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THE REPUBLIC OF LIBERIA

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Marine Advisory: 19/2022

Subject: Hazards of Fumigation using Phosphide onboard Dry Bulk Cargo Vessels.

Reference: (a) [MSC.1/Circ.1264](#)

(b) [MSC.1/Circ.1396](#)

(c) [IMSBC Reg 3.6](#)

To: Shipowners/Operators/Inspectors/Masters/Crew:

Purpose

The purpose of this Marine Advisory is to draw the attention of shipowners, operators, inspectors, masters and crew to the hazards associated with in-transit fumigation of cargo using Phosphides.

Background

Fumigation is the process of releasing toxic gases (pesticides) into a cargo hold or compartment for the purpose of eliminating or avoiding infestation by insects or other pests that may cause the cargo to deteriorate. Fumigation may take place either prior to and/or after loading the cargo. In-transit fumigation is preferred by shippers and charterers because it reduces time in port.

In recent years there has been a significant increase in the number of marine casualty incidents related to in-transit fumigation. In this regard, the Administration has recently investigated two incidents, one of which resulted in a fatality:

1. In the first incident, a crew member was fatally injured after attempting to open a hatch entrance cover during the topping up process of the Phosphide tablets. The excessive pressure from the Phosphine gas caused the hatch cover to break loose from the hinged joint and strike the crew member.
2. In the second incident, smoke was seen emanating from the cargo hold.

In both incidents, crew members were required to assist the fumigation technician including the removal of the fumigation sleeves from the cargo holds.

Hazards

Phosphide tablets are designed to react with moisture in the air and release Phosphine gas, to kill off any insect infestation in the cargo. The major hazards associated with Phosphine gas are:

1. **Toxicity:** Like all fumigant gases, Phosphine is toxic not only to animals but also to humans. Inhalation of fumigation gases may cause respiratory problems, nausea, and ultimately suffocation. Incidents causing illness and death of crew have occurred where phosphine-generating fumigants have been used with crew remaining on board, as such procedures and precautions must be taken to prevent the gas entering the accommodations. Both types of phosphine-generating fumigants (i.e., aluminum phosphide and magnesium phosphide) are dangerous if not used correctly, e.g., if gas leaks into the accommodation areas or pockets of the gas remain in the holds.
2. **Flammability:** Some gases and other agents commonly used for fumigation are flammable in sufficient concentrations. Some fumigants can also ignite, catch fire and even explode when in contact with water. Phosphine gas is flammable when mixed with air at a concentration exceeding 1.8% to 2% by volume in air.
3. **Build-up of pressure:** Excessive build-up of Phosphine gas after reacting with moisture in the air and water in cargo such as wet logs, in an enclosed hatch entrance, can hasten the chemical reaction and build up excessive pressure in that space, causing the hatch cover to lift off with excessive force, when attempting to open it.

It is therefore important that all the appropriate precautions are taken and training provided to ensure the safety of the crew and other persons who may be on board during the cargo operation and fumigation.

Recommendations

The Owners, Operators, Masters and Crew of the vessels that require in-transit fumigation of cargoes:

1. Shall in accordance with Regulation 3.6 of the IMSBC Code, perform in-transit fumigation, where applicable, based on the 'Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds (MSC.1/Circ.1264), as amended by MSC.1/Circ.1396';
2. Should take into consideration the hazards described above in the risk assessment for in-transit fumigation using Phosphides; and
3. Should determine if alternate arrangements can be made where port restrictions prevent the qualified shore fumigator-in-charge to board the vessel or remove the fumigant residues.

For more information please contact the Investigations department at investigations@lisr.com.

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