td>
<td>2E-05</td>
</tr>
<tr>
<td><strong>Process equipment</strong></td>
<td></td>
</tr>
<tr>
<td>(1) Pumps — catastrophic failure</td>
<td>1E-04</td>
</tr>
<tr>
<td>(2) Compressors with gasket — catastrophic failure</td>
<td>1E-04</td>
</tr>
<tr>
<td>(3) Heat exchanger — instantaneous release of entire contents from plate heat exchanger</td>
<td>5E-05</td>
</tr>
<tr>
<td><strong>Transfer equipment — rupture of loading/unloading arm</strong></td>
<td>3E-08</td>
</tr>
</tbody>
</table>

See the uploaded file

Additional Proposed Changes

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
<th>Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed_TIA_1090_59A_.docx</td>
<td>Table 15.6.1</td>
<td>✓</td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Input

Note: This Proposal originates from Tentative Interim Amendment 59A-13-1 (TIA 1090) issued by the Standards Council on March 7, 2013. The lack of proper units for probability of failure of aboveground piping makes the risk-based siting analysis impossible. The additional formatting changes clarify that the units of annual probability per meter apply only to piping. The units in Table 15.8.4.1, as approved by the committee, are technically incorrect.

Emergency Nature: The changes requested will correct errors in the document that were inadvertently introduced in the revision process.

Submitter Information Verification

Submitter Full Name: Phani Raj
Organization: Technology & Management System
Street Address: National Fire Protection Association Report
http://submittals.nfpa.org/TerraViewWeb/FormLaunch?id=/TerraView/Co...
1. Modify the format of Table 15.6.1 and add descriptive units for probability of failure of piping as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Annual Probability of Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmospheric Cryogenic Tanks</td>
<td></td>
</tr>
<tr>
<td>(1) Instantaneous failure of primary container and outer shell, release of entire contents (single containment tank)</td>
<td>5E-07</td>
</tr>
<tr>
<td>(2) Instantaneous failure of primary container and outer shell, release of entire contents (double containment tank)</td>
<td>1.25E-08</td>
</tr>
<tr>
<td>(3) Instantaneous failure of primary and secondary container, release of entire contents (full containment tank)</td>
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</tr>
<tr>
<td>Pressurized Storage (Containers) — instantaneous release of entire contents</td>
<td>5E-07</td>
</tr>
<tr>
<td>Pressure relief valves — outflow at the maximum rate</td>
<td>2E-05</td>
</tr>
<tr>
<td>Process equipment</td>
<td></td>
</tr>
<tr>
<td>(1) Pumps — catastrophic failure</td>
<td>1E-04</td>
</tr>
<tr>
<td>(2) Compressors with gasket — catastrophic failure</td>
<td>1E-04</td>
</tr>
<tr>
<td>(3) Heat exchanger — instantaneous release of entire contents from plate heat exchanger</td>
<td>5E-05</td>
</tr>
<tr>
<td>Transfer equipment — rupture of loading/unloading arm</td>
<td>3E-08</td>
</tr>
</tbody>
</table>

Piping — aboveground

<table>
<thead>
<tr>
<th>Annual probability of failure per meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Rupture for nominal diameter &lt;75 mm</td>
</tr>
<tr>
<td>(2) Rupture for 75 mm &lt; nominal diameter &lt; 150 mm</td>
</tr>
<tr>
<td>(3) Rupture for nominal diameter &gt; 150 mm</td>
</tr>
</tbody>
</table>

2. Correct units in Table 15.8.4.1 as follows:

<table>
<thead>
<tr>
<th>Maximum Heat Flux Level (kW/m²)</th>
<th>Maximum Modified Dosage Unit ((kW/m²)⁴/3 s)</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0</td>
<td>500</td>
<td>At least 10 persons would suffer 2nd degree skin burns on at least 10% of their bodies within 30 seconds of exposure to the fire.</td>
</tr>
<tr>
<td>5.0</td>
<td>300</td>
<td>At least one person inside the building would suffer 2nd degree skin burns on at least 10% of the body within 30 seconds of exposure to the fire.</td>
</tr>
<tr>
<td>32</td>
<td>N/A</td>
<td>Loss of strength of structural steel exposed to the fire to an extent that its primary load-bearing capacity is reduced significantly over the duration of LNG fire being analyzed.</td>
</tr>
</tbody>
</table>
**Submitter’s Substantiation:** The lack of proper units for probability of failure of aboveground piping makes the risk-based siting analysis impossible. The additional formatting changes clarify that the units of annual probability per meter apply only to piping.

