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16715
CG-OES Policy Letter
No. 02-15

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FEB 19 2015

To: Distribution

Subj: GUIDANCE RELATED TO VESSELS AND WATERFRONT FACILITIES CONDUCTING LIQUEFIED NATURAL GAS (LNG) MARINE FUEL TRANSFER (BUNKERING) OPERATIONS

Ref: (a) Title 33 Code of Federal Regulations (CFR) Parts 127, 155, and 156
(b) Title 46 CFR Subchapter D
(c) Marine Safety Manual Volume II
(d) COMDT (CG-521) Policy Letter 01-12 dated April 19, 2012
(e) COMDT (CG-OES) Policy Letter 01-15 dated 19 February, 2015

1. Purpose. This policy letter provides guidance to owners and operators of vessels and waterfront facilities intending to conduct Liquefied Natural Gas (LNG) fuel transfer operations, and Coast Guard Captains of the Ports (COTPs) who assess fuel transfer operations in accordance with references (a) through (c).

This policy letter identifies the minimum safety and security requirements outlined in the federal regulations for LNG fuel transfer operations conducted from vessels and facilities regulated by the Coast Guard, and provides guidance that may be used by COTPs assessing situations where the regulations are not applicable and/or are not appropriate for a specific operation being considered. The LNG transfer operations addressed in this policy letter include bulk liquid transfers conducted from tank vessels (tank ships and tank barges), waterfront facilities handling LNG in bulk (e.g. storage tanks, mobile tank trucks, and rail cars) and portable tanks containing LNG. It is not meant to limit or restrict owners and operators of vessels and waterfront facilities in any way from self-imposing additional requirements as deemed necessary, for their particular operation, to help ensure the safety of personnel and provide for a safe transfer of LNG.

This policy letter does not address LNG Deepwater Port facilities licensed under the Deepwater Port Act of 1974 (33 U.S.C. § 1501 – 1524), as amended, nor does it apply to facilities that handle liquefied hazardous gases other than LNG. Additionally, it does not address design of LNG fuel systems installed on vessels using LNG as fuel or the operations and training requirements for personnel on such vessels. Guidance associated with the design of LNG fuel systems and vessels using LNG as fuel is outlined in references (d) and (e).

This policy letter does not provide guidance on the use of other gaseous fuels such as Compressed Natural Gas (CNG) or Liquefied Petroleum Gas (LPG). At this time and unlike LNG, there appears to be little interest in the use of these commodities as a marine fuel. Accordingly, the Coast Guard will evaluate proposals for using these and other gaseous fuel systems on a case-by-case basis. Owners and operators interested in using gaseous fuels other than LNG should contact the Coast Guard's Office of Design and Engineering Standards (CG-ENG, formerly CG-521).

2. Action. Coast Guard COTPs assessing operations involving the transfer of LNG for use as fuel should refer to this policy letter for guidance in evaluating LNG fuel transfer operations in their COTP zones. Owners and operators of vessels and waterfront facilities conducting LNG transfer operations as well as owners and operators of vessels using LNG as fuel should be familiar with the contents of this policy letter.

3. Directives Affected. None.

4. Background.

a. On 1 August 2012, the North American Emission Control Area (ECA), as designated under the International Convention for the Prevention of Pollution from Ships, came into force. The ECA is intended to reduce air pollution and will impose enforceable limits on a variety of air emissions from vessels. When burned as fuel, LNG produces substantially lower air pollutants. Thus, in order to comply with these stricter emissions standards and realize economic advantages, there has been a growing interest by the maritime industry in converting and/or constructing vessels to use LNG as fuel.

b. The maritime industry is considering a variety of methods for supplying LNG to vessels for use as fuel. Such methods include, but are not limited to, supplies delivered from vessels (e.g. barges, and small tankers), or via shore based structures (e.g. storage tanks, mobile tank trucks, and rail cars).

c. To meet the growing demand for LNG marine fueling operations, international organizations (e.g., International Maritime Organization and the International Standards Organization) are working to develop guidelines that are intended to establish standardized infrastructure and operational procedures to help ensure LNG marine fuel transfer operations are conducted safely and uniformly in the global maritime community. However, these guidelines remain a work in progress while the maritime industry advances initiatives to design and build vessels of this type.

5. Discussion.

a. The Coast Guard developed this policy letter to assist owners, operators, and Coast Guard units understand the existing U.S. regulations that apply to various types of LNG fuel transfer operations currently being considered. In addition to existing regulations, the Coast Guard has

referred to applicable international guidance, and best available information relative to the ongoing work that is being conducted to develop international standards for LNG fueling operations.

b. Regulations for waterfront facilities handling LNG in bulk are contained in 33 CFR Part 127. Although written primarily to address large quantities of LNG imported or exported as cargo, it contains general regulations which are applicable where LNG is being transferred in bulk between vessels and shore-based structures, including tank trucks and rail cars.

c. Vessels transferring LNG for use as fuel are tank vessels carrying cargo and are regulated in accordance with 46 CFR Subchapter D and, in most cases, Subchapter O and 33 CFR Parts 155 and 156.[1] Owners of tank barges intending to transport LNG as cargo should contact the U.S. Coast Guard, Headquarters Office of Design and Engineering Standards, Commandant (CG-ENG) to discuss design requirements.

d. The regulations in 33 CFR Part 127 are issued under the Ports and Waterways Safety Act of 1972 (PWSA) (33 U.S.C. § 1221 – 1232), and apply to structures that are located in, on, or under the navigable waters of the United States or any structure on land, or any area on shore immediately adjacent to such waters, used or capable of being used to transfer LNG, in bulk, to or from a vessel. 33 C.F.R. § 127.001. Under the PWSA, the seaward limits of "navigable waters of the United States" are measured as 12 nautical miles from the territorial sea baseline of the United States. However, for jurisdictional purposes, waterfront facilities handling LNG in bulk must be located shoreward of a State's seaward boundary in order for 33 CFR Part 127 to apply.[2] Generally, State seaward boundaries extend 3 nautical miles from the territorial sea baseline; however, Texas, Puerto Rico, and the west coast of Florida have seaward boundaries that extend out to 9 nautical miles. Structures located beyond State seaward boundaries that are used or intended for use as a port or terminal for the transportation, storage or further handling of oil or natural gas to a State are considered deepwater ports and are regulated under 33 CFR Parts 148 – 150.

e. Enclosures (1) and (2) identify the existing regulations discussed in paragraphs (b) and (c) and provide recommendations which may be used by Coast Guard COTPs/OCMIs when evaluating alternatives for procedures, methods, or equipment as a means for complying with applicable regulations. Enclosure (3) lists current regulations found in 46 CFR parts 35 and 154 related to the operation of tank barges and tank ships. Enclosure (4) provides a non-exhaustive listing of alternatives which may be considered under 33 CFR § 127.017 for waterfront facilities handling LNG for use as fuel (e.g. LNG fuel facilities) in lieu of certain requirements in 33 CFR

[1] 33 CFR 156 Subpart B adopts the definition of hazardous material found at 33 CFR 154.105. This definition of hazardous material excludes liquefied gases, including LNG. However, regulations at 46 CFR Part 154 (Safety Standards for Self-Propelled Vessels Carrying Bulk Liquefied Gases) clarify that transfers of liquefied gases must meet certain requirements of 33 CFR Part 155, Subpart C, 33 CFR 156 Subpart A and reference (b).

