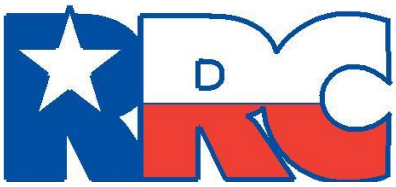
TEXAS LNG EXAMINATION STUDY GUIDE

General Public Dispensing Station Management Level



RAILROAD COMMISSION OF TEXAS

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LNG EXAMINATION STUDY GUIDE
Management-LEVEL

General Public Dispensing Station
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 General Public Dispensing activities. Category 40 examination qualifies an individual to store, sell, and dispense LNG into motor- and mobile fuel containers.

What books do I need?

This examination tests your knowledge of the laws and standards that apply to Retail Wholesale Dealer Management Level operations in Texas. These laws and standards are found in:

Regulations for Compressed Natural Gas And Liquified 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 this book?

You may download the current edition of the Railroad Commission's *Regulations for Compressed Natural Gas And Liquified Natural Gas* in PDF format free online at www.rrc.state.tx.us. 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; click on "Codes and Standards."

Sections and Topics

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

NOTE: The list below is not exhaustive. You are responsible for knowing all the terms and definitions that apply to the LNG activities you will perform, as well as the rules and standards highlighted in this guide.

Railroad Commission *Regulations for Compressed Natural Gas and Liquified Natural Gas*

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)

Container--Any LNG vessel manufactured to the applicable sections of the American Petroleum Institute (API) Code, ASME Code, or DOT requirements in effect at the time of manufacture.
Regulations for LNG, §14.2007(13)

Container appurtenances--Components installed in container openings, including but not limited to pressure relief devices, shutoff valves, backflow check valves, excess flow check valves, internal valves, liquid level gauges, pressure gauges, and plugs.
Regulations for LNG, §14.2007(14)

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)

Motor fuel system--An LNG system to supply natural gas as a fuel for an engine used to propel the vehicle.
Regulations for LNG, §14.2007(36)

Point of transfer--The point at which a connection is made to transfer LNG from one container to another.
Regulations for LNG, §14.2007(43)

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 × 1.25 × 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 × 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 (16°C) required to fill a container.
NFPA 52, §3.3.63

NFPA 52 (2013)

Components. Apart, 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

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.

As you study the applicable codes and standards, pay special attention to the facts, rules and procedures related to the following key topics. When you take the examination, read each question very carefully.

ADMINISTRATIVE RULES - GENERAL REQUIREMENTS

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 From 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 employees 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

The installation of LNG and CNG systems shall be supervised by qualified personnel with reference to their construction and use.
NFPA 52, §4.2

At least one qualified person shall be in continuous attendance with an unobstructed view of the transfer point while unloading is in progress.
NFPA 52, §10.3.5

The maintenance program shall be carried out by a qualified representative of the equipment owner.
NFPA 52, §10.13.1.1

All persons employed in handling and dispensing LNG shall be trained in handling and operating duties and procedures.
NFPA 52, §12.4.1

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 a 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

Portable or wheeled fire extinguishers shall be recommended for gas fires by their manufacturer.
NFPA 59, §12.6.1

Portable or wheeled fire extinguishers shall be available at strategic locations, as determined in accordance with 12.2.1, within an LNG facility and on tank vehicles.
NFPA 59, §12.6.1.1

Portable and wheeled fire extinguishers shall conform to the requirements of NFPA 10, *Standard for Portable Fire Extinguishers*.
NFPA 59, §12.6.1.2

Handheld portable dry chemical extinguishers shall contain minimum nominal agent capacities of 20 lb or greater and shall have a minimum 1 lb/sec agent discharge rate.
NFPA 59, §12.6.1.3

Control systems that are used as part of the fire protection system at the LNG plant shall be inspected and tested in accordance with the applicable fire codes.
NFPA 59, §14.8.10.4

