

# THE PROBLEMS OF OIL TRANSPORTATION SAFETY

Assoc.Prof. Dr.Chogovadze J., Full Prof., Dr. Kochadze T., Dr. eng. Tsetskhladze R.  
Akaki Tsereteli State University, Kutaisi, Georgia

**Abstract:** Discussed are the problems of navigation during execution of cargo and transportation operations of oil and oil products by tanker fleets in open seas, as well as during tanker loading in the regions of harborage.

Various features of the most dangerous maneuvering from the point of view of accident rate are considered, particularly mooring operations in the area of oil terminals.

**KEYWORDS:** OIL PRODUCTS, SHIPPING TANKER, NAVIGATION, MANEUVERING, PORT, HARBORAGE, MOORING, SAFETY, TRANSPORTATION.

## 1. Introduction

The World Ocean is one of the most important parts of biosphere, providing the quality of the environment in planetary scale. Numerous sources of pollution and emission of large amounts of harmful and toxic substances caused degradation of the parts of ecosystems of the World Ocean, disturbance of ecologic balance and decrease of the productivity of marine environment. The mankind many times faced problems of unwanted ecologic consequences of its activities. The pollution of marine environment as the result of shipping is quite widespread and its influence on the ecosystem of the World Ocean is very noticeable, following from the increasing role of sea transportation.

The increase of the scale of oil extraction, intensification of transportation of oil and oil products, construction and exploitation of new transportation corridors leads to growing dangers (risks) of accidental situations. The main part of oil products are emitted into the World Ocean during sea transportation, loading, discharge and cleaning of storages (tanks) of oil tankers, also as the result of accidents of tankers of various tonnages.

The tanker disasters of the regional scale can in various cases cause long-term (decades) and practically irremediable harm to marine ecosystems. The world statistical data shows that the scale of mischief and economical losses of large-scale tanker accidents with oil spillage, in the conditions of Black Sea are capable of undermining national budget of any country of Black sea region[1]. In accordance with world statistical data, for the last 30 years, the most frequently, accidental spillages of oil occur in harbors of port terminals during tanker cargo operation and from the total amount of spillages related to tanker operations and incidents they approximately amount to: 35 % - spillages in the volume less than 7 tones, 27 % - spillages in the volume from 7 to 700 tones; 5 % - spillages in the volume more than 700 tones. Lately due to the Batumi Oil Terminal there were accidental oil spillages in the sea and their material mischief amounted to 200 000 GEL.

## 2. Preconditions and means for resolving the problem

In accordance with forecasted data of specialists, the main yearly volume of oil exported from Georgia by transit through Black Sea to Europe, may substantially increase during next 5-10 years. As of today the carrying capacity of the oil terminal is 15 tones per year. Georgian harbor terminals are specialized on crude oil and oil products (diesel, benzine, black oil, etc).

In Georgia the reloading of oil cargo is being executed in harborage oil terminals, which provide shipment of crude oil and oil products from Kazakhstan, Azerbaijan and Turkmenistan. The oil is being reloaded from Georgian terminals to tankers using modern loading systems. Georgian marine berths are capable of loading tankers with displacement up to 130 000 tons.

The utilization of tanker fleet for transportation of oil creates a certain risk of accidents[2]. The tanker accident, and especially one with fire, threatens with regional ecologic catastrophe and economic losses not only Georgia, but also all the

countries of Black Sea coast: Russia, Ukraine, Turkey, Romania and Bulgaria.

Providing safety during execution of transportation of oil products requires solutions of various difficult tasks of scientific-technical and organizational character. The most important objectives are special training of tanker fleet crew members, in the first place of crew members responsible for navigation, and safe structures of the marine tanker itself. The tactics of execution of the range of difficult maneuvers should be perfected, so that in real situation it can only be slightly modified taking into consideration objective conditions in the area of loading operations. Some of the features of the most dangerous maneuvering from the point of view of accident rate, specifically mooring operations in the area of cargo oil terminals, will be discussed in short.

The process of tanker maneuvering while approaching a point of connection to a pipeline of cargo oil terminal to some extent can be compared to the approach of a ship to the place of anchorage, though the objective of the maneuver and the most importantly parameters of the movement of the ship at the end point of maneuvering may differ substantially. Known is that for anchorage chosen should be an area, where minimal is the probability of worst combination of external factors such as wind, roughness and shallow water.

Point mooring to a receiving facility of a pipeline is being conducted in the conditions of open sea and most often not in favorable hydrometeorologic conditions. It is not an easy task to stop a ship of a large tonnage in a required point, in a required position even during low wind, no roughness and minimal current, and it requires great skills and professionalism of a navigator.

Frequent interruption of a started movement and permanent corrections of a trajectory in a best case creates wasteful time loss, and in the worst case – an accident, which is very dangerous when involving a tanker carrying oil products.

When resolving an issue of approaching an end point of a maneuver with given parameters, navigator has to plan a whole maneuver, starting from choosing a start point, trajectory of the movement to the place of mooring, focal points of trajectory (points, where changed is the movement regime based on manipulations of tanker navigation facilities). On all the phases of maneuvering considered should be external factors influencing the ship. Due to the fact that mooring is being performed with low speed, the influence of external factors substantially effects maneuvering elements of the ship and to large extent determines maneuvering tactics. In the given case it is preferable to choose such a method of approach to the object of mooring, where minimized is the information to be considered by a navigator when choosing control actions of ship navigation facilities. The whole course of mooring and its separate details should be relatively simple and comprehensible for all participants of mooring team. Only in that case a desired result can be achieved in the conditions of minimal time loss and maximal safety, which is the priority when working with oil products.

The planned reequipment of the world tanker fleet with new systems of navigational safety and especially transfer to the construction of tankers with double hulls represents a colossal organizational-economic problem of the world scale, causing financial expenses in the amounts of milliards for ship-owners.

At the same time it should be considered, that double hull tankers can not be viewed as a panacea of accidents, because even at such high price these structures contain imperfections related to difficult accessibility of space between hulls for examination and control of their condition, also increased corrosive wear of both of the hulls when they are used for ballasting with sea water.

### 3. Conclusion

In accordance with the world experience and especially during the last years, none of the marine powers can independently resolve problems related with oil spillages in harborages as well as tanker accidents in the open seas. More so, the world community as a whole does not have enough organizational-legal and legislative mechanisms for prevention of such accidents.

Georgian ports utilizing equipment of modern navigational systems, as well as modern oil harbors are organizationally and technically ready to battle oil spillages in harborages, which in perspective gives opportunity to relatively successfully resolve the problem of providing safety during transportation of oil products and expensive liquidation activities in cases of oil spillages.

The use of new technological methods of eliminating threats of oil spillages, including heavy fractions, will provide favorable ecological environment and secure the status of Adjara as the main recreational zone of Georgia.

Georgia, being the member of IMO[3], in order not to find itself on the periphery of the market of oil transportation by sea means, should bring its national legislation and ports in correspondence with new international requirements and standards of sea safety.

### 4. Literature

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