[2] The Deepwater Port Act regulates structures located beyond State seaward boundaries that are used to handle natural gas for transportation to or from any State (see 33 U.S.C. § 1502, as amended).

Part 127. As used in the context of this document, the words "must" and "shall" are used in the context of mandatory requirements imposed by the Code of Federal Regulations (CFRs). The words "should" and "may" are used to describe a preferred option or describe alternatives respectively.

6. Disclaimer. While the guidance contained in this document may assist the industry, public, Coast Guard, and other Federal and State regulators in applying statutory and regulatory requirements, the guidance is not a substitute for applicable legal requirements nor is it a regulation itself. Thus, it is not intended to, nor does it, impose legally binding requirements on any party outside the Coast Guard.

7. Changes. This policy letter will be posted on the web at www.homeport.uscg.mil. Changes to this policy will be issued as necessary. Suggestions for improvements of this policy should be submitted in writing to Commandant (CG-OES) at the address listed on the first page.

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Encl: (1) Regulations and Recommendations for Waterfront Facilities Providing LNG as Fuel
(2) Regulations and Recommendations for Vessels Providing LNG as fuel (Bunkering Vessels)
(3) Operational Requirements found in 46 CFR Parts 35 and 154
(4) Table of Alternatives to 33 CFR Part 127 for LNG Fuel Facilities

Regulations and Recommendations for Waterfront Facilities Providing LNG as Vessel Fuel

This enclosure outlines the existing regulations applicable to various types of LNG bunkering operations performed from waterfront facilities handling LNG. LNG bunkering operations conducted by tank vessels (e.g., tank barges and tank ships) are addressed in enclosure (2).

Waterfront facilities handling LNG are subject to existing regulations at 33 CFR Part 127. These existing regulations should be applied to LNG bunkering activities to the extent practicable, without allowing alternatives. Where specific requirements are not practicable or where alternatives are otherwise appropriate, the Coast Guard Captain of the Port (COTP) should use the existing process in 33 CFR 127.017 to consider alternatives.

1. Regulations and Alternatives under 33 CFR Part 127

Section 127.005 defines a waterfront facility handling LNG to include any structure on, in, or under the navigable waters of the United States, or any structure on land, or any area on shore immediately adjacent to such waters, used or capable of being used to transfer liquefied natural gas, in bulk, to or from a vessel. The definition is further clarified in the Marine Safety Manual (see MSM Volume II, Section B, Chapter 7.C). It includes any pier, wharf, dock or similar structure to which a vessel may be secured that is used, or is capable of being used, to transfer LNG to or from a vessel, in bulk. It includes areas of land, water, or land and water under and in immediate proximity to the structure, buildings on or contiguous to the structure, and equipment and materials on the structure or in the buildings. Additionally, in discussing facilities and structures, the MSM defines "bulk" as a material that is transported on board a vessel without mark or count and which is directly loaded into a hold or tank on a vessel without containers or wrappers (see MSM Volume II, Section B, Chapter 7.B.2).

The regulations in 33 CFR Part 127 were established to ensure that a minimum level of safety is provided for LNG transfer operations conducted between shore structures and marine vessels. They outline requirements pertaining to general information, general design, equipment, operations, maintenance, firefighting, and security. Because the regulations could not account for all possible situations, they provide the Coast Guard COTP the ability to allow alternative procedures, methods, or equipment to be used in place of the regulatory requirements, if those alternatives provide at least the same degree of safety provided by the regulations. The procedures for considering alternatives are outlined in 33 CFR 127.017.

An owner or operator may request alternative procedures, methods, or equipment by following the request process outlined in 33 CFR 127.017. The request should identify the "gaps" where requirements cannot be met or are not appropriate, and should explain what alternatives the COTP should consider instead. Whenever possible, owners and operators should reference existing standards, practices, and procedures to help substantiate the request. A table providing guidance on possible alternatives to

requirements in 33 CFR Part 127 that the COTP can consider is provided as Enclosure (4).

a. LNG Tank Trucks and Railcars

Independently, LNG tank trucks and railcars are not considered waterfront facilities handling LNG. However, when trucks or railcars are used as a means for transferring LNG to a marine vessel, the location where the transfer occurs (i.e., any area on shore immediately adjacent to such waters, used or capable of being used to transfer liquefied natural gas, in bulk, to or from a vessel) becomes subject to the existing regulations at 33 CFR Part 127.[1] In addition to the requirements and alternatives discussed in the previous section, COTPs should be aware that tank trucks and rail cars are subject to additional, existing state and federal requirements.

Discussion

Any location where LNG tank trucks or railcars are used to transfer LNG to vessels for use as a marine fuel must be viewed and regulated as a waterfront facility handling LNG. The owner of the structure or area of land where the transfer occurs and the operator of the tank truck or railcar conducting the operation are jointly responsible for ensuring that the requirements in 33 CFR Part 127 are met if a LNG transfer takes place.

Tank trucks, railcars, and their associated equipment should meet applicable state and/or federal design requirements which they are normally required to meet. In general, the federal requirements for carriage of hazardous materials by highway and railway outlined in 49 CFR Parts 172, 173, 174, 177 and 179 will apply. Operators of tank trucks and/or railcars should meet the applicable state and/or federal requirements for training along with other operational requirements which may be imposed for persons in charge of a shoreside LNG transfer operation (e.g., 33 CFR 127.301 and 49 CFR 172.704).

Coast Guard jurisdiction of waterfront facilities handling LNG applies primarily over the marine transfer area for LNG as defined in 33 CFR 127.005. For the particular case at hand, this should generally be from the vessel to the last manifold or valve immediately before the tank truck or railcar and would normally include associated piping and transfer hoses. However due to this unique situation and potential for overlapping federal jurisdiction between the Coast Guard and the Department of Transportation, special consideration should be given to the Hazardous Materials Regulations (HMR) contained in 49 CFR Subtitle B, Chapter I, Subchapter C during development of the operations manual required by 33 CFR 127.019. Owners and operators intending to use tank trucks or rail cars as part of their LNG transfer operation should provide the COTP with a detailed list of requirements in the HMR that are applicable to their intended operation.

[1] See e.g., Coast Guard Marine Safety Manual, Volume II, Section B, Chapter 7: Marine Facilities and Structures, p. B7-6.

Typical tank trucks and railcars will typically carry around 13,000 gallons (49.2 m^3) and 34,500 gallons (130.6 m^3) of LNG respectively. These quantities are far less than the 265,000 m^3 cargo capacity vessels envisioned by the regulations. Accordingly, it would be appropriate for the COTP to consider alternatives for some of the requirements outlined in 33 CFR Part 127 when considering these types of operations. However, as noted previously, the regulations should be applied to the extent practicable utilizing the provisions in 33 CFR 127.017 allowing the COTP to consider alternatives. See the previous section for additional details on alternatives.

