

STUDY MATERIAL FOR THE
CERTIFICATE OF FITNESS EXAM
FOR

C-10

SUPERVISE LNG

PLANTS

INSIDE THIS BOOKLET YOU WILL FIND THE
FOLLOWING:

NOTICE OF EXAMINATION (NOE)

REVISED 04/25/00

NOTICE OF EXAMINATION FOR

Title: Examination for the Certificate of Fitness for Supervise LNG Plants (C-10)

Date of Test: No written test is required. Issuance of Certificate of Fitness will be based on an evaluation of applicants' qualifications and experience.

QUALIFICATION REQUIREMENTS

1. Applicants must be at least 18 years of age.
2. Applicants must have a reasonable understanding of the English language.
3. Applicants must present a letter of recommendation from his/her employer.
The letter must be on official letterhead and must state the applicant's full name, character, physical condition, experience, and address of premises where applicant will be employed.
4. Applicants must present two (2) forms of satisfactory identification i.e., driver's license and passport picture ID.
5. Applicants must possess a high school diploma or its equivalent plus three years of satisfactory experience in the manufacture, storage, transportation, delivery, and/or processing of liquefied natural gas, one of which must have been in a supervisory capacity.

APPLICATION INFORMATION

Application Fees: \$25.00 for originals and \$15.00 for renewals. The fee may be paid in cash, money order, or personal check payable to New York City Fire Department. The \$25.00 fee must be payable by all applicants prior to issuance of the Certificate of Fitness test. Application forms are available at the Public Certification Unit, 1st floor, 9 MetroTech Center, Brooklyn, NY 11201.

ADDITIONAL INFORMATION

Applicants must submit required documentation as per Memorandum of Understanding. The Memorandum of Understanding is available at the Public Certification Unit, 1st floor, 9 MetroTech Center, Brooklyn, NY 11201

This study material will help you prepare for the examination for the Certificate of Fitness to supervise Liquefied Natural Gas Plants (C-10). The study material includes information taken from the Rules of the City of New York §23-03 Manufacture, Storage, Transportation, Delivery and Processing of Liquefied Natural Gas. The study material does not contain all the information you need to know in order to perform the job of LNG plant supervisor. In addition to other requirements of the position of LNG plant supervisor, it is your responsibility to become familiar with all applicable rules and regulations of the State and City of New York, even if they are not covered in this material.

All questions on the Certificate of Fitness examination are multiple choice, with four alternative answers to each question. You are to select the ***best*** answer. The best answer ***may not be*** the ***most correct*** answer. If you do not answer a question or mark more than one alternative your answer will be scored as ***incorrect***. A score of **70%** correct is required on the examination in order to qualify for the Certificate of Fitness. Read each question carefully before marking your answer. There is no penalty for guessing.

Sample Questions

_____1. The first President of the United States was:

- (A) Bill Clinton.
- (B) Abraham Lincoln.
- (C) George Washington.
- (D) Ronald Reagan.

The correct answer is “C”. You would mark “C” on your answer sheet.

_____2. The capital of New York State is:

- (A) Albany.
- (B) Washington D.C.
- (C) New York City.
- (D) Buffalo.

The correct answer is “A”. You would mark “A” on your answer sheet.

This study material applies to all liquefied natural gas installations constructed and operated after 6/30/91. It also applies to the safety of operation, to alterations or redesign of existing facilities not covered under the existing regulations. It has applicability to the waterborne transportation and delivery of LNG as it relates to land based facilities. For topics not covered here, the Regulations of the Department of Transportation and the Public Service Commission of the State of New York, and NFPA 59A, 1975 should be consulted.

DEFINITIONS

Agency Having Jurisdiction. Agency having jurisdiction means the local authority having responsibility as mandated by the Charter and Administrative Code of the City of New York, for example, Fire Department, and the Department of Buildings.

Approved. Approved means the certified by the agency having jurisdiction for use or operation, after inspection, test or acceptance of documentation supporting the safety and/or effectiveness of the design, equipment or process.

Barge. Barge is a vessel, with or without its own propulsion system, inspected and approved by the U.S. Coast Guard for transportation and delivery of LNG on waterways within the port of New York.

Barrel. Barrel is the unit of volume equal to 42 U.S. gallons.

Berm. Berm is a concrete or compacted earth structure constructed directly against or closely surrounding the container to a height 10 % in excess of the design liquid level to serve as primary impounding area.

Deriming (defrosting or deicing). Deriming (defrosting or deicing) means the removal by heat and evaporation, sublimation or solution of accumulated matter, such as water and CO₂ from the low temperature process equipment.

Design Pressure. Design pressure is the pressure used in the design of equipment, container or vessel for the purpose of determining the minimum permissible thickness of physical of its different parts. When applicable, static heads must be included in the design pressure to determine the thickness of any specific part.

