

## The Positive Effect of Performance of Crew When Portable SOPEP Box Will be Close to Manifold on Tanker Vessels for STS (Ship to Ship) Operation in Case of Oil Spill

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### Abstract

In global terms, safety of ship to ship operation should be recognized that operational efficiencies delivered by a large number of ship operators would make an invaluable contribution to reducing oil pollution. Spillages and leakages during bunkering operations are a primary source of oil pollution from ships. Risk of oil pollution during STS transfer operations need not be greater than during in-port cargo transfers. However, as a transfer area may be out of range of port services a contingency plan within the SOPEP (Shipboard Oil Pollution Emergency Plan) or VRP (Vessel response plan) to cover such risk should be available and should be activated in the case of an oil spill.

Existence of portable tools box of SOPEP plays a major role in emergency preparedness. The purpose of a portable tools box of SOPEP is to establish a mechanism for a ship to improve the energy efficiency of a ship's operation and emergency. This paper shows the effect of existence of portable tools box of SOPEP near the manifold and how it can be useful.

**Keywords:** SOPEP, oil pollution, tanker,

### Introduction

When oil spill occurs at sea, it spreads over the surface of the sea water. Leaving a deadly impact on marine mammals, birds, the shore line, most importantly the ocean, and the environment. The coast to clean up an oil spill depends on the quantity and quality of oil discharged in the sea and is calculated on the basis of factors such as legal claims, money paid as penalties, loss of oil, repairs and cleanups and the most important loss of marine life and the effect of human health which cannot be measured against any amount. Keeping in mind the recent oil spills at sea, spilling of oil on ship has become the most dreaded accident without doubts. It is always better to take precautionary measures to prevent such accidents. However, sometimes accidents happen without any warning, leaving very less time to act. As prevention is better than cure, in order to avoid above mentioned monetary losses and primarily to avoid marine pollution and losses of marine species, a prevention plan is carried on board by almost all cruise and cargo vessel.

This plan is known as SOPEP or ship oil pollution emergency plan. It shall advise the Master how to react in case of an oil spill to prevent or at least mitigate negative effects on the environment. The Plan contains operational aspects for various oil spill scenarios and lists communication information to be used in case of such incidents. The SOPEP conveys information from the owner to the Master on how to react in case of an oil spill. Actions to be taken within various scenarios as well as communications to be made to owner and other contact points are listed in a format required by the MARPOL Regulations [1].

The Portable SOPEP box is a small box that is located a distance from the SOPEP locker and includes some items for clearing up incidental spills that may occur during operations. This portable box shall be designed as a marine oil spill response measure to be deployed easily and effectively. In this paper, effective strategies for reducing oil pollution by using SOPEP oil box and some faults that leads to oil pollution on tanker operation have been investigated.

### Understanding SOPEP

As mentioned earlier, SOPEP stands for Ship Oil Pollution Emergency Plan and as per the MARPOL 73/78 requirements under Annex I, all ships with 400 GT and above must carry an oil prevention plan as per the norms and guidelines laid down by International Maritime Organization under MEPC (Marine Environment Protection Committee) act. The Gross tonnage requirement for oil tanker, according to SOPEP, reduces to 150 GT, as oil itself is a kind of cargo, which doubles the risk of oil pollution. The action of SOPEP plan is the same as a muster drill, the pollution team must know what each person has to do in any situation regarding pollution, and every member of the crew is responsible to prevent pollution. Any Spillage should be treated as emergency, common spillages occur while re-fueling, Save-alls should be used to prevent this, and all actions should be taken to prevent any diesel or other marine pollutants from going into the water.

Master of the ship is the overall in charge of the SOPEP of the ship, along with the chief officer as subordinate in charge for implementation of SOPEP on board. A SOPEP is intended to be a simple document, and the use of checklists and flowcharts is encouraged. Inclusion of extensive background information on the ship, cargo, etc. should be avoided whenever possible and be restricted to annexes, if included. Every vessel required to carry an approved SOPEP to comply with the flag state requirements at any times in all trades. The purpose of plan is provided to guidance to the

master and officers on board the vessel with respect to the step to be taken when a pollution incident has occurred or likely to occurred.

SOPEP contains the following things:

- The action plan contains duty of each crew member at the time of spill, including emergency muster and actions.
- SOPEP contains the general information about the ship and the owner of the ship etc.
- Steps and procedure to contain the discharge of oil into the sea using SOPEP equipment.
- On board Reporting procedure and requirement in case of oil spill is described.
- Authorities to contact and reporting requirements in case of oil spill are listed in SOPEP.
- Authorities like port state control, oil clean up team etc., are to be notified.
- SOPEP includes drawing of various fuel lines, along with other oil lines on board vessel with positioning of vents, save all trays etc.
- General arrangement of ship is also listed in SOPEP, which includes location of all the oil tanks with capacity, content etc.
- The location of the SOPEP locker and contents of the locker with a list of inventory

Every vessel shall carry a set of equipment as listed below properly stowed in the SOPEP locker to be employed in cases of oil pollution. The equipment maintained in the SOPEP locker must be accessible at all times, ready and handy for immediate use.