The units in Table 15.8.4.1, as approved by the committee, are technically incorrect.

**Emergency Nature:** The changes requested will correct errors in the document that were inadvertently introduced in the revision process.
Public Input No. 6-NFPA 59A-2013 [ Section No. 15.8.4.1 ]

15.8.4.1

Distances to safe levels of radiant heat fluxes and modified thermal dosage values specified in Table 15.8.4.1 and Table 15.8.4.2 shall be calculated with a model that meets the following criteria:

1) Takes into account the physical phenomena observed, and has been validated with available experimental data, including applicable experimental LNG fire published in the literature

2) Has been published in an archival, peer-reviewed scientific journal in the related scientific/engineering disciplines including, but not limited to, fluid dynamics, heat transfer, combustion, or fire science

3) Has been verified to accurately represent the physics

4) Has a scientific assessment of the details of the physics, analysis, and execution process

5) Has been approved by the AHJ

Table 15.8.4.1 Radiant Heat Flux and Thermal Dosage Outside the Plant Boundary

<table>
<thead>
<tr>
<th>Maximum Heat Flux Level (kW/m²)</th>
<th>Maximum Modified Dosage Unit ((kW/m²)⁴/³)</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0</td>
<td>500</td>
<td>At least 10 persons would suffer 2nd degree skin burns on at least 10% of their bodies within 30 seconds of exposure to the fire.</td>
</tr>
<tr>
<td>5.0</td>
<td>300</td>
<td>At least one person inside the building would suffer 2nd degree skin burns on at least 10% of the body within 30 seconds of exposure to the fire.</td>
</tr>
<tr>
<td>32</td>
<td>N/A</td>
<td>Loss of strength of structural steel exposed to the fire to an extent that its primary load-bearing capacity is reduced significantly over the duration of LNG fire being analyzed.</td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Input

Note: This Proposal originates from Tentative Interim Amendment 59A-13-1 (TIA 1090) issued by the Standards Council on March 7, 2013.

The lack of proper units for probability of failure of aboveground piping makes the risk-based siting analysis impossible. The additional formatting changes clarify that the units of annual probability per meter apply only to piping. The units in Table 15.8.4.1, as approved by the committee, are technically incorrect.

Emergency Nature: The changes requested will correct errors in the document that were inadvertently introduced in the revision process.

Submitter Information Verification

Submitter Full Name: Phani Raj
Organization: Technology & Management System
Street Address: City: State: Zip:
Submittal Date: Tue Mar 12 11:02:35 EDT 2013
15.8.4.2 *

Distances to vapor dispersion to concentrations equal to the lower flammability limit (LFL) (volume concentration value 5 percent) shall be calculated using a model that is acceptable for use by the AHJ or a model that has been evaluated by an independent body using the Model Evaluation Protocol facilities published by the Fire Protection Research Foundation report "Evaluating Vapor Dispersion Models for Safety Analysis of LNG Facilities," 2007. Alternatively, distances to the occurrences of ignition of a vapor cloud shall be calculated using a methodology that is acceptable by the AHJ.

Table 15.8.4.2 Criteria for Property Damage Due to Radiant Heat from Fires

<table>
<thead>
<tr>
<th>Exposed structure</th>
<th>Type of construction</th>
<th>Threshold damage criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjacent LNG container</td>
<td>Reinforced concrete</td>
<td>(1) Temperature of no part of the exposed concrete outer surface of the container structure shall exceed 570°F (300°C) over the duration of the fire.</td>
</tr>
<tr>
<td>1000°F</td>
<td>570°C</td>
<td>(2) Temperature of steel reinforcements in pre-stressed concrete shall not exceed</td>
</tr>
<tr>
<td>1000°F</td>
<td>570°C</td>
<td>over the duration of the fire.</td>
</tr>
<tr>
<td>540°C</td>
<td>300°C</td>
<td>Steel structures</td>
</tr>
<tr>
<td>1000°F</td>
<td>570°C</td>
<td>540°C</td>
</tr>
<tr>
<td>Wooden structures</td>
<td>(14,700 W/m²) for piloted ignition</td>
<td></td>
</tr>
<tr>
<td>Net heat flux into the structure shall not exceed 8115 Btu/hr-ft² (26,500 W/m²) for unpiloted ignition or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4660 Btu/hr-ft²</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Input

Adjacent LNG concrete containers defined by this standard are generally stressed at a low level in normal operation. Liquid retention is satisfied by the primary liquid container. Under these conditions, about 50% of the material strength levels is considered adequate to minimize damage. At 1000°F, steel reinforcing has less than 40% of its useful strength in concrete and prestress has less than 7% of its strength. Whereas at 1000°F, concrete has about 50% of its strength. At 570°F, reinforcing steel has about 60% of its strength and prestress tendons have about 32% of their strength. Reversing the values in the table for the adjacent
container section will limit strength values to about 50% of their normal ambient values.

