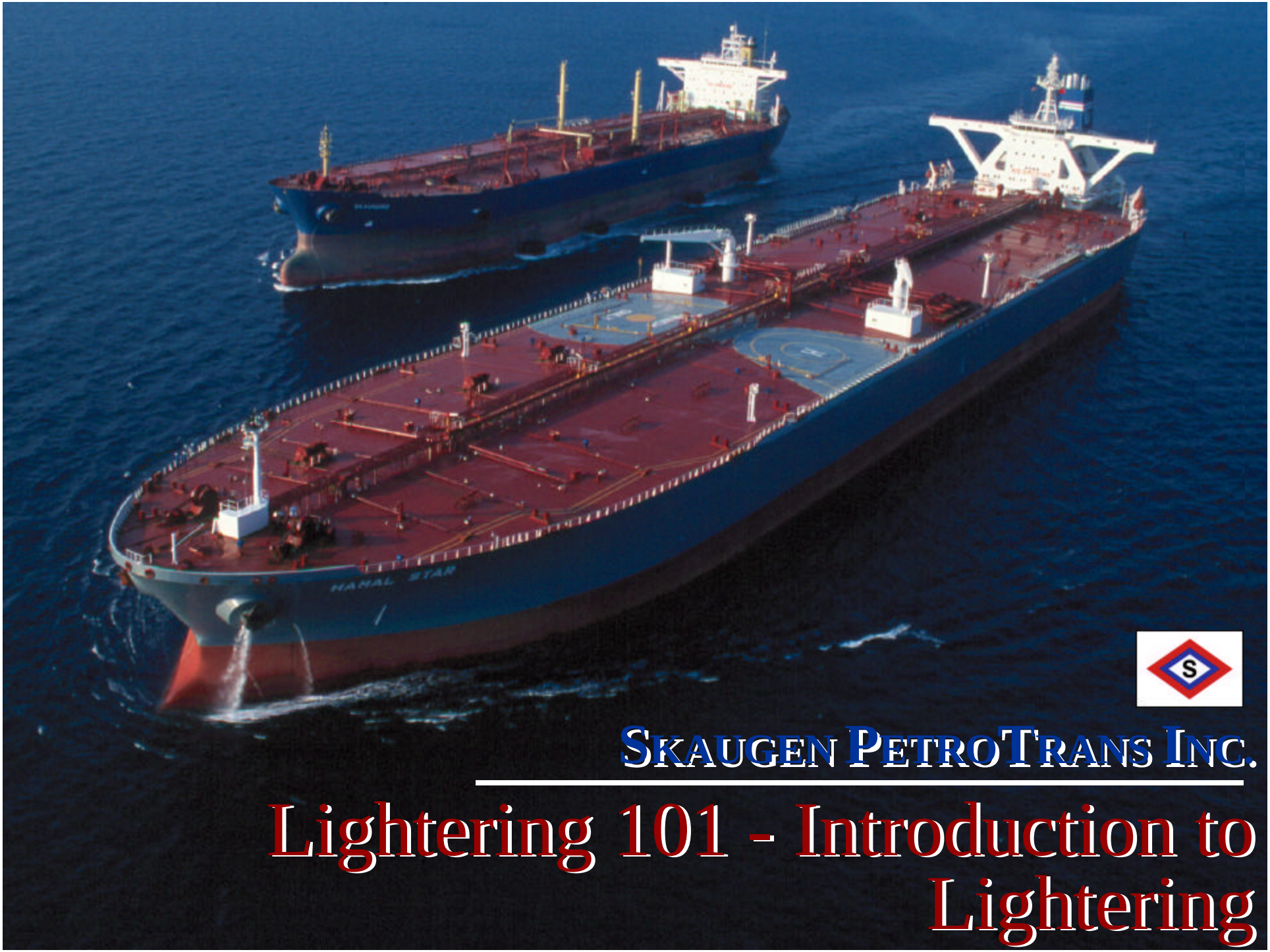


SKAUGEN PETROTRANS INC.

Lightering 101 - Introduction to Lightering

What is Lightering?

III

What: Lightering is defined as the process involving ship-to-ship transfer of oil cargo.

Why: This process is used because economical shipment of crude oil from its source to the United States requires the use of extremely large tankers called very large crude carriers (VLCCs) and ultra large crude carriers (ULCCs). In turn, ports may not be deep enough, or have narrow entrances, or have small berths such that these large tankers cannot be accommodated. Thus, lightering allows offshore unloading of the crude oil cargoes of the very largest tankers.

