

# **TEXAS LNG EXAMINATION STUDY GUIDE**

Category 50  
Testing Laboratory  
Management Level



**RAILROAD COMMISSION OF TEXAS**

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# LNG EXAMINATION STUDY GUIDE

## Management-LEVEL

### Testing Laboratory Management Level

#### Who should use this guide?

You should use this guide if you plan to take the Railroad Commission’s management-level qualifying examination to perform LNG Testing Laboratory activities.

A **Category 50** qualifies an individual to test LNG containers, LNG motor fuel systems or mobile fuel systems, transfer systems, and transport systems for the purpose of determining the safety of the containers or systems for LNG service, including the necessary installation, disconnection, reconnection, testing, and repair of LNG motor fuel systems or mobile fuel systems, transfer systems and transport systems involved in the testing of containers.

#### What books do I need?



This examination tests your knowledge of the laws and standards that apply to Testing Laboratory Management Level operations in Texas.

These laws and standards are found in:

- Regulations for Compressed Natural Gas and Liquefied Natural Gas* (Texas Railroad Commission)
- NFPA 52, Vehicular Natural Gas Fuel Systems Code* (2013 Edition)
- NFPA 59A, Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)* (2013 Edition)

## Where do I get these books?

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You may download the current edition of the Railroad Commission's *Regulations for Compressed Natural Gas And Liquefied Natural Gas* in PDF format free online at [www.rrc.texas.gov](http://www.rrc.texas.gov). If you need printed copies, they may be purchased for \$10.00, tax included, by calling the Railroad Commission's publications office at (512) 463-7309.

You may also order NFPA manuals online at [www.nfpa.org](http://www.nfpa.org); click on "Codes and Standards."

## Sections and Topics

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Before you take this examination, you should know the definitions found in this study guide and the contents of the sections of the codes and standards listed below. The actual examination questions may not cover all of the listed sections and topics.

## Terms and Definitions

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NOTE: The list below is **not** exhaustive.

You are responsible for knowing all the terms and definitions that apply to the CNG activities you will perform, as well as the rules and standards highlighted in this guide.

### Regulations for Compressed Natural Gas and Liquefied Natural Gas (2023)

**Aggregate water capacity (AWC)**--The sum of all individual container capacities as measured by weight or volume of water which are placed at a single installation location.

**Regulations for LNG, §14.2007(2)**

**Automatic fuel dispenser**--A fuel dispenser which requires transaction authorization.

**Regulations for LNG, §14.2007(6)**

**Commercial installation**--An LNG equipment installation located on premises other than a single-family dwelling used primarily as a residence.

**Regulations for LNG, §14.2007(10)**

**Conversion**--The changes made to a vehicle to allow it to use LNG as a motor fuel.

**Regulations for LNG, §14.2007(15)**

**Ignition source**--Any item, substance, or event having adequate temperature and energy release of the type and magnitude sufficient to ignite any flammable mixture of gases or vapors that could occur at a site.

**Regulations for LNG, §14.2007(22)**

**LNG system**--A system of safety devices, containers, piping, fittings, valves, regulators, and other LNG equipment intended for use or used with a motor vehicle fueled by LNG and any system or other facilities designed to be used or used in the sale, storage, transportation for delivery, or distribution of LNG.  
**Regulations for LNG, §14.2007(29)**

**LNG transport**--Any vehicle or combination of vehicles and LNG containers designed or adapted for use or used principally as a means of moving or delivering LNG from one place to another, including but not limited to any truck, trailer, semi-trailer, cargo tank, or other vehicle used in the distribution of LNG.  
**Regulations for LNG, §14.2007(30)**

**Mass transit vehicle**--Any vehicle which is owned or operated by a political subdivision of a state, city, or county, and which is used primarily in the conveyance of the general public.  
**Regulations for LNG, §14.2007(31)**

**Mobile fuel container**--An LNG container mounted on a vehicle to store LNG as the fuel supply for uses other than the engine to propel the vehicle, including use in an auxiliary engine.  
**Regulations for LNG, §14.2007(33)**

