

NAVIGATORS' TASKS IN FACILITATING SAFE TRANSPORTATION OF FUMIGATED CARGO IN NORMAL OPERATING CONDITIONS AND DURING EMERGENCIES

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Since the inception of the maritime craft, its fundamental goal, and the primary priority of mariners, has been safety - the safety of the structure of the vessel itself, the safety of the life of the crew members responsible for its operation, and the safety of goods transported on board. Any event related to the handling or storage of cargo inevitably entails additional risks for the aforementioned safety - in particular, here we will talk about fumigated cargo and the tasks of boatmasters to ensure the safety of their transportation.

The most common fumigants are phosphine and methyl bromide. Phosphine is incredibly toxic to humans, and poisoning with it often leads to painful death of the victims. Such cases are somewhat more common on old river-sea vessels, which had a 70-fold excess of pesticides delivered to the vessel compared to panamax bulk carriers, however, studies for 2006-2016 did not find an absolute correlation between characteristics of ships and the number of phosphine poisoning by seafarers.

In addition, it should be noted that often, despite the sufficient warning of the ship's crew about the presence of cargo fumigated with toxic phosphine on board, the officers are unable to correctly determine the diagnosis and conduct the first treatment of the victim. Studies show that in more than 45% of cases, phosphine poisoning is confused with food poisoning, due to the similarity of symptoms, namely:

- nausea;
- vomiting;
- diarrhea.

Other symptoms include headache, irregular heartbeat, severe dilated pupils, severe dry cough, dizziness, etc. The only way to clearly understand the possibility of phosphine poisoning and to distinguish it from food poisoning is to be aware of the presence of fumigated cargo on board and the principles of poison gas dynamics.

Additional risk factors associated with fumigated cargo include the use of fumigants - special fabric sleeves containing fumigants - which can lead to fires and fires in the holds and decks of grain carriers [1]. The combination of the danger of thermal injuries, acute poisoning and pyrolysis (combustion) products of fumisives and cargo makes the process of transporting fumigated cargo a serious test for boatmasters..

This fact compels attention to the careful observance of the procedures for fumigation and subsequent ventilation of the holds. The responsibility of shipping companies here can be expressed in the creation of well-thought-out procedures and checklists, which are included in the Ship Safety Management System; and the boatmasters themselves are responsible for the strict implementation of these procedures, compliance with all precautions and safety.

However, the safety procedures alone cannot be ensured - it is also necessary to provide for emergency measures in the event of a person being poisoned with phosphine on board. One of such measures may be the product "First-aid kit for medical care in case of fumigation phosphine poisoning", developed by scientists of the State Enterprise "Ukrainian Research Institute of Transport Medicine of the Ministry of Health of Ukraine" and ONMU of the Ministry of Health of Ukraine, taking into account the requirements of such international documents as IMDG Code, MLC-2006, MFAG etc. [2]

The aforementioned first-aid kit provides medicines for two possible types of assistance: pre-medical care by ship workers without special medical education, and full-fledged medical care provided by shore doctors or ship officers who have undergone appropriate training in accordance

with the provisions of the STCW-78 Convention. In order to fully ensure safety on board the ship, boatmasters are required not only to undergo basic medical training in accordance with STCW, but also to take courses on the use of this "First Aid Kit", or other similar products..

It is also necessary to pay attention to the issue of sufficient sealing of cargo spaces with fumigated cargo. All phosphine hazards begin with the release of toxic gas from cargo spaces. The inability of the crew to identify these leaks in time and to take appropriate safety measures is unacceptable for the boatmasters responsible for the carriage of such cargo. The tightness of the covers of the hold can be checked in various ways: physical inspection, visual search, air pressure test by blowing, ultrasound test, etc. Studies have shown that regardless of the type of ships, their size or the amount of cargo in their holds, the last stage of loading namely, the closing of the covers of the hold - always takes place in an atmosphere of poisonous gas that accumulates in the over-grain space of the hold [3]. The results of such studies substantiated the patenting of the model "Methods for the control of airtightness with fumigated and phosphorous vantages before the ship goes on a voyage.» (№ UA 116604 U).

The analysis of marine accidents (AMA) over the past 15 years, associated with fumigated cargo, showed that the main causes of such accidents are poor training of the ship's crew on the basics of marine fumigation, insufficient preparation of the vessel for the carriage of fumigated cargo, lack of knowledge of the symptoms of phosphine poisoning and methods of its treatment, as well as the lack of necessary medicines in the ship's first aid kit [4].

Based on this, we can highlight the main tasks of boatmasters to ensure the safety of transportation of fumigated cargo on board the vessel:

1. Familiarization and training with the basics of marine fumigation, the dynamics of the formation and movement of toxic gases in the hold space.
2. Paying special attention to the dangers of fumigants to human life, symptoms of poisoning by them and measures for the treatment of poisoned people.
3. Conducting appropriate training on the use of medicines from the ship's first-aid kit, as well as additions to this first-aid kit like "First-aid kits for fumigation with phosphine" - this training should go beyond the basic knowledge for boatmasters stipulated by the STCW-78 Convention;
4. After fumigation of cargo on board the vessel, make sure that there are no phosphine leaks from the holds and that they can be adequately ventilated (in particular, this can be done using a "phosphine test detector" [Patent of Ukraine UA 116604 U]).
5. Compliance with the requirements specified in the international regulatory framework, in documents such as:
 - SOLAS-74;
 - IMSBC Code;
 - IMFO Code;
 - IMO Recommendations on the Safe Use of Pesticides on Ships.

Conclusions: Cargo fumigation is a life-threatening activity for ship's crew and requires careful training and competence in marine fumigation, treatment of phosphine-poisoned people and the use of medicines on board, while shipping companies are held accountable for making sound plans and fumigation procedures and related thematic briefing for the crew of a vessel with fumigated cargo.

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