How: The lightering process consists of maneuvering a smaller tanker (service vessel) alongside the larger tanker or STBL (ship to be lightered), typically with both vessels underway. The two vessels are moored together with lines while using large rubber bumpers called fenders between the two vessels to prevent damage. A portion of the crude oil cargo from the larger ship is discharged through hoses connected between the two vessels to the smaller ship. The two vessels may be anchored or may continue underway while the transfer takes place depending upon sea conditions.

Where: Lightering locations are dictated primarily by water depth and traffic. In the Gulf of Mexico, this process takes place twenty (20) to sixty (60) miles from land. Lightering any further offshore would be both time consuming and less convenient

When: All the time!

Glossary of Terms

III

Glossary:

STBL (Ship-to-be-Lightered)	Very large or ultra large tanker carries crude into Gulf of Mexico from foreign port; too large to enter ports.
SS (Service Ship)	Smaller tanker which offloads a portion of the STBL's crude and takes it into port.
NOR (Notice of Readiness)	Notice served by the Master to inform the terminal/charterer that the vessel is ready in all respects to load or discharge cargo.
DOP (Dropping Outward Pilot)	Frequently used provision in a time charter to determine the time and place of redelivery of a ship to the owner by the charterer. The hire ceases at the moment the pilot disembarks.
Laydays/Laycan	A spread of dates – e.g.: "Laydays 1st September/Canceling 15th September," between which dates a vessel is to present for loading. Too early and she will probably have to wait. Too late and the risks being canceled by the charterers.

Glossary of Terms

Glossary: (continued…)

MM (Mooring Master)	Specially trained master mariner who maneuvers the SS alongside the STBL.
Mooring Master Assistant	Person that assists the mooring master and works on the STBL.
LSV (Lightering Support Vessel)	Workboat (180' long) which carries the fenders and hoses, and assists in putting the fenders on the STBL.
Fenders	Specially designed air-inflated rubber "cushions" placed on either the STBL or SS that float on the water and will absorb the forces of bringing the two vessels together.
Hoses	Specially designed, 12" diameter, 1¼" reinforced rubber hoses that the crude oil flows through from the STBL to the SS.

Tankers

III

As shown in the picture to the left, some tankers are equipped with fenders and hoses. These tankers may also have Captains who are Mooring Masters. If this is the case, and the Captain is in compliance with the USCG work- hour regulations, he may conduct the mooring between the service ship and the STBL without assistance. If the ship is not so-equipped or the Captain is not able to do the mooring operation, an LSV with Mooring Master is needed.

Lightering Support Vessels (LSVs)

III

LSVs and Their Role in Ship-To-Ship Transfers

III

The job of the LSV is to deliver the Mooring Master and Mooring Master Assistant to the service ship and STBL; and deploy and recover the fenders and hoses needed for the lightering operation. They are also on standby throughout the operation in case of emergencies. LSVs carry the fenders, hoses, and personnel needed to conduct the lightering operation. In addition, some LSV's are equipped with fire-fighting and oil-spill response equipment.

The Lightering Process

III

Depending on weather, cargo transfers can be made while underway, drifting, or at anchor. At the lightering position in the designated lightering area, up to 70 nautical miles offshore, the LSV fenders one of the tankers involved in the transfer and delivers the Mooring Master. At this time, the cargo transfer hoses may also be loaded onto one of the tankers. In the picture at lower left, the service ship is approaching the STBL with fenders already in place.

The Mooring Master

III

The Mooring Master is stationed on the bridge of the service ship during approach and mooring. Under normal conditions, both vessels will be under way at a pre-agreed speed until the vessels are safely moored together. The speed and course of the STBL, as well as the relative movement between the two vessels must periodically be verified through the ARPA or radar.

The Approach

III

As the mother ship maintains her set course and slow speed, the lightering tanker maneuvers alongside. It slowly edges closer to the mother ship until it matches course and speed. The approach angle between the two vessels should be decreased as the parallel distance decreases, and when the distance is approximately 500 feet, the approach angle should not exceed 3-5 degrees.

