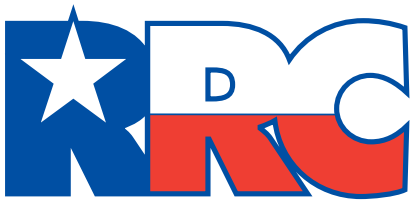
TEXAS LNG EXAMINATION STUDY GUIDE

Transport Driver
Employee Level



RAILROAD COMMISSION OF TEXAS

September 2012

NOTICE

This publication is intended for use in its entirety as a guide for persons preparing to take Railroad Commission LNG qualifying examinations. Any other use or distribution of this publication or use or distribution of any portion of this publication for any purpose whatsoever is considered by the Railroad Commission of Texas to be misuse of this publication.

This publication is not intended to be an exhaustive treatment of the subjects covered and should not be interpreted as precluding the use of other safety programs or procedures that comply with (1) applicable federal, state, and/or local code provisions, statutes, ordinances, and/or other regulations, including, but not limited to, the Railroad Commission of Texas' LNG Safety Rules (16 Texas Administrative Code, Chapter 14) and codes adopted by the Railroad Commission of Texas, and/or (2) other industry standards and/or practices.

Every effort was made to ensure that this publication was accurate and up-to-date as of the date of publication. The reader is cautioned, however, about reliance on this publication or any portion thereof at any time thereafter, particularly because changes in technology are likely to occur that might make portions of this publication inaccurate and out of date. The Railroad Commission of Texas assumes no liability, under any circumstances, for any actions taken or omissions made in reliance of the contents of this publication, from whatever source, or any other consequences of any such reliance.

Exam administration

Taking an examination in Austin

You may take any Railroad Commission qualifying examination in Austin without pre-registering ("walk-in") on any business day, excluding holidays, from 8:00 a.m. to 12:00 noon at the Commission's Alternative Fuels Training Center. The training center is located at 6506 Bolm Road, on the northwest corner of the intersection of Bolm Road and U.S. Highway 183.

Tuesdays and Thursdays are the preferred days for walk-in examinations.

(See map to Training Center on page 18.)

Taking an examination outside of Austin

You may also take any Railroad Commission qualifying examination at more than two dozen other locations statewide. Exam dates, times and locations are listed three months in advance on the Commission's web site. To view a complete schedule, go to www.rrc.state.tx.us. From the drop-down menu under "Education and Training," choose "Training Classes & Qualifying Exams" and click on "Class/Exam Schedule." The online schedule has links to maps showing each class and exam location.

You must register at least two business days in advance to take an examination outside of Austin. To register online, go to www.rrc.state.tx.us. From the drop-down menu under "Education and Training," choose "Training Classes & Qualifying Exams" and click on "Register Now." The web site allows you to register up to four people for an examination.

When you register online, you will receive a return e-mail confirming the registration and the dates and locations of the exams. Registering online also ensures that you will receive advance notification of any changes in the examination date, time or location.

Payment for exams; LNG Form 2016; ID required

The fee is $40.00 for each employee-level exam and $70.00 for each management-level exam. Fees are non-refundable by state law, and cash cannot be accepted.

You may pay the required examination fee at any exam location by check or money order payable to the Railroad Commission of Texas. LNG Form 2016, "Application for Examination," may also be completed at the examination site. Examinees must also present an official state-issued driver's license or photo ID at the exam site.

You may also pay your examination fee by credit card in advance online. To pay by credit card, go to www.rrc.state.tx.us. From the drop-down menu under "Education and Training," choose "Training Classes & Qualifying Exams" and click on "Pay Online." Be sure to print out the confirmation page in Step 6. Make a copy of the confirmation page for your records and bring a copy with you to the examination site.

Open-book examinations

All Railroad Commission employee-level qualifying examinations are open book. Examinees may use a copy of the Commission's ***Regulations for Compressed Natural Gas and Liquefied Natural Gas***. This study guide may not be used during any employee-level examination.

Examination time limit

Railroad Commission employee-level qualifying examinations must be completed within two hours after the examination is given to you, including any breaks you elect to take. The examination proctor is the official timekeeper. You must submit both the examination itself and your answer sheet to the proctor within the two-hour limit.

Grades, reports and retakes

The minimum passing grade is 75 percent on all Railroad Commission qualifying examinations.

