ภาคผนวก ๑

หนังสือเวียนของคณะกรรมการความปลอดภัยทางทะเล ที่ MSC.1/Circ.1264

ข้อแนะนำในการใช้สารกำจัดศัตรูพืชในเรืออย่างปลอดภัยสำหรับการรมยาในระวางสินค้า

(Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds)

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RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS APPLICABLE TO THE FUMIGATION OF CARGO HOLDS

1 The Maritime Safety Committee, at its sixty-second session (24 to 28 May 1993), approved the Recommendations on the safe use of pesticides in ships (MSC/Circ.612), proposed by the Sub-Committee on Containers and Cargoes at its thirty-second session.

2 The Maritime Safety Committee, at its eighty-fourth session (7 to 16 May 2008), approved the Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds, which apply to carriage of solid bulk cargoes including grain in pursuance of the requirement of SOLAS regulation VI/4, proposed by the Sub-Committee on Dangerous Goods, Solid Cargoes and Containers at its twelfth session, set out in the annex.

3 The Committee agreed that the Recommendations should not apply to the carriage of fresh food produce under controlled atmosphere.

4 Member Governments are invited to bring the Recommendations to the attention of competent authorities, mariners, fumigators, fumigant and pesticide manufacturers and others concerned.

5 The present circular supersedes MSC/Circ.612, as amended by MSC/Circ.689 and MSC/Circ.746 with regard to the fumigation of cargo holds.

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ANNEX

RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS APPLICABLE TO THE FUMIGATION OF CARGO HOLDS

1 INTRODUCTION

1.1 Insect and mite pests of plant and animal products may be carried into the cargo holds with goods (introduced infestation); they may move from one kind of product to another (cross-infestation) and may remain to attack subsequent cargoes (residual infestation). Their control may be required to comply with phytosanitary requirements to prevent spread of pests and for commercial reasons to prevent infestation and contamination of, or damage to, cargoes of human and animal food both raw and processed materials. Although fumigants may be used to kill rodent pests, the control of rodents on board ships is dealt with separately. In severe cases of infestation of bulk cargoes such as cereals, excessive heating may occur.

1.2 The following sections provide guidance to shipmasters in the use of pesticides* with a view to safety of personnel. They cover pesticides used for the control of insect** and rodent pests in empty and loaded cargo holds.

2 PREVENTION OF INFESTATION

2.1 Maintenance and sanitation

2.1.1 Ship cargo holds, tank top ceilings and other parts of the ship should be kept in a good state of repair to avoid infestation. Many ports of the world have rules and by-laws dealing specifically with the maintenance of ships intended to carry grain cargoes; for example, boards and ceilings should be completely grain-tight.

2.1.2 Cleanliness, or good housekeeping, is as important a means of controlling pests on a ship as it is in a home, warehouse, mill or factory. Since insect pests on ships become established and multiply in debris, much can be done to prevent their increase by simple, thorough cleaning. Box beams and stiffeners, for example, become filled with debris during discharge of cargo and unless kept clean can become a source of heavy infestation. It is important to remove thoroughly all cargo residue from deckhead frames and longitudinal deck girders at the time of discharge, preferably when the cargo level is suitable for convenient cleaning. Where available, industrial vacuum cleaners are of value for the cleaning of cargo holds and fittings.

2.1.3 The material collected during cleaning should be disposed of, or treated, immediately so that the insects cannot escape and spread to other parts of the ship or elsewhere. In port it may be burnt or treated with a pesticide, but in many countries such material may only be landed under phytosanitary supervision. If any part of the ship is being fumigated the material may be left exposed to the gas.

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* The word *pesticide* as used throughout the text means fumigants. Examples of some commonly used pesticides are listed in appendix 1.

** The word *insect* as used throughout the text includes mites.

3 CHEMICAL CONTROL OF INSECT INFESTATION

3.1 Methods of chemical disinfestation

3.1.1 *Types of pesticides and methods of insect control*

3.1.1.1 To avoid insect populations becoming firmly established in cargo holds and other parts of a ship, it is necessary to use some form of chemical toxicant for control. The materials available may be divided conveniently into two classes: contact insecticides and fumigants. The choice of agent and method of application depend on the type of commodity, the extent and location of the infestation, the importance and habits of the insects found, and the climatic and other conditions. Recommended treatments are altered or modified from time to time in accordance with new developments.