**Pressure relief device**--A device, including a pressure relief valve, which is designed both to open automatically to prevent a continued rise of internal fluid pressure in excess of a specified value (set pressure) and to close when the internal fluid pressure is reduced below the set pressure.  
**Regulations for LNG, §14.2007(44)**

**Pressure vessel**--A container or other component designed in accordance with the ASME Code.  
**Regulations for LNG, §14.2007(45)**

**PSIG**--Pounds per square inch gauge.  
**Regulations for LNG, §14.2007(47)**

**Public Transportation Vehicle**--A vehicle for hire to transport persons, including but not limited to taxis, buses (excluding school buses, mass transit or special transit vehicles), and airport courtesy cars.  
**Regulations for LNG, §14.2007(48)**

**Special Transit Vehicle**--A vehicle designed with limited passenger capacity which is primarily used by a mass transit authority for special transit purposes such as transport of mobility impaired individuals.  
**Regulations for LNG, §14.2007(55)**

**Trainee**--An individual who has not yet taken and passed an employee-level rules examination.  
**Regulations for LNG, §14.2007(57)**

**Transfer area**--That portion of an LNG refueling station where LNG is introduced into or dispensed from a stationary installation.  
**Regulations for LNG, §14.2007(58)**

**Transfer system**--All piping, fittings, valves, pumps, meters, hoses, bulkheads, and equipment used in transferring LNG between containers.  
**Regulations for LNG, §14.2007(59)**

**Transport**--Any container built in accordance with ASME or DOT specifications and used to transport LNG for delivery.

**Regulations for LNG, §14.2007(60)**

**Transport system**--Any and all piping, fittings, valves, and equipment on a transport, excluding the container.

**Regulations for LNG, §14.2007(61)**

**Ultimate consumer**--The person controlling LNG immediately prior to its ignition.

**Regulations for LNG, §14.2007(62)**

## **NFPA 52 (2013)**

**ASME Code.** The American Society of Mechanical Engineers *Boiler and Pressure Vessel Code*.

**NFPA 52, §3.3.3**

**Container.** A pressure vessel, cylinder, or cylinder(s) permanently manifolded together used to store CNG or LNG.

**NFPA 52, §3.3.9**

**Cargo Transport Container.** A mobile unit designed to transport LNG or CNG.

**NFPA 52, §3.3.9.1**

**Composite Container.** A container consisting of an inner metal or plastic gas-containing component, reinforced with a filament and resin outer layer.

**NFPA 52, §3.3.9.2**

**Fuel Supply Container.** A container mounted on a vehicle to store LNG or CNG as the fuel supply to the vehicle.

**NFPA 52, §3.3.9.3**

**Fueling Facility Container.** Primary storage for vehicular fueling.

**NFPA 52, §3.3.9.4**

**Dispensing Station.** A natural gas installation that dispenses CNG or LNG from storage containers or a distribution pipeline into vehicular fuel supply containers or into portable cylinders by means of a compressor, reformer, vaporizer, or pressure booster.

**NFPA 52, §3.3.18**

**DOT.** U.S. Department of Transportation.

**NFPA 52, §3.3.19**

**Liquefied Natural Gas (LNG).** A fluid in the cryogenic liquid state that is composed predominantly of methane.

**NFPA 52, §3.3.30**

**Piping.** A means of transporting natural gas. This term applies to refueling facilities.  
*NFPA 52, §3.3.42*

**Point of Transfer.** The location where connections and disconnections are made.  
*NFPA 52, §3.3.43*

**Pressure.**

***Compression Discharge Pressure.*** The varying pressure at the point of discharge from the compressor.

*NFPA 52, §3.3.44.1*

***Maximum Allowable Working Pressure (MAWP).*** The maximum pressure to which any component or portion of the pressure system can be subjected over the entire range of design temperatures. This value is  $1.1 \times 1.25 \times$  the service pressure.

*NFPA 52, §3.3.44.2*

***Operating Pressure.*** The varying pressure in a fuel supply container during normal container use.

*NFPA 52, §3.3.44.3*

***Maximum Operating Pressure.*** The steady-state gauge pressure at which a part or system normally operates. This value is  $1.25 \times$  the pressure.