Examinations administered at the Training Center in Austin are graded on-site, and examinees are immediately informed of the results. If you fail an examination that you took in Austin, you may retake that same examination only one additional time during a business day. Any subsequent examination must be taken on another business day, unless approved by the Commission.

Exams taken outside of Austin are graded as soon as possible, and the results of the examination are reported within 10 working days.

If you pass an examination, the Railroad Commission will issue you a blue certification card within 10 working days. You will be notified by letter if you fail an examination.

Contacts

Alternative Fuels Research and Education (AFRED)

Rayfield Hearne, Certification Manager	(512) 463-6845	rayfield.hearne@rrc.state.tx.us
Amber Flaherty, Examination Coordinator	(512) 463-6933	amber.flaherty@rrc.state.tx.us
Carol Goodman, Training Coordinator	(512) 463-2682	carol.goodman@rrc.state.tx.us

LP-Gas Operations

April Dawn Richardson, LP-Gas Safety	(512) 463-6935	april.richardson@rrc.state.tx.us

TEXAS LNG EXAMINATION STUDY GUIDE EMPLOYEE-LEVEL TRANSPORT DRIVER

Who should use this guide?

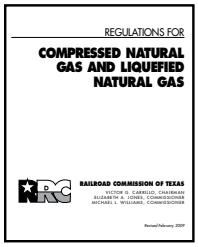
You should use this guide if you plan to take the Railroad Commission's employee-level qualifying examination authorizing you to operate an LNG transport, including the loading and unloading of LNG.

What books do I need?

This examination tests your knowledge of the laws and standards that apply to the transportation of LNG by transport, including the loading and unloading of LNG.

These laws and standards are found in the Railroad Commission's *Regulations for Compressed Natural Gas and Liquefied Natural Gas* (16 Texas Administrative Code, Chapter 14), known informally as the Commission's LNG Safety Rules.

Where do I get the book?



You may download the current edition of the Railroad Commission's *Regulations for Compressed Natural Gas and Liquefied Natural Gas* free online. Go to the Commission's home page at www.rrc.state.tx.us. From the drop-down menu under "Education and Training," choose "Training Classes & Qualifying Exams" and click on "CNG/LNG Safety Rules (PDF)." You may also buy a printed copy of the book for $10.00, tax included, by calling the Railroad Commission's publications office at (512) 463-7309.

Sections and topics

Before you take this examination you should know the definitions on pp. 8-10 of this study guide and the contents of the sections of the codes and standards listed below. The actual examination may not include questions on each of the listed sections and topics, and the exam questions are not organized by topic as they are in this study guide.

Regulations for Compressed Natural Gas and Liquefied Natural Gas

§14.2116	Transfer of LNG
§14.2119	Transport Vehicle Loading and Unloading Facilities and Procedures
§14.2122	Transfer Systems, Including Piping, Pumps, and Compressors, Used for LNG and Refrigerants
§14.2125	Hoses and Arms
§14.2128	Communications and Lighting
§14.2131	Fire Protection

§14.2701	DOT Requirements
§14.2707	Testing Requirements
§14.2710	Markings
§14.2713	Pressure Gauge
§14.2719	Electrical Equipment and Lightning
§14.2722	Liquid Level Gauging Devices
§14.2728	Extinguishers Required
§14.2731	Manifests
§14.2734	Transfer of LNG on Public Highways, Streets, or Alleys
§14.2737	Parking of LNG Transports and Container Delivery Units, and Use of Chock Blocks
§14.2740	Uniform Protection Standards
§14.2746	Delivery of Inspection Report to Licensee
§14.2749	Issuance of LNG Form 2004 Decal

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.

Regulations for Compressed Natural Gas and Liquefied Natural Gas

Aggregate water capacity is the sum of all individual container capacities as measured by weight or volume of water when the containers in a battery at an installation are full.
LNG Safety Rules, §14.2007(2)

ASME means the American Society of Mechanical Engineers.
LNG Safety Rules, §14.2007(6)

A **commercial installation** is an LNG equipment installation located on premises other than a single-family dwelling used primarily as a residence.
LNG Safety Rules, §14.2007(12)

A **container** is any LNG vessel manufactured to the applicable sections of the API Code, ASME Code, or DOT requirements in effect at the time of manufacture.
LNG Safety Rules, §14.2007(15)

Design pressure is the pressure for which a system or portion of that system is designed.
LNG Safety Rules, §14.2007(18)