3.1.1.2 The success of chemical treatments does not lie wholly in the pesticidal activity of the agents used. In addition, an appreciation of the requirements and limitations of the different available methods is required. Crew members can carry out small-scale or "spot" treatments if they adhere to the manufacturer's instructions and take care to cover the whole area of infestation. However, extensive or hazardous treatments including fumigation and spraying near human and animal food should be placed in the hands of professional operators, who should inform the master of the identity of the active ingredients used, the hazards involved and the precautions to be taken.

3.1.2 *Fumigants*

3.1.2.1 Fumigants act in a gaseous phase even though they may be applied as solid or liquid formulations from which the gas arises. Effective and safe use requires that the space being treated be rendered gastight for the period of exposure, which may vary from a few hours to several days, depending on the fumigant type and concentration used, the pests, the commodities treated and the temperature. Additional information is provided on two of the most widely used fumigants, Methyl bromide and Phosphine, in appendix 1.

3.1.2.2 Since fumigant gases are poisonous to humans and require special equipment and skills in application, they should be used by specialists and not by the ship's crew.

3.1.2.3 Evacuation of the space under gas treatment is mandatory and in some cases it will be necessary for the whole ship to be evacuated (see 3.3.1 and 3.3.2 below).

3.1.2.4 A "fumigator-in-charge" should be designated by the fumigation company, government agency or appropriate authority. He should be able to provide documentation to the master proving his competence and authorization. The master should be provided with written instructions by the fumigator-in-charge on the type of fumigant used, the hazards to human health involved and the precautions to be taken, and in view of the highly toxic nature of all commonly used fumigants these should be followed carefully. Such instructions should be written in a language readily understood by the master or his representative.

3.3.1.10 If a clearance certificate cannot be issued after the fumigation of cargo in port, the provisions of 3.3.2 should apply.

3.3.2 *Fumigation continued in transit*

3.3.2.1 Fumigation in transit should only be carried out at the discretion of the master. This should be clearly understood by owners, charterers, and all other parties involved when considering the transport of cargoes that may be infested. Due consideration should be taken of this when assessing the options of fumigation. The master should be aware of the regulations of the flag State Administration with regard to in-transit fumigation. The application of the process should be with the agreement of the port State Administration. The process may be considered under two headings:

.1 fumigation in which treatment is intentionally continued in a sealed space during a voyage and in which no aeration has taken place before sailing; and

.2 in-port cargo fumigation where some aeration is carried out before sailing, but where a clearance certificate for the cargo hold(s) cannot be issued because of residual gas and the cargo hold(s) has been re-sealed before sailing.

3.3.2.2 Before a decision on sailing with a fumigated cargo hold(s) is made it should be taken into account that, due to operational conditions, the circumstances outlined in 3.3.2.1.2 may arise unintentionally, e.g., a ship may be required to sail at a time earlier than anticipated when the fumigation was started. In such circumstances the potential hazards may be as great as with a planned in-transit fumigation and all the precautions in the following paragraphs should be observed.

3.3.2.3 Before a decision is made as to whether a fumigation treatment planned to be commenced in port and continued at sea should be carried out, special precautions are necessary. These include the following:

.1 at least two members of the crew (including one officer) who have received appropriate training (see 3.3.2.6) should be designated as the trained representatives of the master responsible for ensuring that safe conditions in accommodation, engine-room and other working spaces are maintained after the fumigator-in-charge has handed over that responsibility to the master (see 3.3.2.12); and

.2 the trained representatives of the master should brief the crew before a fumigation takes place and satisfy the fumigator-in-charge that this has been done.

3.3.2.4 Empty cargo holds are to be inspected and/or tested for leakage with instruments so that proper sealing can be done before or after loading. The fumigator-in-charge, accompanied by a trained representative of the master or a competent person, should determine whether the cargo holds to be treated are or can be made sufficiently gastight to prevent leakage of the fumigant to the accommodation, engine-rooms and other working spaces in the ship. Special attention should be paid to potential problem areas such as bilge and cargo line systems. On completion of such inspection and/or test, the fumigator-in-charge should supply to the master for his retention a signed statement that the inspection and/or test has been performed, what provisions have been made and that the cargo holds are or can be made satisfactory for fumigation. Whenever a cargo

If the provisions of 3.3.2.9.1 are not satisfied,

either:

