

# The Care and Handling of Liquefied Natural Gas

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**Back by popular demand: Chemical of the Quarter.**

*In response to reader requests, we're reviving this feature, with a new focus—you. We'll be taking a look at chemicals from the mariner's perspective, answering the questions:*

• **What is it?** • **Why should I care?** • **What's the Coast Guard doing about it?**  
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## What is it?

Natural gas is a flammable gas that we use to heat our homes, cook our food, and make electricity. It may, in the future, also power our cars. It is made up of over 90 percent methane. The United States no longer produces enough natural gas to meet our needs, so we import it as liquefied natural gas (LNG) in tank ships from countries thousands of miles away.

## How is it shipped?

LNG's main component, methane, is the lightest of the hydrocarbons. It has only one carbon. LPG (liquefied petroleum gas), or "bottled gas," is a heavier gas that can be liquefied under pressure or by refrigeration. Gasoline is heavier still, containing between 5-12 carbons, and is a liquid at room temperature.

Natural gas must be converted into a liquid before you can put it on a ship. If you didn't, you'd need 600 ships to carry the same amount as a gas!

By its nature, natural gas cannot be liquefied by compressing it—no matter how much you compress it. It must be cooled to below its boiling point (-258°F) before it can be placed in ships' cargo holds as liquefied natural gas.

## Why should I care?

### ► Shipping concerns

Engineers design LNG tank ships with special metals and materials placed where LNG makes contact with parts of the ship (cargo tanks, pumps, piping). They do this because LNG is so cold that it will immediately crack ordinary steels—like the ship's deck—so precautions to prevent spills onto the ship's deck need to be followed. For example, whenever you make or break a line you need to put a drip pan made of a material that

is not brittle at LNG temperatures underneath. Aluminum makes a great drip pan.

### ► Health concerns

As noted, LNG is extremely cold, and will freeze and kill skin (in other words, give you frostbite) if you get even a small amount on you. Additionally, LNG is an asphyxiation concern in unventilated areas; as it vaporizes, it pushes air out of the space. Great care needs to be taken when entering an area containing LNG that does not receive air exchanges on a timely basis.

### ► Fire or explosion concerns

LNG is very flammable. If spilled on water, it will quickly boil off and form a potentially flammable vapor cloud. If it catches fire (on land or water), it will rapidly burn with a tall, hot flame.

Does that mean that an LNG ship is a "floating bomb"? No. LNG won't burn unless it is a vapor, and only then if it is diluted to between five and 15 percent LNG vapor in air. LNG does not explode, even if it catches fire.

## What's the Coast Guard doing about it?

LNG's safety record is excellent, due to the high safety standards that have been implemented throughout the industry. The Coast Guard normally escorts LNG carriers in and around ports and also routinely creates a restricted area around moving LNG tank ships and shoreside terminals.

### About the author:

*Dr. Schneider is a chemical engineer who has worked in hazardous materials and fire protection in the Coast Guard for the past 35 years. He currently works in such diverse areas as developing domestic and foreign bulk cargo classification, chemical compatibility, chemical databases such as the chemical hazards response information systems, weapons of mass destruction, liquefied natural gas, and hazardous spill response.*