DOT means the United States Department of Transportation.
LNG Safety Rules, §14.2007(21)

A **fixed-length dip tube** is a pipe with a fixed open end positioned inside a container at a designated elevation to measure a liquid level.
LNG Safety Rules, §14.2007(26)

An **ignition source** is 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.
LNG Safety Rules, §14.2007(28)

An **LNG system** is a system of safety devices, containers, and other LNG equipment installed at a facility or on a vehicle and designed for use in the sale, storage, transportation for delivery, or distribution of LNG.
LNG Safety Rules, §14.2007(38)

An **LNG transport** is 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.
LNG Safety Rules, §14.2007(39)

The **maximum allowable working pressure** is the maximum gauge pressure permissible at the top of completed equipment, containers, or vessels in their operating position for a design temperature.
LNG Safety Rules, §14.2007(41)

A **mobile fuel container** is an LNG container mounted on a vehicle and used to store LNG as the fuel supply for uses other than motor fuel.
LNG Safety Rules, §14.2007(42)

The **point of transfer** is the point at which a connection is made to transfer LNG from one container to another.
LNG Safety Rules, §14.2007(53)

A **pressure relief valve** is a 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.
LNG Safety Rules, §14.2007(54)

A **pressure vessel** is a container or other component designed in accordance with the ASME Code.
LNG Safety Rules, §14.2007(55)

PSIG means pounds per square inch gauge.
LNG Safety Rules, §14.2007(57)

A **trainee** is an individual employed by a licensee for a period not to exceed 45 days without that individual having successfully completed the required examinations for the LNG activities to be performed.
LNG Safety Rules, §14.2007(67)

The **transfer area** is that portion of an LNG refueling station where LNG is introduced into or dispensed from a stationary installation.
LNG Safety Rules, §14.2007(68)

A **transfer system** is all piping and equipment used in transferring LNG between containers.
LNG Safety Rules, §14.2007(69)

A **transport** is any bobtail or semi-trailer equipped with one or more containers.
LNG Safety Rules, §14.2007(71)

A **transport system** is any and all piping, fittings, valves, and equipment on a transport, excluding the container.
LNG Safety Rules, §14.2007(72)

An **ultimate consumer** is the person controlling LNG immediately prior to its ignition.
LNG Safety Rules, §14.2007(73)

A **vaporizer** is a device other than a container that receives LNG in liquid form and adds sufficient heat to convert the liquid to a gaseous state.
LNG Safety Rules, §14.2007(74)

Water capacity is the amount of water in gallons required to fill a container.
LNG Safety Rules, §14.2007(75)

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 LNG 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. Then, when you take the examination, read each question very carefully.

GENERAL RULES FOR ALL STATIONARY LNG INSTALLATIONS

Transfer of LNG

(b) LNG being transferred into stationary storage containers must be compatible in composition or temperature and density with the LNG already in the container.

When making transfers into fueling facility containers, LNG must be transferred at a pressure that will not exceed the set pressure of the pressure relief device.

(d) At least one licensed or certified individual must be present while unloading an LNG transport.

(e) While a transfer of LNG is in progress, ignition sources must not be permitted within 25 feet of the transfer area or within the distances specified as classified areas.

(f) When making transfers into fueling facility containers, measuring instruments must be provided to determine that containers are not overfilled.

LNG Safety Rules, §14.2116

Transport Vehicle Loading and Unloading Facilities and Procedures

(a) Transport vehicle loading and unloading facilities must meet the following requirements:

(1) Rack structures must be constructed of noncombustible material such as steel or concrete.

(2) Transfer piping, pumps, and compressors must be installed with the following protective measures:

(A) protection from damage from vehicle movements in compliance with the guardrail and fencing requirements of §14.2101 of this title (relating to Uniform Protection Requirements);

(B) isolation valves at both ends of containers with less than 2,000 gallon capacity, and a remote operating valve, automatic closure, or check valve to prevent backflow on containers of 2,000 gallons or more capacity;

(C) isolation valving and bleed connections to depressurize hoses and arms and minimize venting before disconnecting;

(D) hoses and arms equipped with a shutoff valve at the free end;

(E) a check valve on piping for liquid transfer to minimize accidental release; and

(F) a line relief valve between every pair of isolation valves.

(3) Where multiple products are loaded or unloaded at the same location, loading arms, hoses, and manifolds must be marked to indicate the product or products handled by each system.