Generally, materials used for steel structures such as A36 and A516-70 will have over 50% of their yield and tensile properties at 1000F. However, steel structures are designed for general membrane stress levels above 50% of yield. Stress levels at connections and other areas are designed for much higher values. Therefore, resistance to permanent distortion requires a higher strength than 50%. Strength values start dropping off above 500F. Therefore, a threshold damage temperature of 570F is a reasonable value for table 15.8.4.2.

Submitter Information Verification

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Submittal Date: Thu Dec 19 11:51:30 EST 2013

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Public Input No. 151-NFPA 59A-2013 [ New Section after A.5.8.5 ]

A 6.5
In the United States, the Pipeline Hazardous Materials Safety Administration (PHMSA) incorporates by reference earlier editions of the ASME Boiler and Pressure Vessel Code requiring Boilers, pressure vessels, shell and tube heat exchangers, and brazed aluminum plate fin heat exchangers to be hydrostatic tested at 1.5 times the maximum allowable working pressure (MAWP). Where hydrostatic testing is impractical, (see ASME BPVC UG-100) the vessels and heat exchangers may be pneumatically tested at 1.1 times the maximum allowable working pressure when safety precautions are implemented (see ASME BPVC UG-99 and UG-100). The current version of the ASME BPVC at the time this NFPA Standard was issued requires testing at only 1.3 times the MAWP. Owner, operators installing new equipment should gain the approval of the AHJ if testing at 1.3 vs. 1.5 times the MAWP.

Statement of Problem and Substantiation for Public Input

Proposed annex material identifies conflicts in testing of new vessels, boilers, etc. between current and earlier edition of the ASME BPVC which can present substantial difficulties in purchasing of this equipment from certified manufacturers. The proposed annex material aides owner/operators to ensure AHJ requirements are met.

Submitter Information Verification

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Submittal Date: Mon Dec 30 10:33:12 EST 2013

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 153-NFPA 59A-2013 [ Section No. A.7.3.1.7 ]

A.7.3.1.7

ACI 376, Code Requirements for Design and Construction of Concrete Structures for the Containment of Refrigerated Liquefied Gases, contains further information regarding decommissioning of concrete containment tanks. Additional, API 620 Appendix Q, API 625, and ACI 376 contain design requirements to allow the tank systems to be purged into or out of service during tank commissioning or decommissioning. Additional, consideration for continued outgassing of concrete should be considered in decommissioning procedures.

Statement of Problem and Substantiation for Public Input

The added standards also provide design requirements for commissioning and decommissioning. See API 620 Appendix Q Q3.8.1 and Q3.8.2, API 625 Section 643.

Submitter Information Verification

Submitter Full Name: Michael Bellman
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Submittal Date: Mon Dec 30 10:43:16 EST 2013

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
A.9.11.8
Consideration should be given to the installation of “witness” pieces to monitor the installed condition of material associated with “buried” pipe.

Statement of Problem and Substantiation for Public Input

Shall "indicates a mandatory requirement" as per 3.2.3. Should "indicates a recommendation or that which is advised but not required" as per 3.2.4.
Use of should is consistent with Annex A material as this information is not part of the requirements of NFPA 59A.

Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address:
City:
State:
Zip:
Submittal Date: Mon Dec 30 11:16:41 EST 2013

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
For information on fire extinguishing systems, fire explosion prevention and protection systems, see the following:

(1) NFPA 10, Standard for Portable Fire Extinguishers
(2) NFPA 11, Standard for Low-, Medium-, and High-Expansion Foam
(3) NFPA 12, Standard on Carbon Dioxide Extinguishing Systems
(4) NFPA 12A, Standard on Halon 1301 Fire Extinguishing Systems
(5) NFPA 13, Standard for Water Spray Fixed Systems for Fire Protection
(6) NFPA 14, Standard for the Installation of Sprinkler Systems
(7) NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection
(8) NFPA 16, Standard on Explosion Protection by Deflagration Venting
(9) NFPA 17, Standard for Dry Chemical Extinguishing Systems
(10) NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection
(11) NFPA 22, Standard for Water Tanks for Private Fire Protection
(12) NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances
(13) NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
(14) NFPA 68, Standard on Explosion Protection by Deflagration Venting
(15) NFPA 69, Standard on Explosion Prevention Systems
(16) NFPA 72, National Fire Alarm and Signaling Code
(17) NFPA 750, Standard on Water Mist Fire Protection Systems
(18) NFPA 1961, Standard on Fire Hose
(19) NFPA 1962, Standard on Fire Hose Connections
(20) NFPA 1963, Standard on Fire Hose Connections
(21) NFPA 2001, Standard on Clean Agent Fire Extinguishing Systems