.2 After application of fumigants, the ship should be delayed in port alongside at a suitable berth or at anchorage for such a period as to allow the gas in the fumigated cargo holds to reach sufficiently high concentrations to detect any possible leakage. Special attention should be paid to those cases where fumigants in a solid or liquid form have been applied which may require a long period (normally from 4 to 7 days unless a recirculation or similar distribution system is used) to reach such a high concentration that leakages can be detected. If leakages are detected, the ship should not sail until the source(s) of such leakages is(are) determined and eliminated. After ascertaining that the ship is in a safe condition to sail, i.e. no gas leakages are present, the fumigator-in-charge should furnish the master with a written statement that:

.2.1 the gas in the cargo hold(s) has reached sufficiently high concentrations to detect any possible leakages;

.2.2 spaces adjacent to the treated cargo hold(s) have been checked and found gas-free; and

.2.3 the ship's representative is fully conversant with the use of the gas-detection equipment provided.

or:

.3 After application of the fumigants and immediately after the sailing of the ship, the fumigator-in-charge should remain on board for such a period as to allow the gas in the fumigated cargo hold or spaces to reach sufficiently high concentrations to detect any possible leakage, or until the fumigated cargo is discharged (see 3.3.2.20), whichever is the shorter, to check and rectify any gas leakages. Prior to his leaving the ship, he should ascertain that the ship is in a safe condition, i.e. no gas leakages are present, and he should furnish the master with a written statement to the effect that the provisions of 3.3.2.9.2.1, 3.3.2.9.2.2 and 3.3.2.9.2.3 have been carried out.

3.3.2.10 On application of the fumigant, the fumigator-in-charge should post warning signs at all entrances to places notified to the master as in 3.3.2.8. These warning signs should indicate the identity of the fumigant and the date and time of fumigation. A specimen of such a warning sign is given in appendix 2.

3.3.2.11 At an appropriate time after application of the fumigant, the fumigator-in-charge, accompanied by a representative of the master, should check that accommodation, engine-rooms and other working spaces remain free of harmful concentrations of gas.

3.3.2.12 Upon discharging his agreed responsibilities, the fumigator-in-charge should formally hand over to the master in writing responsibility for maintaining safe conditions in all occupied spaces. The fumigator-in-charge should ensure that gas-detection and respiratory protection equipment carried on the ship is in good order, and that adequate fresh supplies of consumable items are available to allow sampling as required in 3.3.2.13.

4 REGULATIONS FOR THE USE OF PESTICIDES

4.1 National and international controls on pesticide usage

4.1.1 In many countries the sale and use of pesticides are regulated by governments to ensure safety in application and prevention of contamination of foodstuffs. Among the factors taken into account in such regulations are the recommendations made by international organizations such as FAO and WHO, especially in regard to maximum limits of pesticide residues in food and foodstuffs.

4.1.2 Examples of some commonly used pesticides are listed in appendix 1. Pesticides should be used strictly in accordance with the manufacturer's instructions as given on the label or package itself. National regulations and requirements vary from one country to another; therefore particular pesticides which may be used for treatment of cargo holds and accommodation in ships may be limited by the regulations and requirements of:

.1 the country where the cargo is loaded or treated;

.2 the country of destination of the cargo, especially in regard to pesticide residues in foodstuffs; and

.3 flag State of the ship.

4.1.3 Ships' masters should ensure that they have the necessary knowledge of the above regulations and requirements.

5 SAFETY PRECAUTIONS – GENERAL

5.1 Fumigation

5.1.1 Ship's personnel should not handle fumigants and such operations should be carried out only by qualified operators. Personnel allowed to remain in the vicinity of a fumigation operation for a particular purpose should follow the instructions of the fumigator-in-charge implicitly.

5.1.2 Aeration of treated cargo holds should be completed and a clearance certificate issued as in 3.3.1.8 or 3.3.1.10 before personnel are permitted to enter.

5.2 Exposure to pesticides resulting in illness

5.2.1 In the case of exposure to pesticides and subsequent illness, medical advice should be sought immediately. Information on poisoning may be found in the Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG) or on the package (manufacturer's instructions and safety precautions on the label or the package itself).

3.2 *Phosphine*

3.2.1 A variety of Phosphine-generating formulations are used for in-ship in-transit or at-berth fumigations. Application methods vary widely and include surface-only treatment, probing, perforated tubing laid at the bottom of spaces, recirculation systems and gas-injection systems or their combinations. Treatment times will vary considerably depending on the temperature, depth of cargo and on the application method used.