*NFPA 52, §3.3.44.3.1*

***Set Pressure.*** The start-to-discharge pressure for which a relief valve is set and marked.

*NFPA 52, §3.3.44.5*

***Settled Pressure.*** The pressure in a container after the temperature of the gas reaches equilibrium.

*NFPA 52, §3.3.44.6*

***Storage Pressure.*** The varying pressure in the storage containers.

*NFPA 52, §3.3.44.7*

**Pressure Regulator.** A device, either adjustable or nonadjustable, for controlling and maintaining, within acceptable limits, a uniform outlet pressure.

*NFPA 52, §3.3.45*

**Vaporizer.** A device other than a container that receives LNG in liquid form and adds sufficient heat to convert the liquid to a gaseous state, or a device used to add heat to LNG for the purpose of saturating LNG.

*NFPA 52, §3.3.59*

**Water Capacity.** The amount of water at 60°F required to fill a container.

*NFPA 52, §3.3.63*

## **NFPA 59A (2013)**

**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.

**NFPA 59A, §3.3.4**

**Design Pressure.** The pressure used in the design of equipment, a container, or a pressure vessel for the purpose of determining the minimum allowable thickness or physical characteristics of its parts.

**NFPA 59A, §3.3.7**

**LNG Plant.** A facility whose components can be used to store, condition, liquefy, or vaporize natural gas.

**NFPA 59A, §3.3.16**

**Overfilling.** Filling to a level above the maximum design liquid level.

**NFPA 59A, §3.3.21**

**Sources of Ignition.** Appliances or equipment that, because of their intended modes of use or operation, are capable of providing sufficient thermal energy to ignite flammable gas–air mixtures.

**NFPA 59A, §3.3.24**

### **Sample Question 1**

Pressure Vessel is defined as a container or other component designed in accordance with the \_\_\_\_\_ Code.

- A. Railroad Commission
- B. DOT
- C. ASME
- D. Federal

*Answer on last page.*



## Key Topics

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NOTE: The list below is **not** exhaustive.

You are responsible for knowing all the facts, rules, standards, and procedures that apply to the Natural Gas activities you will perform, as well as the rules and standards highlighted in this guide.

When you take the examination, read each question very carefully.

## ADMINISTRATIVE RULES - GENERAL REQUIREMENTS

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### Company License

No person may engage in any LNG activities until that person has obtained a license from the Commission authorizing the LNG activities.

*Regulations for LNG, §14.2014(a)*

Licensees, registered manufacturers, company representatives, and operations supervisors at each outlet shall have copies of all current licenses and/or manufacturer registration certificates and certification cards for employees at that location available for inspection during regular business hours.

*Regulations for LNG, §14.2014(c)*

Licenses and manufacturer registrations issued under this chapter expire one year after issuance at midnight on the last day of the month prior to the month in which they are issued.

*Regulations for LNG, §14.2014(d)*

A properly completed LNG Form 2001 listing all names under which LNG-related activities requiring licensing are to be conducted and the applicant's properly qualified company representative, and the following forms or documents as applicable:

(A) LNG Form 2001A for outlets

(B) LNG Form 2007, 2007A, 2007T to register any LNG transports

(C) LNG Form 2019 transfer of ownership

*Regulations for LNG, §14.2014(f)(1)*

## **Application for a New Certificate**

No person shall perform work, directly supervise LNG activities, or be employed in any capacity requiring contact with LNG unless that individual:

(A) is a certificate holder who is in compliance with renewal requirements in subsection (g) of this section and is employed by a licensee; or

(B) is a trainee who complies with subsection (f) of this section.

***Regulations for LNG, §14.2019(a)(1)***

An individual who passes the applicable rules examination with a score of at least 75% will become a certificate holder. AFS will send a certificate to the licensee listed on LNG Form 2016

(A) Successful completion of any required examination shall be credited to the individual.