General Rules for All Stationary LNG Installations

Uniform Protection Requirements

Fencing at LNG stationary installations shall comply with the following:
(1) Fencing material shall be solid construction of noncombustible material or chain link type with wire at least 12 ½ American wire gauge in size.
(2) Fencing shall be at least six feet in height at all points. Fencing may be five feet in height when topped with at least three strands of barbed wire, with the strands four inches apart.
(3) Uprights, braces, and cornerposts of the fence shall be composed of noncombustible material.
(4) Uprights, braces, and cornerposts of the fence shall be anchored in concrete a minimum of 12 inches below the ground.
(5) All fenced enclosures shall have at least one gate suitable for ingress and egress. All gates shall be locked whenever the area enclosed is unattended.
(6) A minimum clearance of two feet shall be maintained between the fencing and any part of an LNG transfer system, dispensing system, or storage container that is part of a stationary installation.
(7) Fencing which is located more than 25 feet from any point of the LNG transfer system, dispensing system, or storage containers shall be designated as perimeter fencing. If the LNG transfer system, dispensing system, or storage container is located inside perimeter fencing and is subject to vehicular traffic, it shall be protected against damage according to subsection (c) of this section.
(8) The storage and compression area must be completely enclosed by fencing.
(9) Where fencing is not used to protect the installation, then valve locks, a means of locking the electric control for the compressors, or other suitable means shall be provided to prevent unauthorized withdrawal of LNG.
Regulations for LNG, §14.2101(b)

Stationary LNG installations shall comply with the sign and lettering requirements specified in Table 1 of this section and the following:
(1) Unless colors are specified, lettering shall be a color in sharp contrast to the background color of the sign and
shall be easily readable.
(2) Signs shall be visible from each point of transfer;
(3) Signs on emergency shutdown devices shall be permanently affixed;
(4) Signs bearing the words, "NATURAL GAS," shall be located on all operating sides of dispensers; and
(5) Signs indicating the licensee's name shall be located at either the vehicle dispenser or refueling area, or at the loading or unloading area.
Regulations for LNG, §14.2101(f)

At least two monitoring sensors shall be installed at all stationary installations to detect hazardous levels of LNG. Sensors shall activate at not more than 25% of the lower flammability limit (LFL) of LNG. If the level exceeds one-fourth of the LFL, the sensor shall either shut the system down or activate an audible and visual alarm. The number of sensors to be installed shall comply with the area of coverage for each sensor and the size of the installation. The sensors shall be installed and maintained in accordance with the manufacturer's instructions.
Regulations for LNG, §14.2101(g)

Stationary LNG Storage Containers

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)

Sample Question 3

Fencing shall be at least ____ feet in height at all points.

A. 4
B. 5
C. 6
D. 7

Answer on last page

LNG Container Installation Distance Requirements

Table 13.5.1 Distances from Containers and Exposuures

Container Water Capacity		Minimum Distance from Edge of Impoundment or Container Drainage System to Offsite Buildings and Property Lines That Can Be Built Upon		Minimum Distance Between Storage Containers	
gal	m^3	ft	m	ft	m
1000–2000	3.8–7.6	15	4.6	5	1.5
2001–18,000	≥7.6–56.8	25	7.6	5	1.5
18,001–30,000	≥56.8–114	50	15	5	1.5
30,001–70,000	≥114–265	75	23	¼ of the sum of the diameters of adjacent containers [5 ft (1.5 m) minimum]	
>70,000	>265	0.7 times the container diameter [100 ft (30 m) minimum]			

[59A: Table 13.6.2.1]

Table 13.5.1.2 Distances from Underground Containers and Exposures

Container Water Capacity		Minimum Distance from Buildings and the Adjoining Property Line That Can Be Built Upon		Distance Between Containers	
gal	m^3	ft	m	ft	m
<18,000	<15.8	15	4.6	15	4.6
18,000–30,000	15.8–114	25	7.6	15	4.6
30,001–100,000	>114	40	12.2	15	4.6

[59A: Table 13.6.3]

Transfer of LNG

Where bulk transfers are made into stationary storage containers, the LNG being transferred shall be compatible in composition or in temperature and density with the LNG already in the container.
NFPA 59A, §14.6.1

Where the composition or the temperature and density are not compatible, means shall be taken to prevent stratification and vapor evolution that could cause rollover.
NFPA 59A, §14.6.2

At least one qualified person shall be in constant attendance while a transfer is in progress.
NFPA 59A, §14.6.4

Sources of ignition shall not be permitted in loading or unloading areas while transfer is in progress.
NFPA 59A, §14.6.5

Prior to transfer, gauge readings shall be obtained, or inventory established to ensure that the receiving container cannot be overfilled, and levels shall be checked during transfer operations.
NFPA 59A, §14.6.6.4

Pressure and temperature conditions shall be monitored during the transfer operation.
NFPA 59A, §14.6.6.7