3.2.2 Any discharge of active packages producing Phosphine gas represents a significant risk to the public who may encounter them at sea. It should therefore be ensured that all waste and residues are disposed of in an appropriate manner, either by incineration or by disposal on shore, as recommended by the manufacturer. **Clear written instructions must be given to the master of the ship, to the receiver of the cargo and to the authorities at the discharging port as to how any powdery residues are to be disposed of.**

3.2.3 These will vary with each formulation and the method of application. Prior to discharge, ventilation must be done, forced if necessary, to reduce the gaseous residues below the occupational exposure limit values set by the flag State regulations in the free spaces (see procedures for ventilation in 3.3.2.17 to 3.3.2.19). For safety aspects during the voyage see 3.3.2.3.

APPENDIX 3

MODEL CHECKLIST FOR IN-TRANSIT FUMIGATION

Date: . . . . . .

Port: . . . . . Terminal/Quay: . . . . . .

Ship's name: . . . . . .

Type of fumigant: . . . . . Method of application: . . . . . .

Date & time fumigation commenced: . . . . . .

Name of fumigator/company: . . . . . .

The master and fumigator-in-charge, or their representatives, should complete the checklist jointly. The purpose of this checklist is to ensure that the responsibilities and requirements of 3.3.2.11, and 3.3.2.12 are carried out fully for in-transit fumigation under section 3.3.2.9.

Safety of operations requires that all questions should be answered affirmatively by ticking the appropriate boxes. If this is not possible, the reason should be given and agreement reached upon precautions to be taken between ship and fumigator-in-charge. If a question is considered to be not applicable write "n/a", explaining why, if appropriate.

PART A: BEFORE FUMIGATION

		SHIP	FUMIGATOR-IN-CHARGE
1	The inspection required before loading has been performed (3.3.2.4)	[ ]	[ ]
2	All the cargo holds to be fumigated are satisfactory for fumigation	[ ]	[ ]
3	Spaces, where found not to be satisfactory, have been sealed	[ ]	[ ]
4	The master or his trained representatives have been made aware of the specific areas to be checked for gas concentrations throughout the fumigation period	[ ]	[ ]
5	The master or his trained representatives have been made familiar with the fumigant label, detection methods, safety procedures and emergency procedures (refer to 3.3.2.6)	[ ]	[ ]
6	The fumigator-in-charge has ensured that gas-detection and respiratory protection equipment carried on the ship is in good order, and that adequate fresh supplies of consumable items for this equipment are available to allow sampling as required by 3.3.2.13.	[ ]	[ ]
7	The master has been notified in writing of:		
	(a) the spaces containing cargo to be fumigated	[ ]	[ ]
	(b) any other spaces that are considered unsafe to enter during the fumigation	[ ]	[ ]

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หนังสือเวียนของคณะกรรมการความปลอดภัยทางทะเล ที่ MSC.1/Circ.1358

ข้อแนะนำในการใช้สารกำจัดศัตรูพืชอย่างปลอดภัย

(Revised recommendations on the safe use of pesticides in ships)

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RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS

1 The Maritime Safety Committee, at its sixty-second session (24 to 28 May 1993), approved the Recommendations on the safe use of pesticides in ships (MSC/Circ.612), proposed by the Sub-Committee on Containers and Cargoes at its thirty-second session.

2 The Maritime Safety Committee, at its eighty-seventh session (12 to 21 May 2010), approved the revised Recommendations on the safe use of pesticides in ships in pursuance of the requirement of SOLAS regulation VI/4, proposed by the Sub-Committee on Dangerous Goods, Solid Cargoes and Containers at its fourteenth session, as set out in the annex to the present circular.

3 Member Governments are invited to bring the revised Recommendations to the attention of competent authorities, mariners, fumigators, fumigant and pesticide manufacturers and others concerned.

4 The present circular supersedes MSC/Circ.612, as amended by MSC/Circ.689 and MSC/Circ.746.

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ANNEX

REVISED RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS

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discharge of cargo and unless kept clean can become a source of heavy infestation. It is important to remove thoroughly all cargo residues from deckhead frames and longitudinal deck girders at the time of discharge, preferably when the cargo level is suitable for convenient cleaning. Where available, industrial vacuum cleaners are of value for the cleaning of cargo spaces and fittings.