(B) An individual who has been issued a certificate shall make the certificate readily available and shall present it to any Commission employee or agent who requests proof of certification.

***Regulations for LNG, §14.2019(b)(1)***

## **Certificate Renewal**

Certificate holders shall pay the nonrefundable \$25 annual certificate renewal fee to AFS on or before May 31 of each year. Individuals who hold more than one certificate shall pay only one annual renewal fee.

(A) Failure to pay the nonrefundable annual renewal fee by the deadline shall result in a lapsed certificate.

(i) To renew a lapsed certificate, the individual shall pay the nonrefundable \$25 annual renewal fee plus a nonrefundable \$20 late-filing fee. Failure to do so shall result in the expiration of the certificate.

(ii) If an individual's certificate lapses or expires, that individual shall immediately cease performance of any LNG activities authorized by the certificate.

(iii) If an individual's certificate has been expired for more than two years from May 31 of the year in which the certificate lapsed, that individual shall comply with the requirements of subsection (b) of this section.

***Regulations for LNG, §14.2019(g)(3)***

## **Rules Examination**

An individual who files LNG Form 2016 and pays the applicable nonrefundable examination fee may take the rules examination.

***Regulations for LNG, §14.2019(b)(3)***

Failure of any examination shall immediately disqualify the individual from performing any LNG related activities covered by the examination which is failed, except for activities covered by a separate examination which the individual has passed.

***Regulations for LNG, §14.2019(e)***

## **Trainees**

A licensee or ultimate consumer may employ an individual as a trainee for a period not to exceed 45 calendar days without that individual having successfully completed the rules examination.

(A) The trainee shall be directly and individually supervised at all times by an individual who has successfully completed the Commission's rules examination for the areas of work being performed by the trainee.

(B) A trainee who has been in training for a total period of 45 days, in any combination and with any number of employers, shall cease to perform any LNG activities for which the trainee is not currently certified, until the trainee successfully completes the rules examination.

***Regulations for LNG, §14.2019(f)***

## **Designation and Responsibilities of Company Representatives and Operations Supervisors**

An applicant for license shall not engage in LNG activities until it has employed a company representative who meets the requirements of §14.2025 of this title.

***Regulations for LNG, §14.2014(b)***

Each licensee shall have at least one company representative for the license and at least one operations supervisor for each outlet.

***Regulations for LNG, §14.2025***

A licensee maintaining one or more outlets shall file LNG Form 2001 with AFS listing the physical location of the first outlet and designating the company representative for the license and file LNG Form 2001A designating the physical location and operations supervisor for each additional outlet.

***Regulations for LNG, §14.2025(1)***

A licensee may have more than one company representative.

***Regulations for LNG, §14.2025(2)***

An individual may be an operations supervisor at more than one outlet provided that:

(A) each outlet has a designated LNG certified employee responsible for the LNG activities at that outlet;

(B) the certified employee's and/or operations supervisor's telephone number is posted at the outlet on a sign with lettering at least 3/4 inches high, visible and legible during normal business hours; and

(C) the certified employee and/or operations supervisor monitors the telephone number and responds to calls during normal business hours.

***Regulations for LNG, §14.2025(3)***

The company representative may also serve as operations supervisor for one or more of the licensee's outlets provided that the person meets both the company representative and operations supervisor requirements in this section.

***Regulations for LNG, §14.2025(4)***

A licensee shall immediately notify AFS in writing upon conclusion of employment, for whatever reason, of its company representative or any operations supervisor and shall at the same time designate a replacement.

(A) A licensee shall cease all LNG activities if it no longer employs a qualified company representative who complies with the Commission's requirements. A licensee shall not resume LNG activities until such time as it has a properly qualified company representative.

(B) A licensee shall cease LNG activities at an outlet if it no longer employs a qualified operations supervisor at that outlet who complies with the Commission's requirements. A licensee shall not resume LNG activities at that outlet until such time as it has a properly qualified operations supervisor.

***Regulations for LNG, §14.2025(5)***

## **Qualified Personnel**

Training shall be conducted upon employment and every 2 years thereafter.