Facility owners and operators must ensure that all aspects of the tank truck and/or railcar operations are incorporated into the operational requirements contained in 33 CFR 127.301 to 127.321, which includes emergency response planning and fuel transfer operations. Owners and operators of facilities proposing to use tank trucks and/or rail cars should also ensure that the requirements listed below are taken into consideration when developing operations and emergency manuals and evaluating security risks associated with their LNG transfer operations:

49 CFR Part 172, Subpart G (172.600-172.606) – Emergency Response Information
49 CFR Part 172, Subpart H (172.700-172.704) – Training
49 CFR Part 172, Subpart I (172.800-172.822) – Safety and Security Plans
33 CFR Part 105 – Maritime Security Facilities

b. Storage Tanks Ashore

Storage tanks on shore with pipelines leading to a manifold at a pier may also meet the definition of a waterfront facility handling LNG, and if so would also be subject to 33 CFR Part 127. As discussed in the previous section on tank trucks and railcars, the quantity of LNG stored on shore may be far less than that envisioned by the regulations and in that regard may give rise to the need for consideration of alternatives under 33 CFR 127.017.

Discussion

Design requirements for the storage tanks, associated equipment, and piping systems outside the marine transfer area defined in 33 CFR 127.005 will be subject to local, state, or federal requirements depending on the details of the design. Unlike LNG import and export facilities which are subject to direct federal oversight from the Federal Energy Regulatory Commission (FERC), permitting of the siting, construction, and operation of smaller LNG bunkering facilities may be shared between a variety of federal, state, and local agencies. As required by 33 CFR127.007(c)(2), owners proposing these types of facilities should identify and consult with appropriate local, state and federal authorities to determine the applicable regulations which may apply. In the unlikely event that no local, state or federal authority having jurisdiction can be identified, COTPs should consult with the U.S. Coast Guard Headquarters, Office of Operating and Environmental Standards (CG-OES) for further discussion and guidance.

c. Vessels Moored to Shore-based Structures used to Transfer LNG

Vessels currently inspected under the regulations in Title 46 of the CFR are not considered waterfront facilities; however, craft that are permanently operated dockside and not inspected under Title 46 may be considered part of a waterfront facility. 33 CFR Part 127 will apply to such craft if they are located in the marine transfer area of a waterfront LNG facility, as defined in 33 CFR 127.005, including the alternatives provision (33 CFR 127.017).

d. Mobile LNG Tank Trucks Forming Part of a Vessel's Fuel Supply System

Mobile LNG tank trucks which are driven aboard a vessel for the purpose of acting as a fuel supply source are not covered by the regulations applicable to waterfront facilities in 33 CFR Part 127. Such installations would be subject to consideration under the regulations applicable to vessels found in Title 46 and may also be subject to consideration by the Department of Transportation concerning the applicable regulations for cargo tank motor vehicles in Title 49. Questions concerning the use of these types of fuel system installations should be directed to the U.S. Coast Guard Headquarters, Office of Design and Engineering Standards (CG-ENG). Operational components associated with this type of installation will require special consideration by the COTP.

e. LNG Delivered in Portable Tanks

The loading or unloading of portable LNG tanks to be used as a fuel source is not considered bunkering. In general, these operations should follow the stowage and handling requirements for portable tanks containing hazardous materials in 49 CFR Part 176. Specific details for stowage will need to be reviewed as part of the vessel's design approval process. LNG in portable tanks is a hazardous material listed in the 49 CFR 172.101 Hazardous Material Table. As such, these portable LNG tanks meet the definition of "Dangerous Cargo" in 33 CFR Part 126 and must be loaded from a Designated Waterfront Facility inspected under 33 CFR Part 126.

Questions concerning the use of these types of fuel system installations should be directed to the U.S. Coast Guard Headquarters, Office of Design and Engineering Standards (CG-ENG). Operational components associated with this type of installation will require special consideration by the COTP.

2. LNG Transfer Operations from Waterfront Facilities Handling LNG

Owners and operators of waterfront facilities handling LNG must ensure that LNG fuel transfer operations are conducted in accordance with all applicable safety regulations, including those contained in 33 CFR Part 127. Operations and emergency manuals must be developed as outlined in existing regulations at 33 CFR 127.305 and 127.307. The person in charge (PIC) of the shoreside transfer operation must meet the requirements of 33 CFR 127.301 and should meet additional training requirements established for tank trucks or railcars as applicable. The PIC must ensure the requirements outlined in 33

CFR 127.315 and 127.317 regarding preliminary transfer inspections and declaration of inspection are met. Coordination with the PIC of the vessel receiving LNG for use as fuel is extremely important and the operations manual should document procedures for interacting with vessel personnel. Additionally, transfer procedures for waterfront facilities handling LNG should include provisions to ensure the requirements listed in 33 CFR 127.315, 127.317, and 127.319 are met.

3. Vessel and Facility Compatibility Assessment

Compatibility assessments should be conducted by the facility owner to confirm the suitability of vessels and facilities participating in LNG fuel transfer operations. At a minimum, the compatibility assessment should evaluate the following, both ashore and aboard the receiving vessel:

Vessel and facility characteristics;

Manifold arrangements;

Cargo handling equipment;

Mooring arrangements;

Parallel mid-body and fendering arrangements;

Gas-safe areas;

Personnel transfer;

Emergency Shutdown Devices (ESDs) and communication systems;

Contingency planning and emergency procedures (note: the Society of International Gas Tankers and Terminal Operators (SIGTTO)) publication Contingency Planning for Marine Terminals Handling Liquefied Gases in Bulk may be a useful source of information);

Temperatures and pressure conditions;

Cargo transfer and ballast plans;

Vapor management capacity; and

Purging and inerting capability.

4. Waterway Suitability Assessment (WSA)

Waterfront facilities subject to requirements found in 33 CFR Part 127 also are subject to the WSA requirements contained in that part. In considering various design proposals that have been submitted to the Coast Guard, however, we have determined that the WSA

regulations were drafted for large LNG tankships and large waterfront facilities (e.g., those importing and exporting LNG as cargo). Elements of the WSA outlined in the regulations and guidance provided in Navigation and Inspection Circular 01-11 may not be appropriate for smaller waterfront facilities intending to conduct LNG bunkering operations.

A safety and security assessment which considers the scope and particulars of the proposed operation is still considered relevant, but the COTP has discretion to accept an alternative to the WSA required by regulation. For such purposes, standards of the International Organization for Standardization (ISO) or other recognized organizations may be used. ISO 28460:2010, *"Petroleum and Natural Gas Industries – Installation and Equipment for Liquefied Natural Gas – Ship-to-shore Interface and Port Operations"*, ISO/TS 16901: 2013, *"Guidelines on Performing Risk Assessments in the Design of Onshore LNG Installations Including the Ship/Shore Interface*", ISO 31010:2009, *"Risk Management – Guidelines on Principles and Implementation of Risk Management"*, ISO 17776:2000, *"Offshore Production Installations – Guidelines on Tools and Techniques and Risk Assessment"*, and ISO/TS 18683:2015, *"Guidelines for Systems and Installations for Supply of LNG to Ships"* may be used to help ensure a comprehensive safety and security assessment is completed. Such assessments may be considered by the COTP as an alternative to the WSA required by 33 CFR 127.007 and described in NVIC 01-11.