2.1.3 The material collected during cleaning should be disposed of, or treated, immediately so that the insects cannot escape and spread to other parts of the ship or elsewhere. In port it may be burnt or treated with a pesticide, but in many countries such material may only be landed under phytosanitary supervision. Where destruction ashore is not practicable, the sweepings should be jettisoned well out to sea. If any part of the ship is being fumigated the material may be left exposed to the gas.

2.2 Main sites of infestation

2.2.1 Tank top ceiling: if, as often happens, cracks appear between the ceiling boards, food material may be forced down into the underlying space and serve as a focus of infestation for an indefinite period. Insects bred in this space can readily move out to attack food cargoes and establish their progeny in them.

2.2.2 'Tween-deck centre lines, wooden feeders and bins are often left in place for several voyages and because of their construction are frequent sources of infestation. After unloading a grain cargo, burlap and battens covering the narrow spaces between the planks should be removed and discarded before the holds are cleaned or washed down. These coverings should be replaced by new material in preparation for the next cargo.

2.2.3 Transverse beams and longitudinal deck girders which support the decks and hatch openings may have an L-shaped angle-bar construction. Such girders provide ledges where grain may lodge when bulk cargoes are unloaded. The ledges are often in inaccessible places overlooked during cleaning operations.

2.2.4 Insulated bulkheads near engine-rooms: when the hold side of an engine-room bulkhead is insulated with a wooden sheathing, the air space and the cracks between the boards often become filled with grain and other material. Sometimes the air space is filled with insulating material which may become heavily infested and serves as a place for insect breeding. Temporary wooden bulkheads also provide an ideal place for insect breeding, especially under moist conditions, such as when green lumber is used.

2.2.5 Cargo battens: the crevices at the sparring cleats are ideal places for material to lodge and for insects to hide.

2.2.6 Bilges: insects in accumulations of food material are often found in these spaces.

2.2.7 Electrical conduit casings: sometimes the sheet-metal covering is damaged by general cargo and when bulk grain is loaded later, the casings may become completely filled. This residual grain has often been found to be heavily infested. Casings that are damaged should be repaired immediately or, where possible, they should be replaced with steel strapping, which can be cleaned more easily.

2.2.8 Other places where material accumulates and where insects breed and hide include:

.1 the area underneath burlap, which is used to cover limber boards and sometimes to cover tank top ceilings;

dispersing nozzles, venturi systems or centrifugal force. Insecticidal smokes are evolved from generators simply by igniting the material and such generators are a convenient form of application for use by ships' personnel.

3.1.2.3 Tests have shown that these insecticidal smokes and sprays can be very effective against insects moving freely in the open, in spaces such as holds. However, no appreciable penetration or control of insects can be obtained in deep crevices, or between or under deck boards, tank top ceilings and limber boards, places where infestation commonly occurs. Where insects are deep seated, it is usually necessary to use a fumigant.

3.1.2.4 Surface sprays – spraying with a suitable insecticide can also be used to control residual infestation. Within the limitations of the technique this is a convenient way to control insects as it does not require evacuation of spaces not being treated. Various formulations are available:

.1 emulsifiable concentrates and water-dispersible powder concentrates for dilution with water; and

.2 oil concentrates for dilution with a suitable carrier oil and, for small-scale use, ready-to-use formulations, usually in a light oil.

3.1.2.5 Hand-operated or mechanically-operated sprayers may be used according to the size of the job to be done. To reach the heights of some ships' holds, power equipment is required which will develop enough pressure to get the spray material where it is needed. Hand sprayers are rarely adequate; "Knapsack" sprayers which develop enough pressure to reach infested areas may be used. Such surface sprays produce a deposit toxic to insects present at the time and also to those that subsequently crawl over or settle on treated surfaces.

3.1.2.6 As with fogging, a disadvantage of spraying is that the insecticide does not kill insects hidden in inaccessible parts of cargo spaces. Insecticidal sprays applied in oil solutions or water emulsions take some time to dry and may be hazardous to persons moving about the ship. No cargo should be loaded until spray deposits have dried.

3.1.2.7 In addition to methods described above, insecticidal lacquers may be painted on to boundary junctures in accommodation and galley areas in accordance with the manufacturers' instructions, to provide control of pests. Hand sprayers and hand-held aerosols may also be effective in these areas.