(4) Operating status indicators must be provided in the transfer area.

(b) Written procedures covering normal transfer and emergency operating procedures must be available for all transfer operations. The procedures must be kept current and available to all employees engaged in transfer operations.

(c) Prior to beginning transfer operations, the following checks must be made:

(1) Gauge readings must be obtained or inventory established to prevent overfilling of the receiving vessel.

(2) Transfer connections must be checked to ensure they are gastight and liquid tight.

(3) Unless required for transfer operations, LNG or flammable liquid transport vehicle engines must be turned off. Brakes must be set and wheels chocked to prevent movement of the vehicle prior to connecting for transfer. The engine must not be started until the transport vehicle has been disconnected and any released vapors have dissipated.

(4) Prior to loading LNG into a transport vehicle tank which does not have a positive pressure or is not in exclusive LNG service, a test must be made to determine the oxygen content in the receiving container. If the oxygen content in either case exceeds 1.0% by volume, the container must not be loaded until suitably purged.

(5) An LNG transport vehicle must be positioned prior to transfer so that it can exit the area without backing when the transfer operation is complete.

(d) During transfer operations, the following checks must be made:

(1) Levels must be checked during the transfer operations.

(2) Pressure and temperature conditions must be observed during the transfer operations. If any unusual variance in pressure occurs, transfer must be stopped until the cause has been determined and corrected.

(e) No repair may be performed on the transfer system while transfer is taking place.
LNG Safety Rules, §14.2119

Transfer Systems, Including Piping, Pumps, and Compressors, Used for LNG and Refrigerants

(a) Transfer systems and pumps used to transfer LNG and refrigerants must be provided with a means for pre-cooling, to reduce the effect of thermal shock and overpressure.

(b) Check valves must be provided as required to prevent backflow in transfer systems and must be located as close as practicable to the point of connection to any system from which backflow might occur.

(c) At a stationary LNG installation, in addition to a locally mounted device to shut down the pump or compressor drive, a readily accessible, remotely located device must be provided at least 25 feet away from the equipment to shut down the pump or compressor in case of an emergency.
LNG Safety Rules, §14.2122

Hoses and Arms

(d) Hoses must be tested at least annually to the setting of the relief valve that protects the hose.

(e) Hoses must be visually inspected for damage or defects before each use and must not be used if any damage or defect is found.
LNG Safety Rules, §14.2125

Communications and Lighting

(a) Emergency communications must be provided near transfer locations, so that the operator can contact remotely located personnel who are associated with the transfer operations

(b) Transfer areas must be illuminated during hours of darkness.
LNG Safety Rules, §14.2128

Fire Protection

(a) Fire protection must be provided for all LNG facilities, as determined by sound fire protection engineering principles, analysis of local conditions, hazards within the facility, and exposure to or from other property. The evaluation must determine at a minimum type, quantity, and location of:

(1) equipment necessary for the detection and control of fires, leaks, and spills of LNG, flammable refrigerants, or flammable gases;

(2) equipment necessary for the detection and control of potential non-process and electrical fires;

(3) the methods necessary for protection of the equipment and structures from the effects of fire;

(4) fire protection water systems;

(5) fire extinguishing and other fire control equipment;

(6) the availability and duties of employees and the availability of local emergency response organizations during an emergency; and

(7) the protective equipment and special training needed by employees for their emergency duties.

(b) A detailed emergency response manual must be prepared for potential emergency conditions. The procedures must include but not be limited to:

(1) shut-down or isolation of all or part of the equipment to ensure that the escape of gas or liquid is promptly stopped or reduced as much as possible;

(2) use of fire protection equipment;

(3) notification of emergency response organizations and public authorities;

(4) first aid; and

(5) duties of employees.

(c) The emergency procedure manual must be available in the operating area and must be updated as required by changes in equipment or procedures.

(d) Employees engaged in LNG activities must be trained in emergency duties and procedures. Refresher training must be conducted at least once every two years.

(e) Fire control measures must be coordinated with the local fire and emergency response organizations.

(f) Safety and fire protection equipment must be visually inspected at least once a month and tested at least once a year. Documentation must be maintained on inspections and tests for at least two years or consistent with other safety record retention schedules, whichever is greater.

(g) Maintenance on fire control equipment must be scheduled so that a minimum of equipment is out of service at any one time and fire protection safety is not compromised. Access routes for movement of fire control equipment to an LNG fueling facility must be maintained at all times.