Facility owners and operators should be encouraged to seek the assistance of a third party familiar with the hazards associated with LNG and its impact on vessels, the marine environment, vessel personnel, and the public to assist them in preparing a safety and security assessment for their particular operation.

5. Security

Waterfront facilities handling LNG must meet the security requirements outlined in 33 CFR 127.701 through 127.711. As previously described, the COTP may consider alternatives in accordance with 33 CFR 127.017. In addition to the security requirements of 33 CFR Part 127, some security requirements imposed by the Maritime Transportation Security Act of 2002 (MTSA) outlined in 33 CFR Chapter I, Subchapter H also apply, including 33 CFR Part 105.

Similar to the consideration for alternatives provided in 33 CFR Part 127, equivalent security measures to the requirements outlined in 33 CFR Part 105 may be accepted by the Coast Guard in accordance with 33 CFR 101.130. Owners and operators of waterfront facilities who wish the Coast Guard to consider equivalent security measures should contact the U.S. Coast Guard Headquarters, Office of Facility Compliance (CG-FAC).

6. Job aides: In an attempt to globally standardize the procedures associated with LNG bunkering operations, several industry organizations have developed or are developing job aides that owners and operators of facilities providing LNG as fuel may find useful.

Names and links to some of the organizations and the information they provide are listed below:

(1) World Ports Climate Initiative (WPCI);
http://www.lngbunkering.org/

(2) Society of International Gas Tanker and Terminal Operators (SIGTTO);
http://www.sigtto.org/publications/publications-and-downloads; and

(3) International Organization for Standardization.
http://www.iso.org/iso/home.html

Owners and operators of facilities intending to transfer LNG for use as fuel are encouraged to become familiar with available industry standards and guidelines. Standards and Guidelines for Natural Gas Fueled Ships, produced by the LNG Ship Fuel Advisory Group and published on its behalf by SIGTTO and the Society for Gas as a Marine Fuel (SGMF) provides a comprehensive listing of the standards and guidelines that are currently available. The list may be viewed at the following web address:

http://www.sgmf.info/media/5637/standards-guidelines-natural-gas-fuelled-v5k1.pdf

Regulations and Recommendations for Vessels Providing LNG as Fuel (Bunkering Vessels)

This enclosure outlines the existing regulations applicable to vessels providing LNG for use as fuel, and the Coast Guard's recommendations for safe vessel-to-vessel transfer of LNG fuel. LNG transfer operations conducted from waterfront facilities are addressed in enclosure (1).

1. Source of Regulations and Recommendations in this Enclosure

Vessels providing bulk LNG for use as fuel meet the regulatory definition of tank vessels and must be designed in accordance with 46 CFR Subchapter D, 46 CFR Part 154, and/or, as an alternative to certain regulatory requirements, the equivalent design criteria specified by the Coast Guard in reference (d) of this policy letter. Questions concerning the design of tank vessels should be directed to the U.S. Coast Guard Headquarters, Office of Design and Engineering Standards (CG-ENG).

Existing operational requirements for tank vessels and personnel involved in transferring LNG from a tank vessel are outlined in 46 CFR Part 35, 46 CFR Subpart 38.15, 46 CFR Part 154, and 33 CFR Parts 155 and 156. Enclosure (3) provides a table indicating the applicable operational requirements for tank ships and tank barges carrying LNG that are listed in 46 CFR Parts 35 and 154. Owners and operators of vessels providing LNG as fuel, and Coast Guard Marine Safety personnel, should be familiar with these requirements.

The risk management information and vessel compatibility assessments discussed in this enclosure are based on recommendations established by the Society of International Gas Tanker and Terminal Operators Ltd (SIGTTO), in their Ship to Ship Transfer Guide for Petroleum, Chemicals, and Liquefied Gases, 1st Ed., 2013. Owners and operators are encouraged to use that publication to the greatest extent practicable and consistent with applicable law. The following International Organization for Standardization (ISO) standards may also be helpful resources: ISO 28460:2010, *"Petroleum and Natural Gas Industries – Installation and Equipment for Liquefied Natural Gas – Ship-to-shore Interface and Port Operations"*, ISO/TS 16901: 2013, *"Guidelines on Performing Risk Assessments in the Design of Onshore LNG Installations Including the Ship/Shore Interface*", ISO 31010:2009, *"Risk Management – Guidelines on Principles and Implementation of Risk Management"*, ISO 17776:2000, *"Offshore Production Installations – Guidelines on Tools and Techniques and Risk Assessment"*, and *ISO/TS 18683:2015, "Guidelines for Systems and Installations for Supply of LNG to Ships"*.

2. Risk Management

Vessel-to-vessel LNG fuel transfer operations are complex and have not been widely used in the United States and overseas. Accordingly, it is important to recognize and identify the unique elements which may be associated with such transfers.

The risk associated with any activity is a product of likelihood the (frequency) of an occurrence and its impact (consequence). Most normal activities involve a range of

potential risks, from frequent, low-impact risks to rare high-impact risks. The consequences resulting from a spill of LNG during a vessel-to-vessel transfer operation are potentially serious and effective mitigation measures should be put in place by the facility operator to reduce the likelihood of such an event occurring.

Owners and operators of vessels intending to conduct vessel-to-vessel transfers of LNG fuel should contact Commandant, U.S. Coast Guard Headquarters, Office of Operating and Environmental Standards, (CG-OES) for evaluation of the proposed operation on a case-by-case basis.

3. Vessel Compatibility Assessment

Vessel compatibility assessments should be conducted by facility owners to confirm the suitability of vessels participating in LNG fuel transfer operations. At minimum, vessel compatibility assessments should evaluate the following:

Vessel characteristics

Manifold arrangements

Cargo handling equipment

Mooring arrangements

Parallel mid-body and fendering arrangements

Gas-safe areas

Personnel transfer

Emergency Shutdown Device (ESD) and communication systems

Contingency planning and emergency procedures

Temperatures and pressure conditions in both vessels

Cargo transfer and ballast plans

Vapor management capacity of each vessel

Purging and inerting capability

4. Transfer Operations

a. Person In Charge (PIC) and Persons on Duty: As outlined in 46 CFR 35.35-1 and 46 CFR 154.1831, there must be enough Tankerman-PICs or restricted Tankerman-PICs and Tankerman-Assistants, authorized for LNG, on duty to safely conduct an LNG transfer. Additionally, each transfer of LNG, cool-down, warm-up, gas-free or air-out

must be supervised by a person designated as a PIC by name or position as outlined in 33 CFR 155.700.