The SOPEP locker shall include but not be limited to:

- SAW DUST
- RAG
- COTTON WASTE
- SUBMERSIBLE PUMP
- QUICK DRY CEMENT
- JOINTING
- CLAMPS
- FIRE HOSE
- CHEMICAL
- BUCKETS
- SHOVELS
- SCUPPER PLUGS

### **Types of oil spill and steps to take in case of an Oil Spill**

There are two types of oil spill accidents on board a ship. One in which there is no danger of the oil going over board; whereas the one wherein the chances of oil going overboard are maximum is the most dangerous one. There can be two situations where in the oil spills over the deck and goes overboard causing marine pollution:

- Overflow of oil from internal transfer of oil through vent or sounding pipe of the tank.
- Oil spill during bunker operation or sludge discharge operation, with proper SOPEP equipment and training, oil spill over the deck can be contained and marine pollution can be avoided

The following points are to be noted in case of oil spill during internal transfer:

- If anybody sees oil on deck immediately close the ship side scuppers and alarm the ship staff by shouting and contacting duty officer on bridge and engine room.
- Stop all the transfer immediately and locate the effected tank and its sounding pipe and vent position.
- Emergency muster to be called up by the master and everybody must carry out their duty as listed in the muster list for oil spill.
- Use of SOPEP equipment and other means to be done to contain the spill within the ship.
- Lower the quantity of spilled tank to a safer level in any other permissible tank.
- Putting saw dust over the scupper plug will give an additional barrier for oil to go overboard.
- Collect the spread oil in a 200 liter SOPEP drum and clear the affected area.
- Master to enter the whole scenario in the ship's incident report form and call up for meeting to discuss the accident so such accidents can be avoided in near future.

The following points are to be noted in case of oil spill during bunkering:

- One stand by officer is always present in the bunkering manifold. If he sees any oil or leakage near that area immediately, shout "stop" to the bunker supplying vessel loudly or in the VHF. If remote switch is supplied, immediately press the switch.
- For sludge disposal operation, if any spill occurs immediately stop the ship's sludge transfer pump from remote panel, normally situated near the bunker manifold.
- Inform the Chief engineer, duty officer about the emergency.
- Scupper must be plugged before starting any of these operations, if oil spill occur on the deck recheck the plug and put saw dust over it.

- Master will call for emergency muster and crew will carry out their duties as per the muster list for oil spill emergency.
- Drip tray in bunker manifold must be check for over filling and should be emptied in 200 liter drum if required.
- A foam type portable fire extinguisher must be readily available to avoid the worsening of the situation by fire.

### Portable SOPEP box

It has seen on some vessels that in addition to the SOPEP locker, SOPEP equipment is being stored in portable units secured on deck. In figure, 1 shows a large, tough and convenient plastic storage locker, and figure2, shows metal type of portable SOPEP box. Storing equipment in portable device will greatly improve the response time in an emergency that is located a distance from the SOPEP store [2].



Figure 1: A large, tough and convenient plastic storage locker



Figure 2: metal type of portable SOPEP

The primary objective of this is to stop or minimize oil outflow in the event of when either damage to the ship such as a collision, fire or explosion or from an error during routine operations spills occurs.

### STS (Ship-to-Ship) and factors affected to displacement of hose connection

The STS (Ship-to-Ship) transfer of oil as well as dry bulk cargoes is a common practice these days given the size of the ships having increased four folds in the past few decades. Theories and experience have time and again proven that observance and adherence to proper procedures, given fair weather and sea can result in such a potentially dangerous operation concludes safely. In ship to ship transfers. Both tankers should comply fully with the safety precautions required for normal cargo operations. If the safety precautions are not being observed on either vessel, the operations must not be started or, if in progress, must be stopped. [3]

Ship to ship transfers undertaken in port or at sea may be subject to approval by the port or local marine authority and certain conditions relating to the conduct of the operation may be attached to such approval. Generally, the STS expert is an ex-mariner, who will look into supervision, co-ordination and authorization of all the events involved including mooring / unmooring of the vessels. Each aspect of such operation is considered to be critical. So, if the STS / bunkering operations in charge rules out or overlooks even minute obstacles faced during ship to ship approaches or even mooring / unmooring the vessels, a mishap could be unavoidable. Hence, considering the risks involved, adherence to the proper procedures is vital. Company, Port and STS Guidelines coupled with usage of specific operational checklists prove to be a great way to ensure risks involved are not overlooked or any safety information left unnoticed.

