

GLOSSARY OF TERMS
RELATED TO TANKER OPERATIONS

There are a number of operations associated with oil tankers that may cause the emission of hydrocarbon to the atmosphere. These operations occur with varying frequency and in different locations. The following discussion is for the purpose of distinguishing among these operations:

Venting -- The volume of vapor in oil tanks expands and contracts with variations in temperature just as occurs with the gasoline tank of an automobile. However, the oil tank in a tanker is not freely open to atmosphere. To prevent a build up of pressure differential, a weighted pressure-vacuum valve with a flame screen is fitted to each tank. The valve lifts to relieve when a pressure differential of 2 pounds per square inch is reached. When the pressure within the tank is the greater, some hydrocarbons are emitted.

Bunkering -- This is the process of refueling the ship's fuel tanks. Just as when refueling an automobile, the addition of fuel displaces the vapor to the atmosphere. The frequency with which this emission takes place and its locale depends upon the size of the tanks, the ship's fuel consumption, and its operating schedule.

Ballasting -- This action is necessary after the cargo has been discharged to immerse hull, propeller and rudder in the interest of controllability of the ship. Hydrocarbons are emitted when water is introduced into some of the cargo tanks. The quantity of ballast taken on can be held to a certain minimum level for purposes of clearing the port unless there are strong winds when a greater amount of ballast would be taken on for safety reasons. Once at sea, the Master will add more ballast and may take on still greater quantities if the ship encounters heavy weather. In vessels with segregated ballast tanks the water is added into tanks dedicated to that purpose and no contamination with

the oil residues remaining in the oil cargo tank takes place nor is there any emission of hydrocarbons. In vessels without the segregated ballast feature, operating on a return voyage to an oil loading source where there is no oily water reception facility, the ship will probably engage in tank cleaning.

Tank Cleaning -- This operation is a lengthy one and is usually carried out at sea, to prepare cargo tanks for a change of cargo, as from crude oil to a refined product, or from crude oil to grain transport. It may also be done to certain tanks in connection with ballasting. To clean the tanks, a machine which plays powerful jets of water upon the interior surfaces is lowered according to a fixed schedule from the top to the bottom of the tank over a period of several hours. As a safety measure the atmosphere in the tank may be inerted before the process begins. This action has been adopted relatively recently because of unexplained explosions which occurred from six or seven years ago in vessels engaged in this operation.

Alternatively, the hydrocarbons may be emitted by blowing in fresh air to bring the tank below the explosive limit before washing begins. The accumulation of oil and water is gathered and separated. It was once common practice to pump the accumulation overboard and this practice termed "operational pollution" has been responsible for most of the oil dumped in the sea, much more than due to tanker accidents. The procedure is now prohibited; instead, the separation process returns to the sea clean water and retains the slops on board. The slops are either discharged ashore or are added on top of the next load of cargo lending the name "load on top" to this practice.

Once a tank has been cleaned and "stripped" of residue, it is ready for the new, different cargo. Clean sea ballast may also be taken in permitting the vessel on loading the next cargo to discharge the clean ballast water into the harbor at the loading facility without pollution.

There is a new method which the industry is experimenting with in the interest of reducing water pollution called crude washing where the oil itself is used as the solvent to speed removal of residues on the interior surfaces of the tank.

The tank, after tank cleaning, is still not regarded as safe for personnel to enter as hydrocarbons are still present.

Gas Freeing -- This process is conducted at infrequent periods when necessary to enter a tank for inspection or repairs such as burning and welding. Before personnel are permitted to enter a tank, the tank must be certified gas-free by a Marine Chemist. To reach the gas-free stage, the tank must be cleaned as described in the paragraph above and in addition the atmosphere of the tank after tank cleaning must be changed a sufficient number of times to insure that no explosive or toxic condition exists and that the tank is safe for human entry. Of course, the process of changing the atmosphere will lead to emission of such hydrocarbons and inert gas as may remain after tank cleaning has been consummated.

Inerting -- In this process an oil tank is made to draw in inert gas instead of fresh air as the cargo is pumped out thereby lowering the oxygen content of the tank atmosphere making it safe from explosion or fire. The inert gas most commonly used is washed, cooled combustion exhaust drawn from the ship's boiler uptakes.

Purging -- The passing of inert gas through an empty cargo tank that has recently discharged either crude oil or petroleum product. The purpose is to reduce the oxygen and hydrocarbon content in order to prevent an explosive mixture with the consequence that a mixture of hydrocarbons and inert gas will be released to the atmosphere.