b. Qualifications of PIC: Each operator or agent of the vessel, or the person who arranges or hires a person to be in charge of the LNG transfer must ensure that the PIC meets the qualifications listed in 33 CFR 155.710 for the type of vessel from which the transfer will occur.

c. Limitations of PIC: As outlined in 33 CFR 156.115, no person may serve as the PIC in charge of more than one transfer point (vessel or facility) unless authorized by the Coast Guard Captain of the Port (COTP).

d. Transfer Procedures: The operator of a vessel transferring LNG for use as fuel must provide transfer procedures that meet the requirements of 33 CFR 155.720 through 155.760 and 33 CFR Part 156. In accordance with 33 CFR 155.740, the transfer procedures must be available for inspection by the COTP whenever the vessel is in operation, legibly printed in a language understood by personnel involved in the transfer, and permanently posted or available where they can be seen and used by personnel engaged in the transfer.

e. Content of Transfer Procedures: To the extent that they apply, the items listed in 33 CFR 155.750 must be included in the vessel's transfer procedures. Recognizing that the transfer procedures outlined in the regulations were not developed specifically with LNG transfer operations in mind, operators are encouraged to augment the procedures with information that is specific to their intended operation. Guidance provided by SIGTTO and/or the Swedish Marine Technology Forum (SMTF) concerning LNG ship-to-ship bunkering operations should be reviewed and considered when developing LNG transfer procedures. Guidance provided by these organizations may help encourage certain best practices and can help ensure that proper actions are taken by personnel involved in LNG transfer operations. Owners and operators of vessels intending to conduct LNG transfer operations are encouraged to review and incorporate the guidance they provide into their transfer procedures. The SMTF ship-to-ship bunkering procedure document can be viewed on the World Wide Web at the link below.

http://www.smtf.se/fileadmin/documents/LNG02_projektrapport_appendix_www.pdf

Information available from SIGTTO may be viewed at the following link:

http://www.sigtto.org/Publications/Publications-and-downloads

Due to the variation and complexity of LNG fuel transfer systems that can exist aboard vessels using LNG as fuel, operators of vessels supplying LNG should develop LNG transfer procedures that are specific to each vessel they intend to service. Operators of both vessels (supplier and end user) should work together to ensure that the transfer procedures are aligned, equipment is in place and actions of personnel involved in the transfer are clearly understood. Meetings, walk throughs, and dry transfer drills are encouraged and should be conducted well in advance of the first liquid cargo transfer.

LNG transfer drills should be conducted at regular intervals (e.g. quarterly) and incorporated into the vessel's drills and training program to ensure that a safe transfer can be conducted by all personnel involved in the transfer.

f. Advance notice of transfer: No person should conduct a transfer operation involving LNG without providing advance notice to the local COTP. The operator of a vessel intending to provide LNG as fuel to a vessel in a vessel-to-vessel transfer operation should notify the COTP as to the time and place of the transfer operation at least 4 hours before it begins. A COTP may impose such requirements in accordance with 33 CFR 156.118.

g. Requirements for transfer: A transfer is considered to begin when the person in charge of the transferring vessel or facility and the person in charge on the receiving facility or vessel first meet to begin completing the declaration of inspection, required by 33 CFR 156.150. No person shall conduct an LNG transfer operation unless the applicable requirements of 33 CFR 156.120 are met.

h. Conduct before a LNG Fuel Transfer: Before transferring LNG to a vessel for use as fuel, the person in charge of transferring LNG should:

(1) Inspect the accessible portions of the transfer piping system and equipment to be used during the transfer and ensure that any worn or inoperable parts are replaced;

(2) Review and agree with the person in charge of receiving LNG as to:

(i) The sequence of transfer operations;
(ii) The transfer rate;
(iii) The duties, location, and watches of each person assigned for transfer operations;
(iv) Emergency procedures; and
(v) For each of the tanks to which LNG will be transferred, note the pressure, temperature, and volume to ensure that they are safe for transfer to the vessel's tanks and piping systems;

(3) Ensure that transfer connections allow the vessel to move to the limits of its moorings without placing strain on the loading arm or transfer piping system;

(4) Ensure that each part of the transfer system is aligned to allow the flow of LNG to the desired location;

(5) Ensure that the LNG fuel transfer piping and hose connections are tight and free of any leaks prior to the transfer of LNG. This may be accomplished by pressurizing the system with an inert gas or other means;

(6) Ensure that warning signs are displayed;

(7) Eliminate all ignition sources in the transfer area;

(8) Ensure that personnel are on duty in accordance with the LNG fuel transfer system operations manual;

(9) Ensure firefighting equipment is ready for use; and

(10) Test the following to determine that they are operable:

(i) The sensing and alarm systems;
(ii) The emergency shutdown system; and
(iii) The communication systems.

i. Conduct during a LNG Fuel Transfer: During the LNG fuel transfer operation, the person in charge of transferring LNG should:

(1) Be in continuous communication with the person in charge of receiving LNG on the vessel;

(2) Ensure that an inspection of the transfer piping and equipment for leaks, defects, and other symptoms of safety and operational problems is conducted at regular intervals during transfer; and

(3) Ensure that the transfer operations are discontinued before electrical storms or upon notification of any contingency identified in the emergency manual.

j. Conduct after a LNG Fuel Transfer: After a LNG fuel transfer, the person in charge of transferring LNG should ensure that the hoses, manifold, and piping used during the transfer operation are:

(1) Properly drained and inerted to ensure natural gas levels are below the lower flammability level prior to disconnecting;

(2) Free of residual LNG; and

(3) Securely blanked.

k. Job aides: In an attempt to establish global standards for the procedures associated with LNG bunkering operations, several industry organizations have developed or are developing job aides that owners and operators of vessels providing LNG as fuel may find useful. Names and links to some of the organizations and the information they provide are listed below:

(1) World Ports Climate Initiative (WPCI);
http://www.lngbunkering.org/

(2) Society of Inrenational Gas Tanker and Terminal Operators (SIGTTO);
http://www.sigtto.org/publications/publications-and-downloads; and

(3) International Organization for Standardization.
http://www.iso.org/iso/home.html

Owners and operators of vessels intending to bunker LNG are encouraged to become familiar with available industry standards and guidelines. Standards and Guidelines for Natural Gas Fueled Ships, produced by the LNG Ship Fuel Advisory Group and published on its behalf by SIGTTO and the Society for Gas as a Marine Fuel (SGMF) provides a comprehensive listing of the standards and guidelines that are currently available. The list may be viewed at the following web address:

http://www.sgmf.info/media/5637/standards-guidelines-natural-gas-fuelled-v5k1.pdf

5. Equipment

a. Firefighting Equipment: Vessels providing LNG as fuel should be outfitted with firefighting equipment capable of effectively handling an incident involving LNG. In evaluating the risks and hazards for a particular operation, owners and operators should identify the firefighting equipment required. Where firefighting equipment is not specified by regulations, or where it is considered ineffective based on the regulations specified, owners and operators should consider providing equipment that will reduce the risk and potential for a fire to occur, and, if one were to occur, will ensure appropriate first response assets are available to provide for an appropriate response to such an event. A beneficial source of information related to the management of liquefied gas fire hazards, including liquefied gas fire prevention and fire fighting, is SIGTTO's publication, "*Liquefied Gas Fire Hazard Management, (2004).*"

b. Emergency Shutdown: As outlined in 46 CFR 154.1866, cargo transfer hose connections should comply with the requirements outlined in 46 CFR 154.538 and all machinery associated with cargo loading, unloading, or cooling should be capable of being shut down from a remote location. An emergency shutdown system should be provided for the LNG fuel transfer system at each transfer control location. The system should be capable of manual, remote, and automatic operation of the shutdown valve required in International Maritime Organization (IMO) Resolution MSC.285(86), Section 2.9.2.2, and may be integrated with the safety systems described in 46 CFR 62.35-50.