(h) Fire extinguishing and other fire control systems must follow the local fire marshal's requirements and recommendations for the protection of specific hazards.

(i) Dry chemical fire extinguishers suitable for extinguishing gas fires must be provided at each stationary LNG installation.
LNG Safety Rules, §14.2131

SAMPLE QUESTION

Monitoring sensors at stationary LNG installations must activate at not more than _____ percent of the _____ flammability limit of LNG.

A. 25 / lower
B. 35 / lower
C. 25 / upper
D. 35 / upper

Answer: A

LNG TRANSPORTS

DOT Requirements

(a) This subchapter applies to transport containers used in the transportation and distribution of LNG.

(b) LNG transports must comply with the requirements of DOT specification MC-338 and the applicable parts of Title 49, Code of Federal Regulations, Parts 171 - 180.
LNG Safety Rules, §14.2701

Testing Requirements

(a) Transport container units required to be registered with the Commission must be tested at least once every five years.

(1) Documentation of the required testing must be filed by the Commission licensed testing company.

(2) The results of any test required for a transport container must clearly indicate whether the transport container unit is safe for LNG service.

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

(b) Transport containers must be tested in accordance with 49 CFR §338.

(c) Transport containers must be inspected for corroded areas, dents, or other conditions (including leakage under test pressure) which could render the container unsafe for LNG service.
LNG Safety Rules, §14.2707

Marking

(a) LNG transports and container delivery units in LNG service must be marked with the name of the licensee or ultimate consumer operating the unit.

The required names marked on an LNG transport or container delivery unit must be in letters at least two inches in height and in sharp color contrast to the background.

(b) Other required markings an LNG transport or container delivery unit must comply with DOT marking requirements.

(c) If a transport unit is loaned or leased for a period of time not to exceed 30 days, the unit may have painted or permanently affixed thereon, in lieu of the name of the licensee operating the transport unit, the name of the owner of the transport unit in letters at least two inches in height.
LNG Safety Rules, §14.2710

Pressure Gauge

LNG transport containers must be equipped with an isolation valve installed between the container and the pressure gauge.
LNG Safety Rules, §14.2713

Electrical Equipment and Lighting

LNG transports and container delivery units must not be equipped with an artificial light other than electrical.
LNG Safety Rules, §14.2719

Liquid Level Gauging Devices

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

Fixed tube devices must 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.
LNG Safety Rules, §14.2722

Fire Extinguishers Required

(a) Transport power units must be equipped with at least one fire extinguisher having a UL rating of 10 B:C or more, and must be labeled or marked with that rating.

(b) Fire extinguishers on a transport power unit must be mounted so that a visual inspection can determine whether the extinguisher is fully charged.
LNG Safety Rules, §14.2728

Manifests

Manifests or bills of lading must be covered by permanent shipping papers authorized by the DOT.
LNG Safety Rules, §14.2731

Transfer of LNG on Public Highways, Streets, or Alleys

Transferring LNG on public highways, streets, or alleys is prohibited except in an emergency or where the containers are on machinery being used for the construction or maintenance of such public highways, streets, or alleys.
LNG Safety Rules, §14.2734

Parking of LNG Transports and Container Delivery Units; Use of Chock Blocks

(a) LNG transport or container delivery units must not be parked on any public street, highway or alley, except in an emergency or in connection with normal duties or meals or with normal rest stops.

LNG transport or container delivery units must not be parked in a congested area and must be parked at least 50 feet from any building except a building devoted exclusively to LNG operations.

(b) LNG transports must carry at least two chock blocks designed to effectively prevent the movement of the transport when it is parked and during transfer of fuel.
LNG Safety Rules, §14.2737

Uniform Protection Standards

(b) 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.
LNG Safety Rules, §14.2740

Delivery of Inspection Reports to Licensee

If a transport driver receives an inspection report from the Railroad Commission, the driver must deliver that report to the licensee in whose name the transport unit is registered
LNG Safety Rules, §14.2746

Issuance of LNG Form 2004 Decal

(a) A Railroad Commission Form 4 LNG decal must not be issued to any transport that has not been tested as required at least once during the preceding five years.
LNG Safety Rules, §14.2749