While tank car or tank vehicle loading or unloading operations are in progress, rail and vehicle traffic shall be prohibited within 25 ft of LNG facilities or within 50 ft of refrigerants whose vapors are heavier than air.
NFPA 59A, §14.6.6.8

Venting of LNG

Venting of LNG is prohibited as part of routine activities, except for the following:
(1) as provided for in §14.2119 of this title (relating to Transport Vehicle Loading and Unloading Facilities and Procedures); and
(2) through a trycock installed on a stationary storage tank during filling of the tank
Regulations for LNG, §14.2116

General Rules For LNG Fueling Facilities

General Facility Design

LNG fueling facilities that are permitted to be unattended shall be designed to secure all equipment from tampering.
NFPA 52, §10.2.1.1

Operating instructions identifying the location and operation of emergency controls shall be posted conspicuously in the facility area.
NFPA 52, §10.2.1.3

LNG fueling facilities transferring LNG during the night shall have permanent, adequate lighting at points of transfer and operation.
NFPA 52, §10.2.1.4

If other combustible or hazardous liquids are able to encroach on the LNG fueling facility, means shall be provided to protect the LNG facility.
NFPA 52, §10.2.2.3

Points of transfer shall be located not less than 25 ft from the nearest important building not associated with the LNG facility, from the line of adjoining property that is able to be built upon, or from fixed sources of ignition.
NFPA 52, §10.2.2.5

Vehicles delivering LNG to the facility or vehicles being fueled from the facility shall not be considered sources of ignition.
NFPA 52, §12.3.4

Vehicles containing fuel-fired equipment (e.g., recreational vehicles and catering trucks) shall be considered a source of ignition unless all sources of ignition such as pilot lights, electric igniters, burners, electrical appliances, and engines located on the vehicle being refueled are shut off completely before entering an area where ignition sources are prohibited.
NFPA 52, §12.3.5

Buried and underground containers shall be provided with means to prevent the 32°F isotherm from penetrating the soil.
NFPA 52, §13.5.2

All buried or mounded components in contact with the soil shall be constructed from material resistant to soil corrosion or protected to minimize corrosion.
NFPA 52, §13.5.4

LNG shall not be vented to the atmosphere under normal operations unless the vent leads to a safe point of discharge. Vent pipes or stacks shall have the open end suitably protected to prevent entrance of rain, snow, and other foreign material. Vent stacks shall have provision for drainage.
Regulations for LNG, §14.2304(a)

Temperature monitoring systems shall be provided where the foundations supporting cryogenic containers and equipment could be adversely affected by freezing or frost heaving of the ground.
Regulations for LNG, §14.2304(b)

Emergency Refueling

(a) Licensees and nonlicensees, such as mass transit authorities, may use a mobile refueling vehicle for emergency refueling provided it complies with the following requirements:
(1) The gross vehicle weight (GVW) shall not exceed the GVW rating. Installation of the container shall not adversely affect the vehicle.
(2) The vehicle used to transport the container shall comply with all DOT and Texas placarding requirements.
(3) The LNG cargo container shall have a maximum water capacity of 200 gallons.
(4) The container, fittings, and transfer equipment shall be properly secured against displacement.
Regulations for LNG, §14.2310(a)

The individual performing the transfer of LNG shall be properly trained in all aspects of LNG transfer.
Regulations for LNG, §14.2310()

Sample Question 4

At least _____ qualified person shall be in constant attendance while a transfer is in progress.

A. One
B. Two
C. Three
D. Four

Answer on last page

Fuel Dispensing Systems

The dispensing device shall be protected from vehicle collision damage.
NFPA 52, §10.4.1

An ESD shall be provided that includes a shutoff valve for stopping liquid supply and shutting down transfer equipment.
NFPA 52, §10.4.2

An ESD actuator, distinctly marked for easy recognition with a permanently affixed, legible sign, shall be provided within 10 ft of the dispenser and also at a safe, remote location.
NFPA 52, §10.4.3

The maximum delivery pressure at the fueling nozzle shall not exceed the maximum allowable pressure of the vehicle fuel tanks.
NFPA 52, §10.4.4

Hose and arms shall be equipped with a shutoff valve at the fuel end and a breakaway device to minimize release of liquid and vapor in the event that a vehicle pulls away while the hose remain connected.
NFPA 52, §10.4.5

When not in use, hose shall be secured to protect it from damage.
NFPA 52, §10.4.6