The remotely operated valve should shutdown upon:

(1) Manual activation of the emergency shutdown system from the transfer control location; and

(2) Automatic activation by the vessel's:

(i) Gas detection system;

(ii) Fire detection system; and

(iii) High fuel tank level detection system.

c. LNG Fuel Transfer Hoses: LNG fuel transfer hoses stored on the vessel for the purpose of transferring LNG should meet the requirements of 46 CFR 154.551.

Transfer hose connections should include provisions to prevent electrical flow during connection or disconnection of the transfer hose string through the hose string or the loading arm. This can be accomplished by the insertion of one short length of non-conducting hose without internal bonding in each hose string, or installation of an insulating flange.

Note: Each transfer hose string should contain only one electrically discontinuous length of hose or insulating flange, to prevent electrostatic build-up in the hose string.

d. LNG Bunkering Manifold: The LNG bunkering manifold should be designed to withstand the external loads during bunkering. The connections at the bunkering station should be of a dry-disconnect type equipped with additional safety dry break-away coupling/self-sealing quick release. Questions concerning the design of LNG bunkering stations should be directed to the U.S. Coast Guard, Headquarters, Office of Design and Engineering Standards, Commandant (CG-ENG).

e. Radio and Communication Equipment: Radio and communication equipment should meet the following specifications:

(1) Radio and communication equipment with antennas located where flammable gas may accumulate should be secured prior to transfer;

(2) Portable radio devices for use during the LNG fuel transfer operations should be tested and listed or certified intrinsically safe (UL 913 or IEC 60079-11, Ex "ia") by an independent laboratory accepted by the Commandant under 46 CFR part 159;

(3) Portable electronic devices such as mobile phones, cameras, and other devices using batteries should not be allowed in hazardous areas unless they are listed or certified intrinsically safe (UL 913 or IEC 60079-11, Ex "ia") by an independent laboratory accepted by the Commandant under 46 CFR part 159; and

(4) Antennas of radio and communication equipment should be located in non-hazardous locations when possible. The antenna location should not pose an obstruction to helicopter landing areas, platform cranes, or other unit operations and antenna feed lines should be protected from possible physical damage.

f. Deck Lighting: A vessel engaged in transfer operations between sunset and sunrise should have deck lighting that illuminates the transfer area, and is suitable for service in the intended location including meeting any applicable hazardous area equipment requirements. Lighting should be located or shielded so as not to mislead or otherwise interfere with navigation on the adjacent waterways. Lighting should adequately illuminate:

(1) Each transfer operation's work area and each transfer connection point in use on the vessel; and

(2) Each transfer operation's work area and each transfer connection point in use in the transfer system transferring to the vessel.

Where the illumination is apparently inadequate, the OCMI/COTP may require verification by instrument of the levels of illumination. On a horizontal plane 3 feet above the deck the illumination should measure at least 5.0 foot-candles at transfer connection points; and 1.0 foot-candle in transfer operations work areas.

g. Personnel Protection: Each owner or operator of a vessel transferring LNG should provide personal protective equipment to protect personnel involved with LNG handling and transfer operations from exposure to fire and cryogenic liquid. The following personal protective equipment should be provided in a place where it is readily available to personnel:

(1) Gloves;

(2) Full face shields;

(3) Fit-for-purpose clothing;

(4) Protective footwear such as leather, steel-toed work boots (no canvas sneakers should be worn during LNG fuel transfer operations); and

(5) Hard hats.

h. Portable Gas Detectors: Owners and operators of vessels transferring LNG should ensure that two portable gas detectors capable of measuring 0-100% of the lower flammable limit of methane are readily available for use by personnel engaged in LNG fuel transfer operations.

Operational Requirements Found in 46 CFR Parts 35 and 154

46 CFR PART 35—OPERATIONS (TS = Tank Ships TB = Tank Barges)		
Subpart 35.01—General Provisions; Special Operating Requirements	**TS**	**TB**
§ 35.01-1 Inspection and testing required when making alterations, repairs, or other such operations involving riveting, welding, burning, or like fire-producing actions	X	X
§ 35.01-5 Sanitary condition and crew quarters	X	
§ 35.01-10 Shipping papers	X	X
§ 35.01-15 Carriage of persons other than crew	X	X
§ 35.01-25 Sacrificial anode installations	X	X
§ 35.01-35 Repairs and alterations to firefighting equipment	X	X
§ 35.01-45 Open hopper type barges		X
§ 35.01-50 Special operating requirements for tank barges carrying certain dangerous bulk cargoes		X
§ 35.01-55 Pilot boarding operation.	X	
§ 35.01-60 Person excluded.	X	
Subpart 35.03—Work Vests	**TS**	**TB**
§ 35.03-1 Application	X	X
§ 35.03-5 Approved types of work vests	X	X
§ 35.03-10 Use	X	X
§ 35.03-15 Shipboard stowage	X	X
§ 35.03-20 Shipboard inspections	X	X
§ 35.03-25 Additional requirements for hybrid work vests.	X	X
Subpart 35.05—Officers and Crews	**TS**	**TB**
§ 35.05-15 Tank vessel security	X	X
§ 35.05-20 Physical condition of crew	X	X
§ 35.05-25 Illness, alcohol, drugs	X	X
Subpart 35.07—Logbook Entries	**TS**	**TB**
§ 35.07-1 Application	X	X
§ 35.07-5 Logbooks and records	X	X
§ 35.07-5 Logbooks and records	X	X
Subpart 35.08—Stability Information	**TS**	**TB**
§ 35.08-1 Posting of stability letter.	X	X
Subpart 35.10—Fire and Emergency Requirements	**TS**	**TB**
§ 35.10-1 Emergency training, musters, and drills	X	
§ 35.10-3 Display of plans	X	X
§ 35.10-5 Muster lists, emergency signals, and manning	X	
§ 35.10-15 Emergency lighting and power systems	X	
Subpart 35.15—Notice and Reporting of Casualty and Voyage Records	**TS**	**TB**
§ 35.15-1 Notice and reporting of casualty and voyage records	X	X
Subpart 35.20—Navigation	**TS**	**TB**
§ 35.20-1 Notice to mariners; aids to navigation	X	
§ 35.20-5 Draft of tankships	X	
§ 35.20-7 Verification of vessel compliance with applicable stability requirements	X	X
§ 35.20-10 Steering gear test	X	
§ 35.20-20 Master's and officer's responsibility	X	X
§ 35.20-30 Flashing the rays of a searchlight or other blinding light	X	
§ 35.20-35 Whistling	X	
§ 35.20-40 Maneuvering characteristics	X	
§ 35.20-45 Use of Auto Pilot	X	