3.1.2.8 During the application of contact insecticides by any method all personnel not directly involved should be evacuated from the areas being treated for a period of time not less than that recommended by the manufacturer of the specific pesticide used on the label or package itself.

3.1.3 Fumigants

3.1.3.1 Fumigants are used where contact insecticides will not give control. Fumigants act in a gaseous phase even though they may be applied as solid or liquid formulations from which the gas arises. Effective and safe use requires that the space being treated be rendered gas-tight for the period of exposure, which may vary from a few hours to several days, depending on the fumigant type and concentration used, the pests, the commodities treated and the temperature. Additional information is provided on two of the most widely used fumigants, methyl bromide and phosphine (hydrogen phosphide) in the annex, paragraph 5.

3.1.3.2 Since fumigant gases are poisonous to humans and require special equipment and skills in application, they should only be used by specialists and not by the ship's crew.

3.2 Disinfestation of empty cargo spaces

3.2.1 An empty cargo space may be treated by any of the methods described, excepting the use of insecticidal lacquers. Care should be taken to avoid contamination and taint to subsequent cargoes. Examples of some commonly used pesticides are listed in the annex. (For precautions see 3.1.4.)

3.3 Disinfestation of food stores, galleys, and crew and passenger accommodation

3.3.1 In general only those insecticides suitable for use in cargo spaces should be used in dry food stores in ships. A wider range of insecticides may be needed for treatments in galleys and in passenger and crew accommodation, especially against pests such as cockroaches, ants, flies and bed-bugs. Examples of some commonly used pesticides are listed in the annex.

3.4 Disinfestation of cargoes and surrounds

3.4.1 The recommendations applicable to the fumigation of loaded or partially loaded cargo holds are contained in MSC.1/Circ.1264.

3.5 Carriage of fumigated freight containers, barges and other cargo transport units on a ship

3.5.1 The recommendations applicable to the fumigation of cargo transport units are contained in MSC.1/Circ.1265.

4 CONTROL OF RODENT PESTS

4.1 General

4.1.1 With regard to rodent control, ships are subject to the provisions of the WHO's International Health Regulations.

4.1.2 Rodents may be controlled by fumigation, by the use of a bait incorporating a poison which acts within a few minutes (acute poison), or one which acts over a period (chronic poison), or by trapping.

4.2 Fumigation and baiting

4.2.1 Fumigation against rodents is normally done at dosages and periods of exposure much less than those required for insect control. It follows that an insect fumigation also controls rodents in areas that are treated. However, rodent control often requires fumigation of accommodation and working spaces that may not normally be treated for insect control.

4.2.2 Fumigation against rodents alone should be undertaken in port and ventilation completed in port. The precautions in 3.1.4 should be observed.

4.2.3 Methods involving fumigation or the use of acute poisons should be employed only by qualified personnel of pest control servicing firms or appropriate authorities (e.g., Port Health Authorities). Baits containing acute poisons should be collected and disposed of by such personnel when the treatment is completed. Chronic poisons should be used strictly in accordance with the manufacturer's instructions contained on the label or on the package itself.

6.1.2 Pesticides should be stored in strict compliance with national regulations and requirements or the manufacturers' instructions.

6.1.3 Smoking, eating or drinking while using pesticides should always be avoided.

6.1.4 Empty pesticide receptacles and packaging should never be re-used.

6.1.5 Hands should always be washed after applying pesticides.

6.2 Space and surface spraying (see also 3.1.2 above)

6.2.1 When spraying is being carried out by professional operators they are responsible for taking the necessary safety precautions. If operations are carried out by the crew, the master should ensure that the following safeguards are observed, both in the preparation and the application of the pesticides:

.1 wear protective clothing, gloves, respirators and eye protection appropriate to the pesticides being used;

.2 do not remove clothes, gloves, respirators or eye protection whilst applying pesticides, even under hot conditions; and

.3 avoid excessive application and run-off on surfaces and avoid contamination of foodstuff.

6.2.2 If clothing becomes contaminated:

.1 stop work immediately and leave area;

.2 remove clothing and footwear;

.3 take a shower and wash skin thoroughly;

.4 wash clothing and footwear, and wash skin again; and

.5 seek medical advice.

6.2.3 After work:

.1 remove and wash clothing, footwear and other equipment; and

.2 take a shower using plenty of soap.