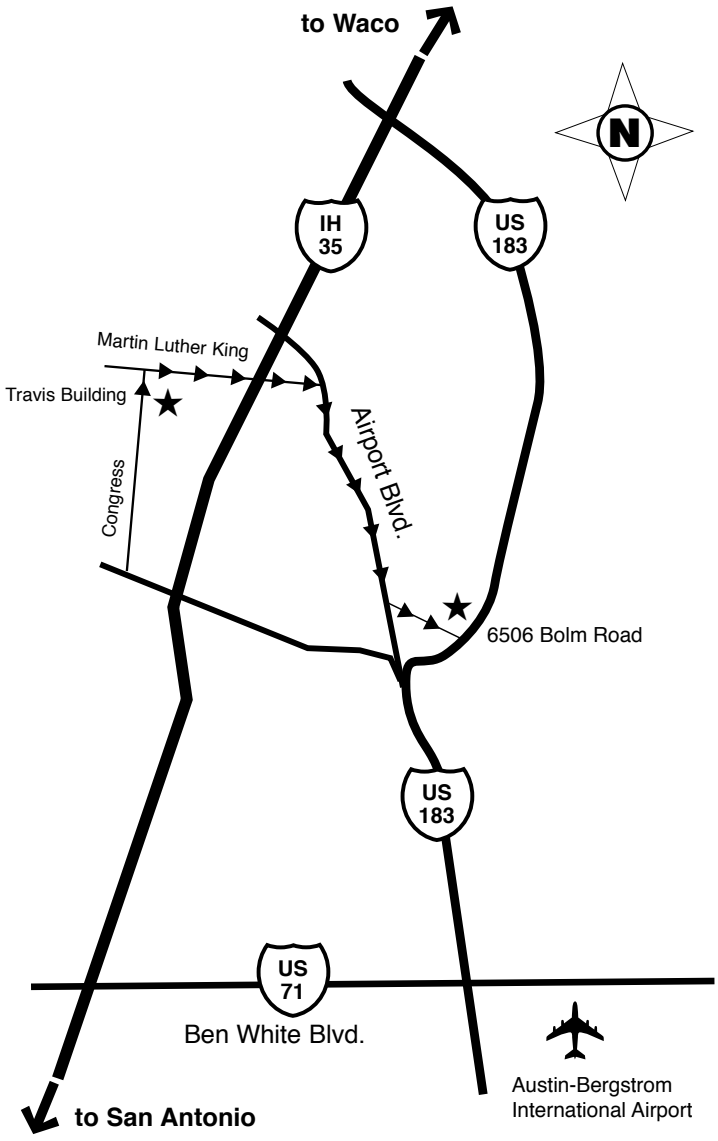
SAMPLE QUESTION

The operating end of the container at a stationary LNG installation, including _____, which is exposed to vehicular traffic, must be protected from damage by the vehicular traffic.

A. The material handling equipment
B. The entire dispensing system
C. Any part of the LNG transfer system, dispensing system or storage container
D. All of the above

Answer: D

RRC/AFRED TRAINING CENTER 6506 BOLM RD., AUSTIN



DIRECTIONS TO RRC ALTERNATIVE FUELS TRAINING CENTER, AUSTIN

From the Travis Building:
Go one block north to Martin Luther King, Jr. Blvd. Turn right on MLK and go about 2 miles to Airport Blvd. Turn right (south) on Airport and go about 1 1⁄2 miles. The fifth traffic light, just over the railroad bridge, is Bolm Road. Turn left (east) onto Bolm Road and go about 1 mile. 6506 is the last building on the left before U.S. 183.

Entering Austin on I-35 going south:

Take exit 239/240 for Hwy 183 South/ Austin-Bergstrom International Airport. Stay on 183 past Cameron Road, U.S. 290, Manor Road, Loyola Lane, and Techni-Center Drive. Proceed down the hill on 183 and take the Bolm Road exit. At the light, turn right onto Bolm Road. The Training Center is on the northwest corner of 183 and Bolm Road. Enter through the double glass doors on the south side of the building.

Entering Austin on I-35 going north:

Take exit 230 for Texas Hwy. 71/Ben White Blvd. Turn right toward Bastrop. Stay on 71 for approximately 4.3 miles. Exit onto U.S. 183 North. Stay on 183 past the Colorado River bridge. Stay in the right lane and take the Bolm Road exit. Turn left at the light onto Bolm Road and go under the overpass. The Training Center is on the northwest corner of 183 and Bolm Road. Enter through the double glass doors on the south side of the building.