46 CFR PART 35—OPERATIONS (TS = Tank Ships TB = Tank Barges)		
Subpart 35.25—Engine Department	**TS**	**TB**
§ 35.25-1 Examination of boilers and machinery by engineer	X	
§ 35.25-10 Requirements for fuel oil	X	
Subpart 35.30—General Safety Rules	**TS**	**TB**
§ 35.30-1 Warning signals and signs	X	X
§ 35.30-5 Fires, matches, and smoking	X	X
§ 35.30-10 Cargo tank hatches, ullage holes, and Butterworth plates	X	X
§ 35.30-15 Combustible gas indicator	X	X
§ 35.30-20 Emergency equipment	X	X
§ 35.30-25 Explosives	X	X
§ 35.30-30 Portable electric equipment	X	X
§ 35.30-35 Spark producing devices	X	X
§ 35.30-40 Flammable liquid and gas fuels as ship's stores	X	X
Subpart 35.35—Cargo Handling	**TS**	**TB**
§ 35.35-1 Persons on duty	X	X
§ 35.35-5 Electric bonding	X	X
§ 35.35-10 Closing of freeing-ports, scuppers, and sea valves	X	X
§ 35.35-15 Connecting for cargo transfer	X	X
§ 35.35-20 Inspection before transfer of cargo	X	X
§ 35.35-25 Approval to start transfer of cargo	X	X
§ 35.35-30 “Declaration of Inspection” for tank vessels	X	X
§ 35.35-35 Duties of person in charge of transfer	X	X
§ 35.35-40 Conditions under which transfer operations shall not be commenced or if started shall be discontinued	X	X
§ 35.35-42 Restrictions on vessels alongside a tank vessel loading or unloading cargo of Grade A, B, or C	X	X
§ 35.35-45 Auxiliary steam, air, or electric current		X
§ 35.35-50 Termination of transfer operations		X
§ 35.35-55 Transfer of other cargo or stores on tank vessels	X	X
§ 35.35-60 Transportation of other cargo or stores on tank barges	X	X
§ 35.35-70 Maintenance of cargo handling equipment	X	X
§ 35.35-75 Emergencies	X	X
§ 35.35-85 Air compressors	X	X
Subpart 35.40—Posting and Marking Requirements	**TS**	**TB**
§ 35.40-1 General alarm contact maker	X	X
§ 35.40-5 General alarm bells	X	X
§ 35.40-6 Emergency lights	X	X
§ 35.40-7 Carbon dioxide and clean agent alarms	X	
§ 35.40-8 Carbon dioxide warning signs	X	
§ 35.40-10 Steam, foam, carbon dioxide, or clean agent fire smothering apparatus	X	X
§ 35.40-15 Fire hose stations	X	X
§ 35.40-17 Foam hose/monitor stations	X	
§ 35.40-18 Water spray systems	X	X
§ 35.40-20 Emergency equipment	X	X
§ 35.40-25 Fire extinguishers	X	X
§ 35.40-30 Instructions for changing steering gear	X	X
§ 35.40-35 Rudder orders	X	X
§ 35.40-40 Marking and instructions for fire and emergency equipment	X	X

46 CFR PART 154 —SAFETY STANDARDS FOR SELF-PROPELLED VESSELS CARRYING BULK LIQUEFIED GASES
Subpart E - Operations
§ 154.1800 Special operating requirements under Part 35 of this chapter.
§ 154.1801 Certificates, letters, and endorsements: U.S. flag vessels.
§ 154.1802 Certificates, letters and endorsements: Foreign flag vessels.
§ 154.1803 Expiration of Certificates of Compliance.
§ 154.1804 Document posted in wheelhouse.
§ 154.1806 Regulations on board.
§ 154.1808 Limitations in the endorsement.
§ 154.1809 Loading and stability manual.
§ 154.1810 Cargo manual.
§ 154.1812 Operational information for terminal personnel.
§ 154.1814 Cargo information cards.
§ 154.1816 Cargo location plan.
§ 154.1818 Certification of inhibition.
§ 154.1820 Shipping document.
§ 154.1822 Shipping document: Copy for transfer terminal.
§ 154.1824 Obstruction of pumproom ladderways.
§ 154.1826 Opening of cargo tanks and cargo sampling.
§ 154.1828 Spaces containing cargo vapor: Entry.
§ 154.1830 Warning sign.
§ 154.1831 Persons in charge of transferring liquid cargo in bulk or preparing cargo tanks.
§ 154.1834 Cargo transfer piping.
§ 154.1836 Vapor venting as a means of cargo tank pressure and temperature control.
§ 154.1838 Discharge by gas pressurization.
§ 154.1840 Protective clothing.
§ 154.1842 Cargo system: Controls and alarms.
§ 154.1844 Cargo tanks: Filling limits.
§ 154.1846 Relief valves: Changing set pressure.
§ 154.1848 Inerting.
§ 154.1850 Entering cargo handling spaces.
§ 154.1852 Air breathing equipment.
§ 154.1854 Methane (LNG) as fuel.
§ 154.1858 Cargo hose.
§ 154.1860 Integral tanks: Cargo colder than −10 °C (14 °F).
§ 154.1862 Posting of speed reduction.
§ 154.1864 Vessel speed within speed reduction.
§ 154.1866 Cargo hose connection: Transferring cargo.
§ 154.1868 Portable blowers in personnel access openings.
§ 154.1868 Portable blowers in personnel access openings.
§ 154.1872 Cargo emergency jettisoning.

Table of Alternatives to 33 CFR Part 127 for LNG Fuel Facilities

In accordance with 33 CFR § 127.017, Captains of the Port (COTP) may allow operators to use alternative procedures, methods, or equipment standards instead of the requirements contained in 33 CFR Part 127. The table below outlines alternatives to the requirements in 33 CFR Part 127 which may be considered in lieu of the requirements in 33 CFR Part 127 for waterfront facilities dedicated only for handling LNG for use as fuel. The list of items identified and discussed below is not binding in anyway and alternatives other than those specified may be considered by the local COTP. COTPs should not approve alternative requests for those requirements in 33 CFR Part 127 that are not listed in the table below, and the requirements should be enforced as written.