Bunkering is only one facet of a vessel's dynamic operating schedule, but is categorized as a critical operation under the ISM Code. Stemming bunkers commands careful planning, co-ordination and co-operation between all parties involved

from the point of ordering until completion of the delivery. Commercial schedules can impose immense pressure on owners and a vessel's crew to stem bunkers within limited times. However, non-compliance with recognized operating procedures in a vessel's Safety Management System during bunker operations has the potential to result in substantial costs, penalties and even greater delay where spillage occurs consequently. In some jurisdictions, accidental spillage of bunker fuel can also result in criminal charge [4,5].

On STS operation, the portable hose plays a major role for transferring cargo. Hose lengths should be considered on a case-by-case bases and but as a reference, hose lengths equal to twice the maximum difference in manifold height between the two ships are usually sufficient to allow for variables during transfer. As the tanker rises or falls because of cargo transfer, the hose should be adjusted to avoid undue strain on the hoses, connections and ship's manifold and to ensure that the radius of the curvature of the hose remains within the limits recommended by the manufacturer. [6]

Although oil hoses are robustly constructed for a marine environment, they can be damaged from improper handling. In general, while handling hoses; adequate support is the key to the prevention of over-bending (kinking), which can lead to premature hose retirement. When transferring the one end of the hose to the other ship, lifting straps should be used that are preferably flat nylon or equivalent reinforced cloth bands to prevent any chafing of the hose cover.

There are two relevant elements should not be overseen while engaging in such critical operations:

- The mooring lines are normally deployed from the maneuvering ship. However, when prevailing weather conditions or weather forecasts require it, sending lines from both ships can increase the number of mooring lines. Loads should not be concentrated by passing most of the mooring ropes through the same fairlead or onto the same mooring bitts. Use should be made of all available fairleads and bitts mooring operations onboard tankers present significant risks to the tanker crew, all personnel engaged in mooring operations should be formally trained to ensure they are competent and are aware of the hazards involved. Most STS Service providers have a standard mooring plan, suitable for the particular location. It is important to ensure moorings allow for ship movement and freeboard changes to avoid over stressing the lines throughout the operation, but that they are not so long that they allow unacceptable movement between the ships. Mooring lines leading in the same direction should be of similar material.
- The weather condition limit will mostly depend on the effect of the sea and swell on the fenders or mooring lines and the rolling movements induced by the participating ships, taking into account the relative freeboard and displacement. Decent weather conditions play an important role for all critical marine based operations to be safely accomplished and 'Lightering' is considered no different. Sometimes when the cargo transfer is carried out of port / sheltered limits and heavy weather makes a fall, the operations have to be aborted indefinitely amounting to loss in time and money. So all involved parties for the weather forecasts should maintain a constant vigilant check and all communication recorded appropriately.

## Results and Discussion

A recent spate of oil spills during routine bunkering operations has resulted in a number of significant pollution claims and has raised concerns as to the number of spillages resulting from a lapse of awareness during critical aspects of the bunkering operation or a basic failure to follow defined procedures.

The circumstances leading to each incident were often different. Oil spills can of course also result where external factors impinge on the vessel's operation. Notwithstanding external factors, the following were commonly identified as causative in the incidents reviewed:

- Failure to close completely a valve to a tank, which had completed loading its nominated quantity of fuel. During filling of adjacent tanks, bunker fuel continued to enter the first completed tank unnoticed, eventually exceeding tank capacity.
- Failure to adhere to the stipulated maximum loading rate contained in the vessel's bunker plan and agreed prior to operations. Because of excessive rate of supply, air pockets collected in the top frames of the tank. When the fuel reached its optimum level in the tank, fuel was forcefully blown out through the air vents.
- Failure to adhere to recognized procedures for topping off tanks. During topping off a valve was closed against the flow of one of two receiving tanks. The flow rate was not reduced sufficiently and the increased pressure to the adjacent receiving tank resulted in overflow.
- Failure to monitor the progression of loading at adequate intervals resulting in overflow.

In figure 3, shows these factors cause oil spill on tanker operation.