***NFPA 52, §12.4.3***

Training shall include the following:

- (1) Information on the nature, properties, and hazards of LNG in both the liquid and gaseous phases
- (2) Specific instructions on the facility equipment to be used
- (3) Information on materials that are compatible for use with LNG
- (4) Use and care of protective equipment and clothing
- (5) Standard first aid and self-aid instruction
- (6) Response to emergency situations such as fires, leaks, and spills
- (7) Good housekeeping practices
- (8) Emergency response plan as required in 12.2.3
- (9) Evacuation and fire drills.

***NFPA 52, §12.4.4***

### **Sample Question 2**

An individual who files an LNG Form \_\_\_\_\_ and pays the applicable nonrefundable examination fee may take the rules examination.

- A. 16
- B. 2001
- C. 2007
- D. 2016
- E. 2018B

***Answer on last Page***

## **Report of LP-Gas Incident/Accident**

At the earliest practical moment or within two hours following discovery, a licensee owning, operating, or servicing equipment or an installation shall notify AFS by telephone of any incident or accident involving LNG which:

- (1) involves a single release of LNG during or following LNG transfer or during container transportation. Any loss of LNG which is less than 1.0% of the gross amount delivered, stored, or withdrawn need not be reported. Any loss occurring as a result of a pullaway shall be reported;
- (2) caused an estimated damage to the property of the operator, others, or both totaling \$50,000 or more, including gas loss;
- (3) caused a death or any personal injury requiring hospitalization;
- (4) required taking an operating facility out of service;
- (5) resulted in an unintentional ignition of LNG requiring an emergency response;
- (6) involved the LNG installation on any vehicle propelled by or transporting LNG;
- (7) could reasonably be judged as significant because of rerouting of traffic, evacuation of buildings, or media interest, even though it does not meet paragraphs (1) - (6) of this subsection; or
- (8) is required to be reported to any other state or federal agency (such as the Texas Department of Public Safety or U.S. Department of Transportation).

***Regulations for LNG, §14.2049***

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## **General Rules for Stationary LNG Installations**

### **Testing of Containers**

Any stationary LNG container previously in LNG service brought into Texas or which has not been subject to continuous LNG pressure or inert gas pressure shall be inspected by a currently licensed Category 15, 20, or 50 licensee to determine if the container shall be leak-tested or re-certified. A copy of the inspector's written report shall be filed with AFS. The container shall not be used until the appropriate leak test or certification process determines the container is safe for LNG service.

***Regulations for LNG, §14.2104(b)***

Any stationary LNG container which has been subject to continuous LNG or inert gas pressure may not require testing prior to installation provided the licensee or operator of the container files LNG Form 2023 at the time LNG Form 2500 is submitted for any facility requiring submission of a site plan in accordance with §14.2040 of this title (relating to Filings for Stationary LNG Installations).

***Regulations for LNG, §14.2104(c)***

Each container shall be identified by the attachment of a nameplate(s) in an accessible location marked with the information required by the *ASME Boiler and Pressure Vessel Code* and the following:

- (1) Builder's name and date container was built
- (2) Nominal liquid capacity
- (3) Design pressure at the top of the container
- (4) Maximum permitted liquid density
- (5) Maximum filling level
- (6) Minimum design temperature.

***NFPA 52, §13.3.16***

AFS may remove a container from LNG service or require ASME acceptance of a container at any time if AFS determines that the nameplate is loose, unreadable, or detached, or if it appears to be tampered with or damaged in any way and does not contain at a minimum the items specified in subsection (a) of this section.

***Regulations for LNG, §14.2104(d)***

### **Hoses and Arms**

Hoses or arms used for transfer shall be designed for the temperature and pressure conditions of the loading or unloading system.

***NFPA 59A, §11.8.1***

Hoses shall be approved for the service and shall be designed for a bursting pressure of at least five times the working pressure.

***NFPA 59A, §11.8.2***

Hoses shall be tested at least annually to the maximum pump pressure or relief valve setting and shall be inspected visually before each use for damage or defects.