Dike. Dike is compacted earth, a concrete, or other non-combustible structure used to establish an impounding area suitable for containing the fluids involved.

Fail-Safe. Fail-safe is the design feature which provides for safe conditions in the event of malfunction of control devices, detection of fire or gas leak or interruption of any energy source.

Impounding area. Impounding area is an area which limits by dikes, berms or natural topography, the containment of spilled LNG, flammable refrigerants or other low flash liquids.

Incombustible or Non-combustible. Incombustible or non-combustible means a material which will not ignite and burn when subjected to fire. However, any material which releases flammable gases when heated to any temperature up to 1380° Fahrenheit for five minutes must not be considered non-combustible.

Installations. Installations include tanks, vaporization or liquefaction facilities, processing equipment, piping and associated loading and unloading facilities, and all fire protection.

Liquefied Natural Gas (LNG). Liquefied natural gas means a gas in the liquid state composed predominantly of methane and which may contain minor quantities of ethane, propane, nitrogen or other components common to natural gas.

Maximum Allowable Working Pressure. Maximum allowable working pressure means the maximum gage pressure permissible at the bottom of completed equipment, container or vessel in its operating position for a design temperature.

PSIA. PSIA is pounds per square inch absolute.

PSIG. PSIG is pounds per square inch gage.

Primary Components. Primary components, in general, include those whose failure would permit leakage of the liquid being stored; those exposed to a temperature between -60°F and -270°F, and those subject to thermal shock. The primary components must include, but not be limited to, the following parts of a double-wall tank; shell plates, bottom plates, knuckle plates, compression rings, shell stiffeners, manways, and nozzles including reinforcement shell anchors, pipe, tubing, forgings, and boltings on both inner and outer tank and the roof plates of the inner tank. All LNG liquid and vapor piping and fittings must be considered primary components.

Process Equipment. Process equipment means all systems required to condition, liquefy, or vaporize natural gas in all areas of application referred to in the regulations.

Risk Analysis. Risk analysis means a methodology of assessment of an identified hazard utilizing a systematic evaluation of failure modes, probabilities and consequences resulting in quantitative data supporting recommendations for corrective action.

Secondary Components. Secondary components, in general, include those which will normally not be in contact with the refrigerated liquid being stored, those exposed to product vapors and having a design metal temperature of -60°F or higher.

Service Building. Service building is a building used for office, maintenance, shops, electrical distribution, garage or storage.

Tanker (LNG). Tanker means an ocean-going vessel, inspected and approved by the U.S. Coast Guard for the transportation and delivery of LNG.

Tanks. Tanks means LNG storage vessels. LNG vessels or containers of more than 2,500 gallons in capacity operating at not more than 2.5 PSIG. Process, satellite, or similar tanks. LNG vessels or containers with a capacity of 2,500 gallons or less.

PLANT SITE

Minimum clearances must be maintained between LNG containers, flammable refrigerant storage tanks, flammable liquid storage tanks, building, structures and plant equipment, and plant property lines as prescribed in the chart of minimum distance requirements. Sitting tanks must be based on radiation and vapor dispersions studies made by competent authorities prior to approval of site plans in order to establish the minimum distance of the property line and to critical occupancies.

A thermal radiation and vapor dispersion study prepared by recognized experts in thermodynamics must be submitted. The experts should be selected by the owner and acceptable to the Fire Department. The study should include vapor dispersion characteristics resulting from spills caused by total failure modes of the storage tanks, or equipment, or piping. The study should show equilibrium temperatures within a radius of 1,500', 1,200', and 1,000', 800', 600', 500', 400', 300', 200', and 100' from flame surface (innertank wall) in events where an entire tank or group of tanks are involved in a fire.

A proposed site plan including all major characteristics of the site such as plant buildings, tanks, containers, dikes, process areas, transfer areas, major LNG piping, lot lines, shore lines, and exposure within 1,500' of lot lines must be filed with the Fire Department. The Fire Department may require aerial photos to be included with the proposed plan site.

LGN tanks, cold boxes, piping and supports, and other cryogenic equipment must be sited, designed and constructed in such a way that no damage from freezing or heaving of the soil will develop. The soil must be selected, prepared, and protected in accordance with the requirements of the Department of Ports and Trades or the Department of Buildings.

LNG plant sites must be protected from flooding, rains, high tides, or soil erosion by grading, draining and dikes. Grass, weeds, trees, or undergrowth must be cleared within 25 feet of any piping, container, or process equipment. A complete description of the facility must be filed along with the site plan. This description must include LNG tanks and sizes, method of liquefaction and vaporization, other method of acquiring LNG, and fire extinguishing systems. In addition a detailed analysis of the typical product to be stored must be included.