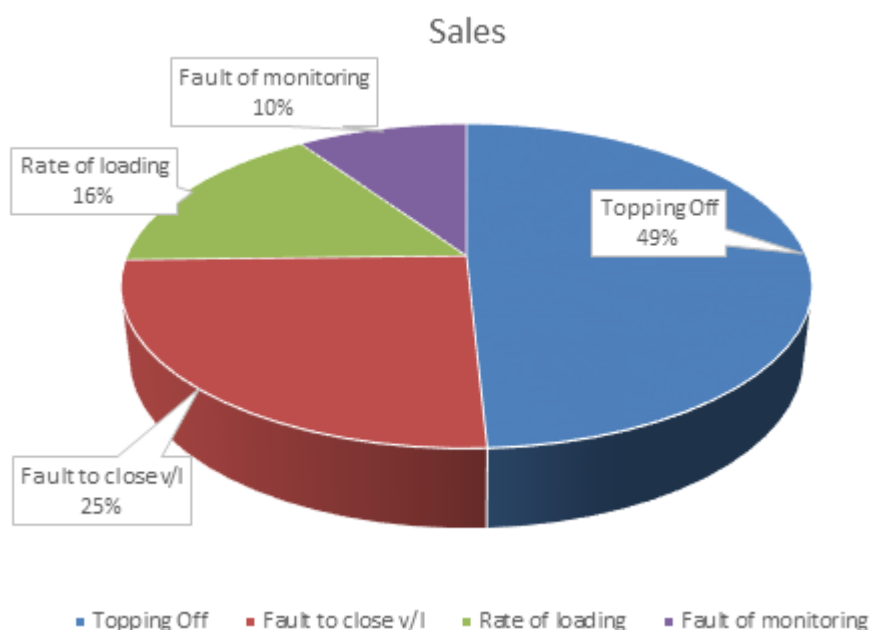


Figure 3: Factors of oil spill on tanker operation

The purpose of a portable tools box of SOPEP is to establish a mechanism for a ship to improve the energy efficiency of a ship's operation and emergency .

Empirical analysis shows in recent years efficient used of portable SOPEP box be useful and one of best factor for preventing oil spill close to manifold. Due to figure 3, these faults leads to oil spill, during bunkering or STS operation and existence of portable SOPEP box is a best aid in contrast with any oil pollution.

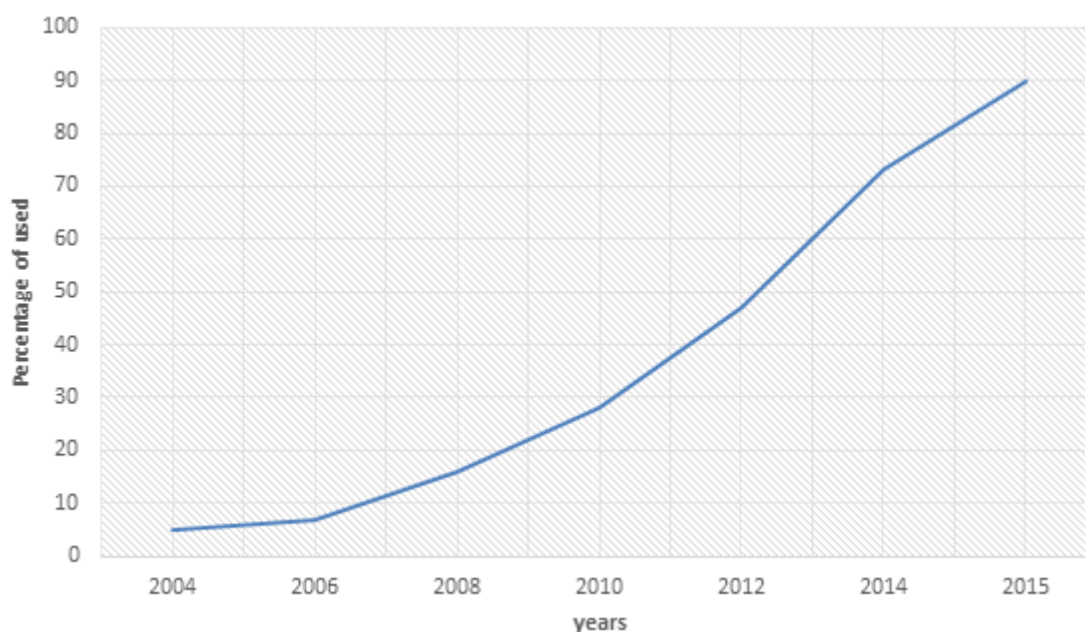


Figure 4: The percentage of use portable SOPEP box close to manifold on tanker vessels

The important results obtained are as follows:

Each oil tanker involved in the cargo transfer operation if have portable tools box of SOPEP near the manifold can take easily react in case of an oil spill. Portable SOPEP box would speed up in contrast with oil spill when it exists close to manifold. The purpose of the action to be taken if a spill of oil occurs or is threatened, whether from an error during routine operations or after a major incident such as a collision, fire or explosion

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