***NFPA 59A, §11.8.6***

#### **Sample Question 3**

Hoses shall be approved for the service and shall be designed for a bursting pressure of at least \_\_\_\_ times the working pressure.

- A. Three
- B. Four
- C. Five
- D. Six

***Answer on last page***

**Piping Materials**

All piping materials, including gaskets and thread compounds, shall be selected for compatibility with the liquids and gases handled throughout the range of temperatures to which they are subjected.

*NFPA 59A, §9.3.1.1*

Threaded pipe shall be at least Schedule 80.

*NFPA 59A, §9.3.2.4*

**Installation of Piping**

Piping systems and components shall be designed to accommodate the effects of fatigue resulting from the thermal cycling to which the systems are subjected.

*NFPA 59A, §9.2.3*

Provision for expansion and contraction of piping and piping joints due to temperature changes shall be in accordance with ASME B 31.3, Section 319.

*NFPA 59A, §9.2.4*

Pipe joints of 2 in. nominal diameter or less shall be threaded, welded, or flanged.

*NFPA 59A, §9.4.1.1*

Pipe joints larger than 2 in. nominal diameter shall be welded or flanged.

*NFPA 59A, §9.4.1.2*

Where necessary for connections to equipment or components, where the connection is not subject to fatigue producing stresses, joints of 4 in. nominal diameter or less shall be threaded, welded, or flanged.

*NFPA 59A, §9.4.1.6*

**Installation of Valves**

Extended bonnet valves shall be installed with packing seals in a position that prevents leakage or malfunction due to freezing.

*NFPA 59A, §9.4.2.1*

Where the extended bonnet in a cryogenic liquid line is installed at an angle greater than 45 degrees from the upright vertical position, it shall be demonstrated to be free of leakage and frost under operating conditions.

*NFPA 59A, §9.4.2.2*

Shutoff valves shall be installed on container, tank, and vessel connections, except for the following:

- (1) Connections for relief valves in accordance with the ASME *Boiler and Pressure Vessel Code*, Section VIII, Division 1, UG-125(d) and Appendix M-5
- (2) Connections for liquid level alarms as required by 10.2.1.3 or 13.15.2 if an ASME container
- (3) Connections that are blind flanged or plugged.

*NFPA 59A, §9.4.2.3*

**Piping Identification**

Piping shall be identified by color coding, painting, or labeling.

*NFPA 59A, §9.6*

**Sample Question 4**

Threaded pipe shall be at least Schedule \_\_\_\_\_.

- A. 20
- B. 40
- C. 60
- D. 80

*Answer on last page*

Nondestructive examination methods, limitations on defects, and the qualifications of the personnel performing and interpreting the examinations shall meet the requirements of ASME B 31.3, *Process Piping*, Chapter VI, Sections 341 through 344 and the following:

(1) The requirements of Normal Fluid Service shall apply as a minimum for examination acceptance criteria, unless specified otherwise in the engineering design.

(2) Personnel performing nondestructive examinations (NDE) shall, as a minimum, be qualified Level I per ASNT SNT-TC- 1A, *Personnel Qualification and Certification in Nondestructive Testing*, or an equivalent qualification standard.

(3) Personnel interpreting nondestructive examinations shall, as a minimum, be qualified Level II per ASNT SNT-TC-1A or an equivalent qualification standard.

(4) NDEs shall be performed in accordance with written procedures meeting all the requirements of ASME *Boiler and Pressure Vessel Code*, Section V, as applicable to the specific NDE method.

**NFPA 59A, §9.7.4.1**

Test and examination records and written procedures required within this standard and within ASME B 31.3, Paragraph 345.2.7 and Section 346 respectively, shall be maintained for the life of the piping system by the facility operator or until such time as a re-examination is conducted.

**NFPA 59A, §9.7.5.1**

**Liquid Level Gauging**

Gauging devices shall be designed and installed so that they can be replaced without taking the container out of operation.

**NFPA 59A, §10.2.1.2**

**Pressure Gauging**

Each container shall be equipped with a pressure gauge connected to the container at a point above the maximum intended liquid level.