33 CFR Part 127	**Alternatives**
§ 127.003 Incorporation by reference.	Use of the most current edition of standards available to the public may be allowed in lieu of those incorporated by reference if they can be shown to provide at least the same degree of safety to the edition specified. Coast Guard Headquarters has confirmed that the following revised standards are at least equivalent to those specified by the regulations: ANSI B16.5, Pipe Flanges and Flanged Fittings (2013); ANSI/ISA 12.13.0, Part 29-1: Gas detectors - Performance requirements of detectors for flammable gases (2013); API RP 2003, Protection Against Ignitions Arising Out of Static, Lightning and Stray Currents (2008); ASME B31.3, Process Piping (2012); ASTM F 1121–87 Standard Specification for International Shore Connections for Marine Fire Applications (2010); NFPA 10, Standards for Portable Fire Extinguishers (2010); NFPA 30, Flammable and Combustible Liquids Code (2012); NFPA 51B, Standard for Fire Prevention During Welding, Cutting and Other Hot Work (2014); NFPA 59A, Production, Storage, and Handling of Liquefied Natural Gas (LNG) (2013); NFPA 70, National Electrical Code (2014); NFPA 251, Standard Methods of tests of Fire Endurance of Building Construction and Materials (2006).
§ 127.007 Letter of intent and waterway suitability assessment.	LOI, Preliminary WSA, and Follow-on WSA should be provided as required by the regulations and contain details of the information specified in 33 CFR 127.007(c), (f), and (g). If a waterway will not be used as a means for delivering LNG to the facility, an operational risk assessment which analyzes safety and security associated with the anticipated shore based operations within the marine transfer area should be performed in lieu of a detailed analysis of the waterway. The risk assessment required by 33 CFR 127.007(f)(2)(iii) should be conducted by an entity that is familiar with conducting risk assessments concerning safety and security of LNG operations and should be conducted in accordance with industry standards, guidelines and/or recommended practices for risk assessment established by a recognized organization. For this purpose, a number of organizations have published guidance which may be used. Such organizations include, but are not limited to the following: the National Fire Protection Association (NFPA), the International Organization for Standardization (ISO), the Society of

	International Gas Tanker and Terminal Operators (SIGTTO), and Recognized Classification Societies (e.g. ABS, DNV-GL, LR)
§ 127.101 Design and construction: General.	NFPA 59A (2013), Chapters 5, 9, 10, 11 and 13 as applicable and/or NFPA 52 (2013), Vehicular Gaseous Fuel Systems Code, Chapter 10 and 13 as applicable.
§ 127.103 Piers and wharves.	NFPA 59A (2013), Chapter 11, Section 11.5.1.
§ 127.105 Layout and spacing of marine transfer area for LNG.	NFPA 59A (2013), Chapter 5, Sections 5.3.7.1 and 5.3.7.2, NFPA 52 (2013), Chapter 10, Sections 10.2.2 and 10.2.3
§ 127.107 Electrical power systems.	NFPA 59A (2013), Chapter 4, Section 4.4 and NFPA 70, Section 700.12.
§ 127.109 Lighting Systems.	33 CFR 154.570 or 33 CFR 155.790.
§ 127.111 Communications systems.	NFPA 59A (2013), Chapter 11, Sections 11.9.1, 11.9.3, and 11.9.4, or 33 CFR 154.560, or 33 CFR 155.785.
§ 127.113 Warning signs.	NFPA 52 (2013), Chapter 12, Section 12.8.
§ 127.201 Sensing and alarm systems.	NFPA 52 (2013), Chapter 10, Section 10.3.7 and Chapter 12, Section 12.6.
§ 127.205 Emergency shutdown.	Should comply with 127.205 and NFPA 52 (2013), Chapter 10, Sections 10.8.4 and 10.11.3. If installed as part of a vehicle dispensing system, should comply with NFPA 52 (2013), Chapter 10, Sections 10.4.2 and 10.4.3.
§ 127.301 Persons in charge of shoreside transfer operations: Qualifications and certification.	NFPA 59A (2013), Chapter 14, Section 14.9.5.
§ 127.305 Operations Manual.	NFPA 59A (2013), Chapter 14, Section 14.3
§ 127.307 Emergency Manual.	NFPA 59A (2013), Chapter 14, Section 14.4 and NFPA 52 (2013), Chapter 12, Sections 12.2.2 and 12.2.3. If road or rail vehicles are used, emergency procedures should also satisfy applicable requirements of local, state, and or federal agencies.
§ 127.311 Motor vehicles.	Should meet 33 CFR 127.311 and if road vehicles are used to transfer LNG should meet NFPA 52 (2013), Chapter 10, Sections 10.3.9 through 10.3.12 and Chapter 12, Sections 12.3.3 through 12.3.5.
§ 127.315 Preliminary transfer inspection.	NFPA 59A (2013), Chapter 14, Section 14.6.7.2 through 14.6.7.2.3
§ 127.317 Declaration of inspection.	NFPA 59A (2013), Chapter 14, Section 14.6.7.2.4
§ 127.319 LNG transfer.	NFPA 59A (2013), Chapter 14, Section 14.6.7.2.
§ 127.401 Maintenance: General.	NFPA 52 (2013), Chapter 10, Section 10.13.
§ 127.503 Training: General.	NFPA 59A (2013), Chapter 14, Section 14.9.5. If road or rail vehicles are used they must also comply with local, state, and federal regulations.
§ 127.601 Fire equipment: General.	NFPA 52 (2013), Chapter 10, Section 10.3.7.1 and Chapter 12, Section 12.2, and the operator should provide written confirmation to the COTP that the level of fire protection provided is acceptable to the local authority having jurisdiction for response, control, and extinguishment of a fire at the facility.
§ 127.603 Portable fire extinguishers.	NFPA 52 (2013), Chapter 10, Section 10.3.7.1 and Chapter 12, Section 12.2 and provide written documentation to the COTP that the level of fire protection provided is acceptable to the local authority having jurisdiction for response, control, and extinguishment of a fire at the LNG fuel facility.
§ 127.605 Emergency	NFPA 52 (2013), Chapter 10, Section 10.3.7.1 and Chapter 12, Section

outfits.	12.2 and provide written documentation to the COTP that the level of fire protection provided is acceptable to the local authority having jurisdiction for response, control, and extinguishment of a fire at the LNG fuel facility.
§ 127.607 Fire main systems.	NFPA 52 (2013), Chapter 10, Section 10.3.7.1 and Chapter 12, Section and provide written documentation to the COTP that the level of fire protection provided is acceptable to the local authority having jurisdiction for response, control, and extinguishment of a fire at the LNG fuel facility.
§ 127.609 Dry chemical systems.	NFPA 52 (2013), Chapter 10, Section 10.3.7.1 and Chapter 12, Section 12.2 and provide written documentation to the COTP that the level of fire protection provided is acceptable to the local authority having jurisdiction for response, control, and extinguishment of a fire at the LNG fuel facility.
33 CFR Part 105: Maritime Security: Facilities	Although outside the scope of this Enclosure, 33 CFR Part 105 applies to waterfront facilities handling LNG that are subject to 33 CFR Parts 126 and 127. Any facility owner or operator subject to the requirements of 33 CFR Part 105 may request a waiver of those requirements as outlined in 33 CFR § 105.130. Additional safety and security requirements may be imposed on road or rail vehicles carrying LNG by local, state, or other federal agencies.