Statement of Problem and Substantiation for Public Input

There is no need to list standards in the annex which are already Incorporated by Reference in Chapter 2. Others suggested for deletion from A12.2 (NFPA 750, NFPA 1961, NFPA 1963 are being proposed to be added as incorporated by reference standards in chapter 2. Additionally, NFPA 1962 is being proposed for addition to Chapter 14 in the maintenance section 14.7. Reworded 1st statement to reflect scope of standards to remain in annex

Related Public Inputs for This Document

<table>
<thead>
<tr>
<th>Related Input</th>
<th>Relationship</th>
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</table>

Submitter Information Verification
Submitter Full Name: Michael Bellman
Organization: American Gas Association

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I, Michael Bellman, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. Except to the extent that I may lack authority to make an assignment of content identified above, I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association's (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
A12.4.4 (8)

(8) Where fire protection systems are installed in accordance with NFPA 72 and are planned to be integrated with other systems, the integrated systems should be tested based upon NFPA 3 Recommended Practice for Commissioning and Integrated Testing of Fire Protection and Life Safety Systems.

Statement of Problem and Substantiation for Public Input

The additional annex material identifying NFPA 3 provides additional guidance when integrating various fire protection and life systems with other systems.

Related Public Inputs for This Document

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<th>Relationship</th>
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</thead>
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</tbody>
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Submitter Information Verification

Submitter Full Name: Michael Bellman
Organization: American Gas Association
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Mon Dec 30 11:41:09 EST 2013

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I, Michael Bellman, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Input (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Input in this or another similar or derivative form is used. Except to the extent that I may lack authority to make an assignment of content identified above, I hereby warrant that I am the author of this Public Input and that I have full power and authority to enter into this copyright assignment.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
A 12.9.1.1

The security assessment should include physical and cybersecurity threats and vulnerabilities. Guidance for both physical and cybersecurity can be found in the U.S. Department of Homeland Security, Transportation Security Administration’s Pipeline Security Guidelines. Facilities included in the U.S. Department of Homeland Security's Chemical Facility Anti-terrorism Standards are required to meet the intent of the Risk-Based Performance Standards Guidance.

Statement of Problem and Substantiation for Public Input

Proposed annex material identifies concerns to be considered during the assessment and guidance for addressing risks.

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
Public Input No. 165-NFPA 59A-2013 [New Section after A.14.6.7.4.3]

A 14.7.1
For recommended maintenance to electrical systems not already addressed by this standard, see NFPA 70B Recommended Practice for Electrical Equipment Maintenance.

Statement of Problem and Substantiation for Public Input

New annex material identifies additional resources when developing maintenance plans related to electrical systems

Related Public Inputs for This Document

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Origin (from sources other than the submitter)

These comments were developed by the American Gas Association’s (AGA) Supplemental Gas Committee and were reviewed and approved by the AGA Operations Safety Regulatory Action Committee.
D.1 General.
This annex is reprinted from Title 49 of the Code of Federal Regulations, Part 193, Liquified Natural Gas Facilities: Federal Safety Standards, Subpart H. The references herein are found in Personnel Qualifications and Training, 49 CFR 193, “Transportation.” It is applicable to LNG plants in the United States under the jurisdiction of the Pipeline and Hazardous Materials Safety Administration, Department of Transportation.

Sec. 193.2701 Scope. This subpart prescribes requirements for personnel qualifications and training.

Sec. 193.2703 Design and fabrication. For the design and fabrication of components, each operator shall use —

(1) With respect to design, persons who have demonstrated competence by training or experience in the design of comparable components.

(2) With respect to fabrication, persons who have demonstrated competence by training or experience in the fabrication of comparable components.

Sec. 193.2705 Construction, installation, inspection, and testing.

(1) Supervisors and other personnel utilized for construction, installation, inspection, or testing must have demonstrated their capability to perform satisfactorily the assigned function by appropriate training in the methods and equipment to be used or related experience and accomplishments.

(2) Each operator must periodically determine whether inspectors performing duties under Sec. 193.2307 are satisfactorily performing their assigned function.