Where a hose or arm of nominal 3 in. diameter or larger is used for liquid transfer or where one of nominal 4 in. diameter or larger is used for vapor transfer, an emergency shutoff valve shall be installed in the piping of the transfer system within 10 ft from the nearest end of the hose or arm.
NFPA 52, §10.4.7

Where the flow is away from the hose, a check valve shall be permitted to be used as the shutoff valve.
NFPA 52, §10.4.7.1

Where either a liquid or vapor line has two or more legs, an emergency shutoff valve shall be installed either in each leg or in the feed line before the legs.
NFPA 52, §10.4.7.2

Where excess-flow check valves are used, the closing flow shall be greater than the maximum system design flow rate and less than the flow rating of the piping system that results from a complete line failure between the excess-flow valve and the equipment downstream of the excess-flow check valve.
NFPA 52, §7.11.3

A fueling connector and mating vehicle receptacle shall be used for reliable, safe, and secure transfer of LNG or gas vapor to or from the vehicle, with minimal leakage.
NFPA 52, §10.4.9

The fueling connector either shall be equipped with an interlock device that prevents release while the line is open or have self-closing ends that automatically close upon disconnection.
NFPA 52, §10.4.10

Compliance with NFPA 52 §10.4 or requirements of this section does not ensure conformity with other state and federal regulations, such as those of the Texas Commission on Environmental Quality or the United States Environmental Protection Agency. Retail LNG dispensers shall comply with the applicable weights and measures requirements of the Texas Department of Agriculture relating to dispensing accuracy.
Regulations for LNG, §14.2313(a)

The licensee or operator of the appurtenance or equipment shall maintain documentation sufficient to substantiate any claims made regarding the safety of any valves, fittings, and equipment and shall, upon request, furnish copies to AFS.
Regulations for LNG, §14.2313(d)

Manually operated container valves shall be provided for each container.
Regulations for LNG, §14.2313(e)

Manually operated shutoff valves shall be installed in manifolds as close as practicable to a container or group of containers.
Regulations for LNG, §14.2313(f)

Automatic Fuel Dispensing Systems

Automatic fuel dispensers shall be fabricated of material suitable for LNG and resistant to the action of LNG under service conditions. Pressure containing parts shall be stainless steel, brass, or other equivalent cryogenic material. Aluminum may be used for approved meters.
Regulations for LNG, §14.2319(a)

Electric installations within dispenser enclosures and the entire pit or open space beneath dispensers shall comply with NEC, Class 1, Group D, Division 1, except for dispenser components located at least 48 inches above the dispenser base which NEC states are intrinsically safe.
Regulations for LNG, §14.2319(b)

A device shall be installed in the liquid piping so that displacement of an automatic dispenser will result in the displacement of such piping on the downstream side of the device.
Regulations for LNG, §14.2319(e)

The fueling nozzle shall prevent LNG from being discharged unless the nozzle is connected to the vehicle.
Regulations for LNG, §14.2319(f)

A key, card, or code system shall be used to activate the automatic dispenser.
Regulations for LNG, §14.2319(g)

Automatic dispensers shall incorporate cutoff valves with opening and closing devices which ensure the valves are in a closed position when dispensers are deactivated.
Regulations for LNG, §14.2319(h)

LNG fuel storage installations which include automatic dispensers shall be equipped with an emergency shut-down device for the entire LNG installation located at least 20 feet from the nearest dispenser or storage area. The emergency shut-down device shall be distinctly marked for easy recognition.
Regulations for LNG, §14.2319(i)

If automatic dispensers are to be used during hours of darkness, permanent adequate lighting shall be provided to facilitate proper operations.
Regulations for LNG, §14.2319(j)

Fuel dispensers, including automatic dispensers, may be operated only by an individual who has been properly trained.

(1) The licensee owning, operating, or servicing a CNG fuel dispensing facility shall ensure the safe operation of the system and provide training to users.
(2) Step-by-step operating instructions provided by the manufacturer shall be posted at or on each automatic dispenser, readily visible to the operator during transfer operations. The instructions shall describe each action necessary to operate the automatic dispenser and include the location of and procedure for activating emergency shutoff equipment.
(3) Each person or entity who operates a fuel dispenser, excluding an automatic dispenser, shall be provided with written instructions and safe operating procedures by the licensee. The person operating the dispenser should be cautioned to study and preserve such instructions and procedures.
Regulations for LNG, §14.2319(k)

Sample Question 5

A key, card, or code system shall be used to _____.