6.3 Fumigation

6.3.1 Ships' personnel should not handle fumigants and such operations should be carried out only by qualified operators. Personnel allowed to remain in the vicinity of a fumigation operation for a particular purpose should follow the instructions of the fumigator-in-charge implicitly.

6.3.2 Aeration of treated spaces on board a ship should be completed and a gas-free certificate should be issued as described in 3.1.4 before personnel are permitted to enter.

ANNEX

PESTICIDES SUITABLE FOR SHIPBOARD USE

1 INTRODUCTION

1.1 The materials listed should be used strictly in accordance with the manufacturers' instructions and safety precautions, given on the label or package itself, especially in respect of flammability and with regard to any further limitations applied by the law of the country of loading, destination or flag of the ship, contracts relating to the cargo, or the shipowner's instructions.

1.2 Materials may be used by ship's personnel unless the contrary is indicated. A space-application insecticide may be used in conjunction with a residual insecticide.

1.3 It should be especially noted that some materials listed may taint sensitive commodities, e.g., coffee and cocoa, and special care should be taken when stowing these commodities in order to prevent this. The reason for naming purified grades in the list below is to minimize tainting.

2 CONTACT INSECTICIDES IN A CARGO SPACE

2.1 Fast-acting insecticides for space application, e.g., against flying insects:

.1 Pyrethrins (with or without synergist);

.2 Bioresmethrin; and

.3 Dichlorvos.

2.2 Slower-acting residual insecticides for surface application:

.1 Malathion (premium grade);

.2 Bromophos;

.3 Carbaryl;

.4 Fenitrothion;

.5 Chlorpyriphos-methyl; and

.6 Pirimiphos-methyl.

3 CONTACT INSECTICIDES AND BAITS IN ACCOMODATION

3.1 Fast-acting insecticides for space application, e.g., against flying insects:

.1 Pyrethrins (with or without synergist);

.2 Bioresmethrin; and

.3 Dichlorvos.

5 FUMIGANTS

TO BE APPLIED ONLY BY QUALIFIED OPERATORS

Additional information on methyl bromide and phosphine (hydrogen phosphide) to be read in conjunction with 3.1.3.

Methyl bromide

Methyl bromide is used in situations where a rapid treatment of spaces or commodities is required. Fumigation with methyl bromide should be **permitted only when the ship is in the confines of a port** (either at anchor or alongside) and to disinfest the spaces after the crew members have disembarked (see 3.1.3.3). Prior to re-embarkation of the crew, ventilation of the treated spaces should be completed and a gas-free certificate should be issued as described in 3.1.4 before personnel are permitted to enter.

Phosphine (Hydrogen phosphide)

A variety of phosphine-generating formulations are used for at-berth fumigations and also for in-ship in-transit fumigations. Application methods vary widely and include surface only treatment, probing, perforated tubing laid at the bottom of spaces, recirculation systems and gas-injection systems or their combinations. Ventilation of the treated spaces should be completed and a gas-free certificate should be issued as described in 3.1.4 before personnel are permitted to enter. **All safety recommendations related to the fumigation of cargo in cargo holds under in-ship in-transit fumigation are laid down in MSC.1/Circ.1264.**

5.1 Fumigants against insects in empty cargo spaces and against rodents anywhere aboard ship:

Carbon dioxide

Nitrogen

Methyl bromide and carbon dioxide mixture

Methyl bromide

Hydrogen cyanide

Phosphine (Hydrogen phosphide)

5.2 Fumigants against insects in loaded or partially loaded cargo spaces and cargo transport units:

Refer to MSC.1/Circ.1264 and MSC.1/Circ.1265

CARE IS NEEDED IN SELECTING TYPES AND AMOUNTS OF FUMIGANTS FOR TREATMENT OF PARTICULAR COMMODITIES

.1 Carbon dioxide;

.2 Nitrogen;

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หนังสือเวียนของคณะกรรมการความปลอดภัยทางทะเล ที่ MSC.1/Circ.1361

ข้อแนะนำในการใช้สารกำจัดศัตรูพืชในเรืออย่างปลอดภัยสำหรับการรมยาในระวางสินค้า

(Revised recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo transport units)

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MSC.1/Circ.1361
27 May 2010

REVISED RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS APPLICABLE TO THE FUMIGATION OF CARGO TRANSPORT UNITS

1 The Maritime Safety Committee, at its eighty-fourth session (7 to 16 May 2008), approved the Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo transport units (MSC.1/Circ.1265) to supersede MSC/Circ.612, as amended by MSC/Circ.689 and MSC/Circ.746 with regard to the fumigation of cargo transport units, proposed by the Sub-Committee on Dangerous Goods, Solid Cargoes and Containers at its twelfth session.