Sec. 193.2707 Operations and maintenance.

(1) Each operator shall utilize for operation or maintenance of components only those personnel who have demonstrated their capability to perform their assigned functions by —

(a) Successful completion of the training required by Secs. 193.2713 and 193.2717; and

(b) Experience related to the assigned operation or maintenance function; and

(c) Acceptable performance on a proficiency test relevant to the assigned function.

(2) A person who does not meet the requirements of paragraph (a) of this section may operate or maintain a component when accompanied and directed by an individual who meets the requirements.

(3) Corrosion control procedures under Sec. 193.2605(b), including those for the design, installation, operation, and maintenance of cathodic protection systems, must be carried out by, or under the direction of, a person qualified by experience and training in corrosion control technology.

Sec. 193.2709 Security. Personnel having security duties must be qualified to perform their assigned duties by successful completion of the training required under Sec. 193.2715.
Sec. 193.2711 Personnel health. Each operator shall follow a written plan to verify that personnel assigned operating, maintenance, security, or fire protection duties at the LNG plant do not have any physical condition that would impair performance of their assigned duties. The plan must be designed to detect both readily observable disorders, such as physical handicaps or injury, and conditions requiring professional examination for discovery.

Sec. 193.2713 Training: operations and maintenance.

1. Each operator shall provide and implement a written plan of initial training to instruct
   
   (a) All permanent maintenance, operating, and supervisory personnel —

      i. About the characteristics and hazards of LNG and other flammable fluids
         used or handled at the facility, including, with regard to LNG, low
d         temperatures, flammability of mixtures with air, odorless vapor, boiloff
         characteristics, and reaction to water and water spray;

      ii. About the potential hazards involved in operating and maintenance
         activities; and

      iii. To carry out aspects of the operating and maintenance procedures under
         Secs. 193.2503 and 193.2605 that relate to their assigned functions; and

   (b) All personnel —

      i. To carry out the emergency procedures under Sec. 193.2509 that relate to
         their assigned functions; and

      ii. To give first-aid; and

   (c) All operating and appropriate supervisory personnel —

      i. To understand detailed instructions on the facility operations, including
         controls, functions, and operating procedures; and

      ii. To understand the LNG transfer procedures provided under Sec. 193.2513.

2. A written plan of continuing instruction must be conducted at intervals of not more than two years to keep all personnel current on the knowledge and skills they gained in the program of initial instruction.

Sec. 193.2715 Training: security.

1. Personnel responsible for security at an LNG plant must be trained in accordance with a written plan of initial instruction to:

   (a) Recognize breaches of security;

   (b) Carry out the security procedures under Sec. 193.2903 that relate to their
       assigned duties;

   (c) Be familiar with basic plant operations and emergency procedures, as
       necessary to effectively perform their assigned duties; and

   (d) Recognize conditions where security assistance is needed.

2. A written plan of continuing instruction must be conducted at intervals of not more than two years to keep all personnel having security duties current on the knowledge and skills they gained in the program of initial instruction.

Sec. 193.2717 Training: fire protection.
(1) All personnel involved in maintenance and operations of an LNG plant, including their immediate supervisors, must be trained in accordance with a written plan of initial instruction, including plant fire drills, to:

(a) Know and follow the fire prevention procedures under Sec. 193.2805(b);

(b) Know the potential causes and areas of fire determined under Sec. 193.2805(a);

(c) Know the types, sizes, and predictable consequences of fire determined under Sec. 193.2817(a); and

(d) Know and be able to perform their assigned fire control duties according to the procedures established under Sec. 193.2509 and by proper use of equipment provided under Sec. 193.2801.

(2) A written plan of continuing instruction, including plant fire drills, must be conducted at intervals of not more than two years to keep personnel current on the knowledge and skills they gained in the instruction under paragraph (a) of the section.

(3) Plant fire drills must provide personnel hands-on experience in carrying out their duties under the fire emergency procedures required by Sec. 193.2509.

Sec. 193.2719 Training: records.

(1) Each operator shall maintain a system of records which —

(a) Provide evidence that the training programs required by this subpart have been implemented; and

(b) Provide evidence that personnel have undergone and satisfactorily completed the required training programs.

(c) Records must be maintained for one year after personnel are no longer assigned duties at the LNG plant.

Statement of Problem and Substantiation for Public Input

The language in 49 CFR 193 was changed in 2004 which removed requirements from Part 193 and referenced fire protection related requirements within NFPA 59A.

Note: online public input version does not allow for proper renumbering: 193.2717 (1) (a) should read "(a) Know the potential causes and areas of fire;"

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