A. Access the exterior gate.
B. Activate the automatic dispenser.
C. Identify the operator.
D. Pay for the transaction.

Answer on last page

Engine Fuel Systems

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

Manual fuel shutoff valves shall be readily accessible, operable without tools, and labeled as to their function.
NFPA 52, §9.12.1.13

Installation of Vehicle Fuel Containers

Containers shall be located in a place and in a manner so as to minimize the possibility of damage to the container and its appurtenances.
NFPA 52, §9.12.1.2

No part of the container or its appurtenances shall protrude beyond the sides or top of any vehicle to prevent the container from being struck or punctured.
NFPA 52, §9.12.1.5.1

In addition to NFPA 52 §9.12.1.2, vehicle fuel containers on school buses, mass transit vehicles, and other public transportation vehicles shall be installed on the underside of the vehicle, except as specified in subsection (c) of this section. Fuel containers on special transit vehicles shall be installed in a location which will not interfere with vehicle operation.
Regulations for LNG, §14.2610(a)

Non-roof-mounted containers shall not be mounted ahead of the front axle or beyond the rear bumper on motor vehicles.
NFPA 52, §9.12.1.5.2

The minimum clearance from the road to the container, its housing, or its fittings, whichever is lowest, shall not, with the vehicle loaded to its gross weight rating, be less than that defined by the vehicle manufacturer's design, or allow any component to touch the surface should the vehicle have a flat tire or require the removal of any tire.
NFPA 52, §9.12.1.6.1

If fuel or container vent piping containing fuel is installed within 8 in. of engine or exhaust system components that exceed 250°F, it shall be shielded against direct heating.
NFPA 52, §9.12.1.2.2

Containers shall be mounted to prevent their jarring loose, slipping, or rotating.
NFPA 52, §9.12.1.7

The mounting system shall minimize fretting corrosion between the container and the mounting system.
NFPA 52, §9.12.1.10

Containers shall not be installed so as to affect adversely the operating characteristics of the vehicle.
NFPA 52, §9.12.1.11

Containers shall be installed and fitted so that no gas from fueling operations can be released inside the passenger compartment, by permanently installing the fueling receptacle outside the passenger compartment of the vehicle in a location protected from physical damage and dislodgment.
NFPA 52, §9.12.2.1

Enclosures, structures, seals, and conduits used to vent enclosures shall be fabricated of materials designed to resist damage, blockage, or dislodgment caused by the movement of articles carried in the vehicle or by the closing of luggage compartment enclosures or vehicle doors.
NFPA 52, §9.12.2.2

Enclosures shall require the use of tools for removal.
NFPA 52, §9.12.2.2.1

Roof-mounted containers are allowed if the vehicle was originally designed and manufactured to have roof-mounted containers or if the original manufacturer approves the design of the structure mounting. Vehicles shall not be modified to have roof-mounted containers.
Regulations for LNG, §14.2610(c)

Container markings shall be visible after the container's permanent installation on a vehicle.
NFPA 52, §9.12.1.3.1

Sample Question 6

If fuel or container vent piping containing fuel is installed within ___ in. of engine it shall be shielded against direct heating.

A. 5
B. 6
C. 7
D. 8

Answer on last page.

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

The detection system shall activate a visual alarm within the driver's compartment of the vehicle at a gas concentration not exceeding 20 to 30 percent of the LFL and sound an audible and visual alarm at a gas concentration not greater than 50 to 60 percent of the LFL.
NFPA 52, §9.13.3.1

Sensor locations shall include at a minimum the engine and driver's compartment and any enclosed fuel container or installation within a compartment.
NFPA 52, §9.13.3.1.1

Motor vehicles equipped with a gas detection system shall provide warnings at two different levels in accordance with 9.13.3.1 and the following:
(1) At the 50 percent to 60 percent LFL level, a warning that is audible and visible to the driver outside the vehicle
(2) An 87 dBA warning that is audible outside the vehicle with windows up and doors closed
(3) A visual warning that is visible in direct sunlight
NFPA 52, §9.13.3.1.2

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

Vehicle Fueling Connection

Vehicle fueling connections shall provide for the reliable and secure connection of the fuel system containers to a source of LNG.
Regulations for LNG, §14.2634(a)

Fueling connections shall prevent escape of gas when the connector is not properly engaged or becomes separated.
Regulations for LNG, §14.2634(b)