**NFPA 59A, §10.3**

**Electrical Equipment**

Electrical equipment and wiring shall be in accordance with NFPA 70, National Electrical Code, or CSA C22.1, Canadian Electrical Code.

**NFPA 59A, §10.7.1**



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.

***NFPA 59A, §13.18.3.1***

Facility operators shall prepare and implement a maintenance program for all plant fire protection equipment.

***NFPA 59A, §12.7***

In addition to NFPA 59A §12.7, safety and fire protection equipment shall be visually inspected at least once a month and tested at least once a year. Documentation shall be maintained on inspections and tests for at least two years or consistent with other safety record retention schedules, whichever is greater.

***NFPA 59A, §14.2131(b)***

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## ***Engine Fuel Systems***

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Containers shall be designed, fabricated, tested, and marked (or stamped) in accordance with the Regulations of DOT Specification 4L or the “Rules for the Construction of Unfired Pressure Vessels,” ASME Boiler and Pressure Vessel Code, applicable at the date of manufacture.

***NFPA 52, §9.3.1***

Container appurtenances shall have a rated working pressure not less than the maximum allowable working pressure of the container.

***NFPA 52, §9.3.1.2***

Containers shall be equipped with a device or devices that provide an indication of when the container is filled to the maximum allowable liquid level.

***NFPA 52, §9.3.2.1***

## **Engine Fuel Delivery Equipment**

Pressure gauges shall be designed for the maximum pressure and temperature conditions to which they can be subjected, with a minimum burst pressure safety factor of 4.

*NFPA 52, §9.5.2*

Dials shall be graduated to indicate at least 1.2 times the pressure at which the pressure relief device incident to the pressure gauge is set to function.

*NFPA 52, §9.5.3*

A gauge opening shall not exceed 0.055 in. (No. 54 drill size) at the inlet connection.

*NFPA 52, §9.5.4*

The engine pressure regulator inlet and each chamber shall have a design operating pressure not less than the maximum pressure of the container.

*NFPA 52, §9.6*

Piping, tubing, and fittings shall be designed, installed, inspected, and tested in accordance with ANSI/ASME B31.3, *Process Piping*.

*NFPA 52, §9.7*

## **Installation of Venting Systems and Monitoring Sensors**

All safety relief devices on vehicular fuel containers that discharge to the atmosphere shall vent outside of the vehicle.

*NFPA 52, §9.4.4*

All discharge lines and outlets shall be installed in accordance with 9.4.5.1 through 9.4.5.11.

*NFPA 52, §9.4.5*

The discharge lines shall be able to withstand the pressure of the relief vapor discharge when the PRD is in the full-open position.

*NFPA 52, §9.4.5.4*

Onboard methane detection, fire suppression, and fire protection systems shall be installed, inspected, validated, and maintained in accordance with the system OEM written recommendations and shall be maintained as a permanent vehicle record.

*NFPA 52, §9.13.3.2*

Periodic testing shall be done at a minimum of three times per year.

*NFPA 52, §9.13.3.2.1*

## **Installation of Valves**

Valves, valve packing, gaskets, and seats shall be designed for the intended service.

*NFPA 52, §9.8.1*

All parts of container shutoff valves shall be stainless steel, brass, or copper except gaskets, packing, and seats.

*NFPA 52, §9.8.2.1*

Valves shall be mounted securely and shielded or installed in a protected location to prevent damage from vibration, shock, and unsecured objects.

*NFPA 52, §9.12.4.1*

The vehicular fueling system shall be equipped with a backflow check valve to prevent the return flow of LNG from the container(s) to the filling connection.

*NFPA 52, §9.12.4.6*

## **LNG Transports**

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### **Testing Requirements**

Transports required to be registered with AFS shall be tested at least once every five years by a Category 15, 20, or 50 licensee.

(1) Documentation of the required testing shall be filed by the Category 15, 20, or 50 licensee.

(2) The results of any test required under this section shall clearly indicate whether the transport container unit is safe for LNG service. The Category 15, 20, or 50 licensee shall send LNG Form 2008 to AFS within 30 calendar days of the due date of any tests required under this section.