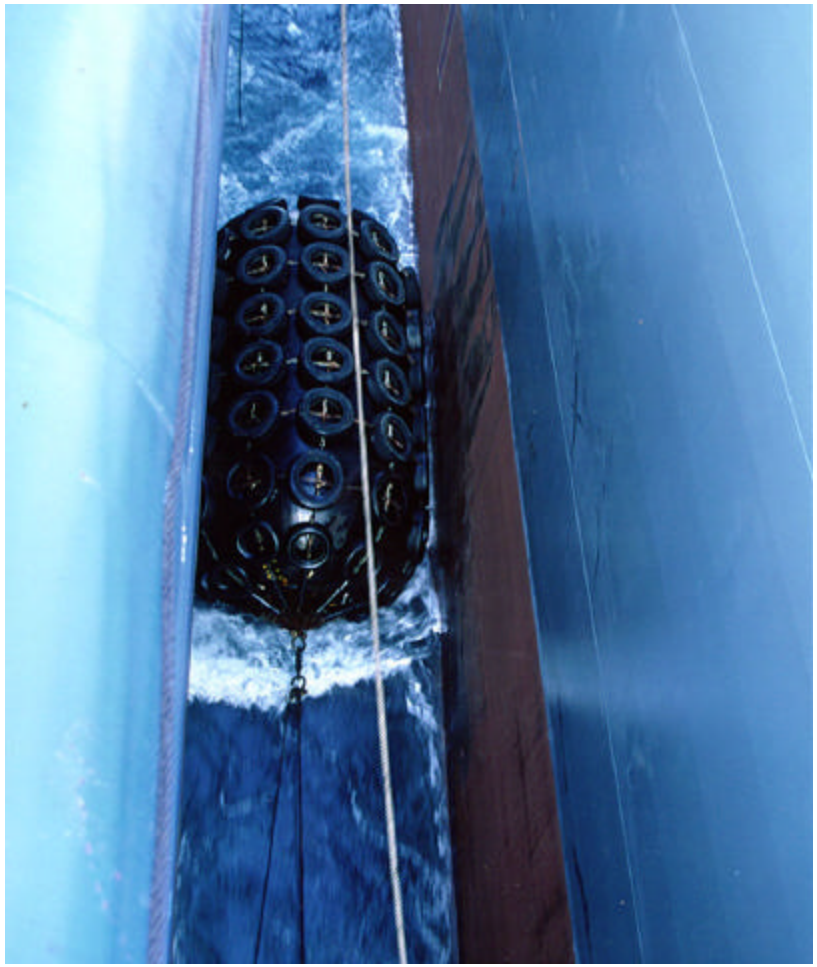
Edging Closer

III

The preferred speed during final approach and mooring is usually between 4 and 6 knots. However, the speed must be adjusted in each case to optimize the maneuverability of both vessels. As the two vessels come near together, they should be as close to parallel as possible, so that all four fenders simultaneously share the load of the impact.

The Fenders

III



The OCIMF's Ship-to-Ship transfer Guide (Petroleum) recommends the use of four 6.5m x 3.3m high pressure pneumatic fenders for berthing of an Aframax and a VLCC type tanker.

Mooring Lines

III

Mooring is to be done by the crew of each vessel involved in the operation. As a minimum, the following lines will be passed to the STBL from the SS: 4 to 6 headlines, 2 forward spring lines, 2 aft spring lines, and 4 to 6 stern lines.The STBL will also be required to supply 2 to 4 mooring lines aft and forward. Upon completion of mooring operations, both vessels must ensure that messenger lines and stoppers are made ready in proper position for fast cast off of the mooring lines should that be necessary at some point.

All Fast Offshore

III

Hose Connection

III

Next comes connecting the 12-inch, 90-foot cargo transfer hoses and the gauging of the tanks. Crew members of each vessel are responsible for connecting the reducers and cargo hoses. The hose body must be supported between the hose and the ship's rail by a nylon strap with rubber "chafe" fitting and suspended from the ship's derrick/crane. Continuous attention must be given to the manifold area. A qualified member from each vessel must be stationed at the manifold during the entire transfer.

Cargo Transfer

III

During the cargo transfer, the STBL must keep a proper bridge watch to ensure that a safe anchor position is maintained; or if slow steaming, that safe navigation is carried out. The pumping of cargo shall commence at a slow rate, but when flow has been established, and no leaks found, the STBL may increase pumping pressure to optimum rate. All hose connections shall be continuously monitored for leaks. When transfer is completed, hoses are drained and returned to the service ship.