The fueling receptacle shall be mounted to withstand a breakaway force such that the breakaway device specified in 10.4.5 operates before the receptacle separates from the vehicular fuel system.
NFPA 52, §9.12.9.2

The fueling receptacle on the vehicular fuel system shall be supported and meet all the following requirements:
(1) Receive the fueling connector and accommodate the service pressure of the vehicle fuel system
(2) Incorporate a means to minimize the entry of dust, water, and other foreign material
(3) Be designed for any corrosive conditions that are anticipated
NFPA 52, §9.12.9.1

Signs and Labeling

Signs or labels shall be readily visible before and during transfer operations, shall be weather-resistant, and shall be located as specified in Table 1 of this section.
Regulations for LNG, §14.2637(a)

Upon completion of a vehicle conversion, the licensee making the conversion shall affix to the vehicle an identification tag or decal in a location that is easily readable. The tag or decal shall contain letters that indicate the licensee's name, current license number, and the year and month the conversion was made.
Regulations for LNG, §14.2637(b)

Each school bus, special transit vehicle, mass transit vehicle, and public transportation unit shall be marked with the manual shutoff valve's location with the words "Manual Shutoff Valve." Decals or stencils are acceptable.
Regulations for LNG, §14.2637(c)

Each LNG-fueled vehicle shall be identified with a weather-resistant, diamond-shaped label located on an exterior vertical or near-vertical surface on the lower right rear of the vehicle (or on the trunk lid of a vehicle so equipped, but not on the bumper or tailgate of any vehicle), inboard from any other markings.
NFPA 52, §9.12.8.2

The labels for vehicles less than Class 6 shall be a minimum of 4.72 in. long × 3.27 in. high.
NFPA 52, §9.12.8.3

The marking in the label required by 9.12.8.2 shall consist of a border and the letters "LNG" minimum height centered in the diamond] of silver or white reflective luminous material on a blue background.
NFPA 52, §9.12.8.5

Sample Question 7

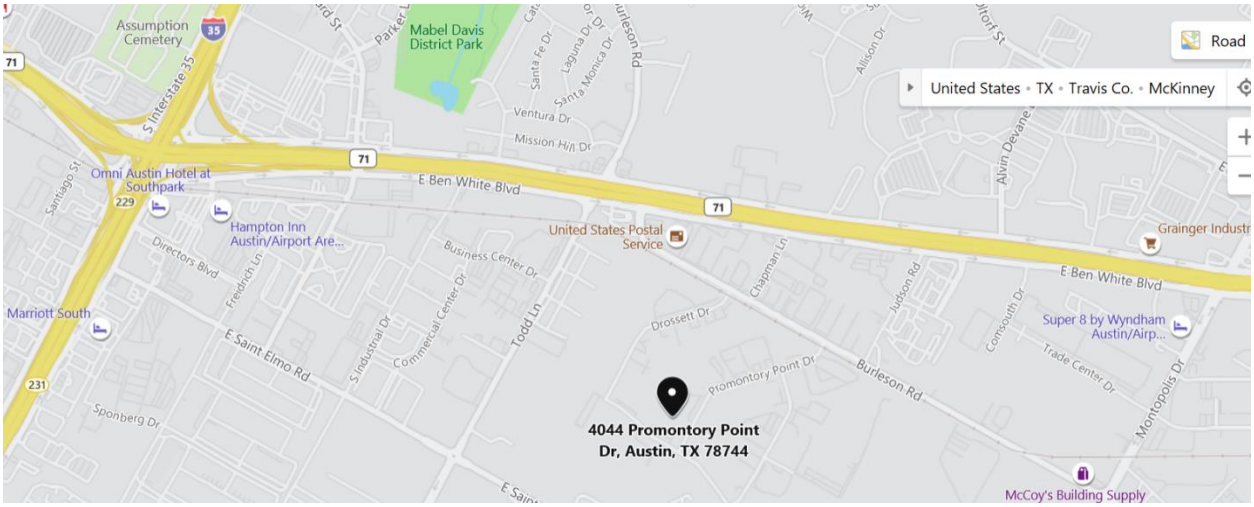
Periodic testing of the monitoring systems shall be done at a minimum of ____ per year.

A. Once
B. Twice
C. Three times
D. Four times

Answer on last page

ALTERNATIVE FUELS TRAINING CENTER

4044 Promontory Point Austin Texas 78744



Sample Question Answers

1. C
2. D
3. C
4. A
5. B
6. D
7. C