(3) If evidence of any unsafe condition is discovered as a result of any tests performed under this section, the transport container unit shall be immediately removed from LNG service and shall not be returned to LNG service until AFS notifies the licensee in writing that the transport container unit may be returned to LNG service.

*Regulations for LNG, §14.2707(a)*

Containers shall be tested in accordance with 49 CFR §180.407.

*Regulations for LNG, §14.2707(b)*

Containers shall be inspected for corroded areas, dents, or other conditions (including leakage under test pressure) which could render the container unsafe for LNG service.

*Regulations for LNG, §14.2707(c)*

**Pressure Gauge**

Transport containers shall be equipped with a pressure gauge for LNG service which shall be maintained in good operating condition at all times. An isolation valve shall be installed between the container and the pressure gauge.

*Regulations for LNG, §14.2713*

**Liquid Level Gauging Devices**

Truck and trailer containers shall be equipped with a liquid level gauging device of approved design, such as a fixed tube device.

Fixed tube devices shall be arranged so that the maximum liquid level to which the container may be filled is set at the maximum permitted for the container based on an initial liquid temperature not to exceed 40 degrees Fahrenheit. An isolation valve shall be installed between the container and the liquid level gauging device.

*Regulations for LNG, §14.2722*

**Uniform Protection Standards**

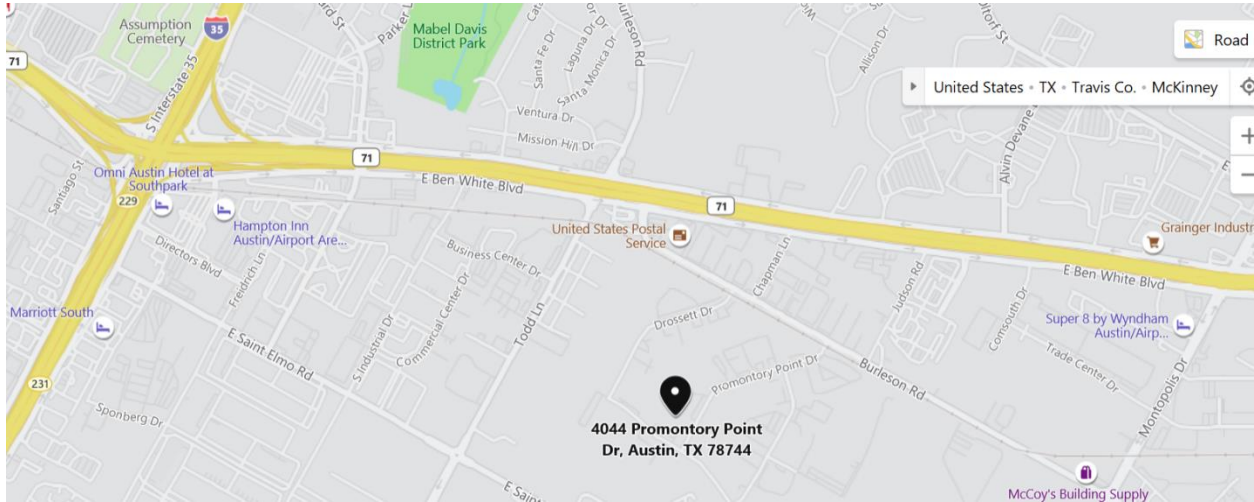
LNG transport units and container delivery units, including appurtenances, shall be maintained in a safe operating condition at all times.

*Regulations for LNG, §14.2740(a)*

Any transport unit or container delivery unit discovered to be in an unsafe condition while being operated on a public roadway may be continued in operation only to the nearest place where repairs can safely be made. Such operation shall be conducted only if it is less hazardous to the public than to permit the transport unit or container delivery unit to remain on the public roadway.

*Regulations for LNG, §14.2740(b)*

# ALTERNATIVE FUELS TRAINING CENTER 4044 Promontory Point Austin Texas 78744



Sample  
Question  
Answers

1. C
2. D
3. C
4. D