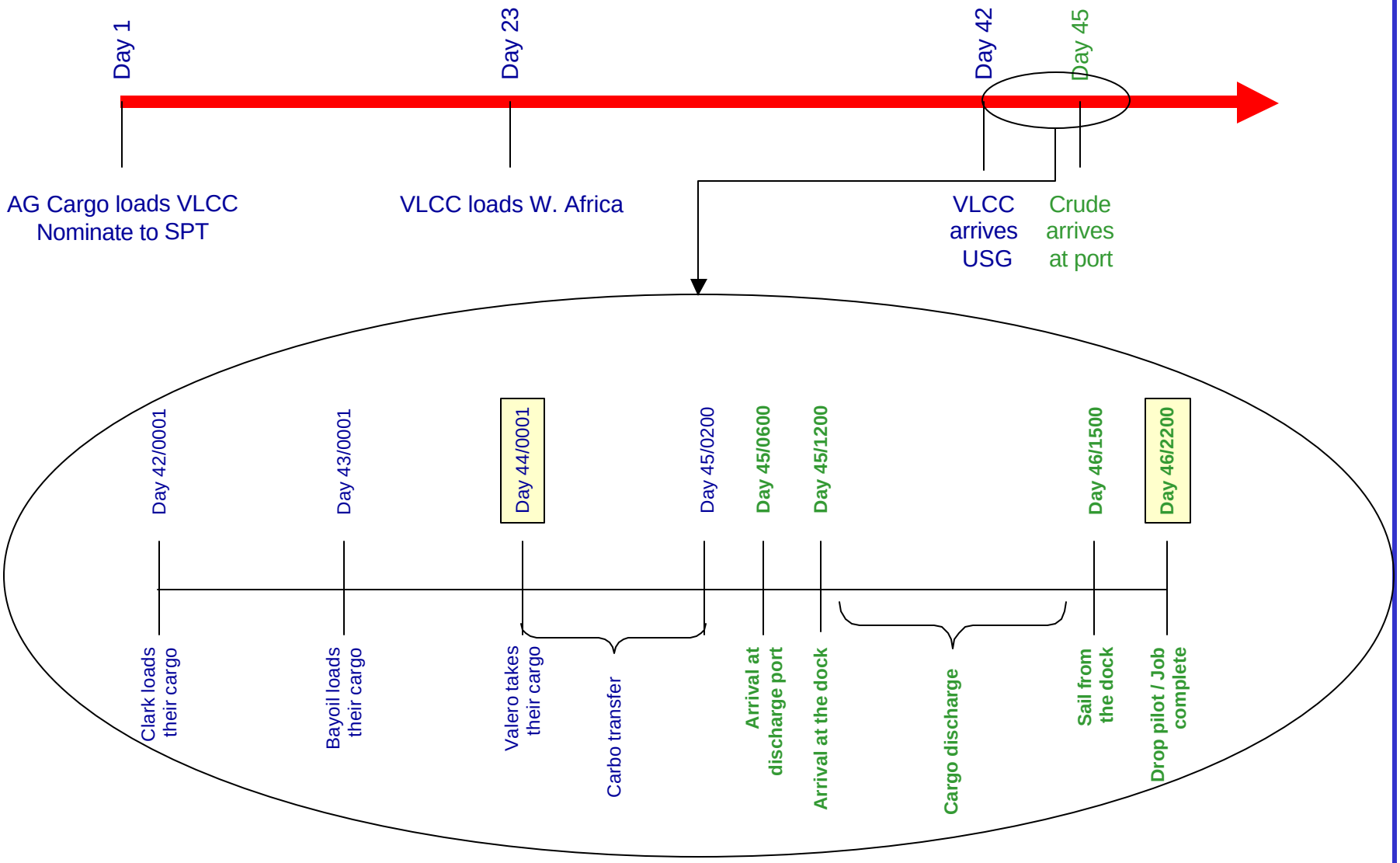
Unmooring Operation

III

Under normal weather conditions, the unberthing will be carried out with the STBL at anchor. It may, however, be necessary to do the operation underway. In that case, the STBL will be instructed by the MM to maintain a speed and course previously agreed upon. During unmooring, plenty of slack must be given on the mooring lines and good quality messenger lines must be used to avoid difficulties in removing the eyes off bitts.

Crude Oil Transportation Time Line

III



Lightering Coastline

III