2 The Committee, at its eighty-seventh session (12 to 21 May 2010), having considered the proposal by the Sub-Committee on Dangerous Goods, Solid Cargoes and Containers, at its fourteenth session, with regard to the amendments to the IMDG Code which have been adopted at this session, approved Revised Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo transport units, set out in the annex, which apply to the carriage of packaged dangerous goods in pursuance of the requirements of SOLAS regulation VI/4 and the relevant provisions of the IMDG Code.

3 The Committee agreed that the Revised Recommendations should not apply to the carriage of fresh food produced under controlled atmosphere.

4 Member Governments are invited to bring the Revised Recommendations to the attention of competent authorities, mariners, fumigators, fumigant and pesticide manufacturers and others concerned and to apply the circular on or after 1 January 2011.

5 The present circular supersedes MSC.1/Circ.1265.

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ANNEX

REVISED RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS APPLICABLE TO THE FUMIGATION OF CARGO TRANSPORT UNITS

1 INTRODUCTION

1.1 These recommendations address the hazards to personnel arising from the operations involved in the carriage of fumigated cargo transport units. This guidance is aimed at everyone involved in the supply chain. Although the contents of the cargo transport unit may not be subject to the provisions of the International Maritime Dangerous Goods (IMDG) Code, fumigating a cargo transport unit brings it into the scope of the IMDG Code. According to this Code the mandatory hazard communication provisions include:

.1 warning mark on cargo transport unit;

.2 documents (transport document and special list, manifest or detailed stowage plan) associated with the transport of cargo transport units that have been fumigated and have not been completely ventilated before transport; and

.3 instructions for disposal for any residual fumigant.

1.2 It is generally acknowledged, however, that there may be non-compliance with these provisions. Before entering the cargo transport units, all personnel should assess the risk as to whether it is safe to enter and determine the presence of fumigant by the use of gas detection equipment.

2 REASONS FOR FUMIGATION

2.1 General

2.1.1 The presence of insects and rodents on ships is clearly undesirable for various reasons, and in addition to aesthetic and nuisance aspects, they may damage equipment and spread disease and infection, contaminate food in galleys and food stores, and cause damage to cargoes that will result in commercial or other losses.

2.1.2 The same highly toxic chemicals are used in cargo transport units as on board bulk ships. However, when a cargo transport unit that contains fumigant chemicals leaves the place at which it was fumigated, no one can practically supervise the hazard unless they are aware of the presence of the fumigant. Any person who later enters the cargo transport unit can, therefore, be unknowingly exposed to dangerous levels of highly toxic chemicals.

2.2 Insects in cargo transport units

2.2.1 Grubs and larvae of insects and other species can infest cargo, as well as packaging, dunnage, etc., associated with the cargo, at any stage during harvesting, manufacture, processing, storage, packing or transport. These can spoil foodstuffs, textiles, leather goods, furniture, art and antiques, affect electronic equipment, contaminate sterile goods or deface consumer packaging or labelling, making the goods unfit for sale and therefore valueless.

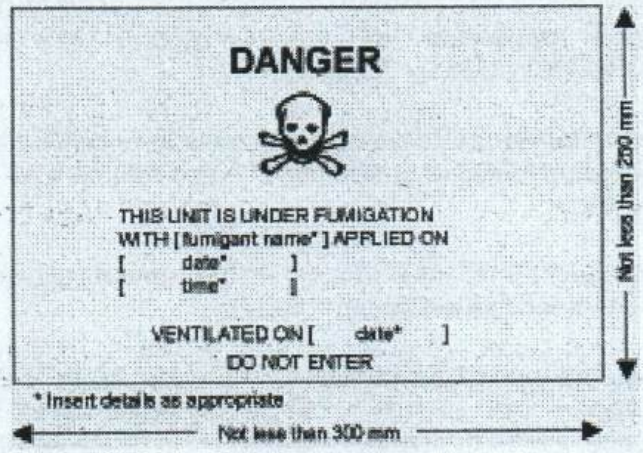
5.5.2.3 Marking and placarding

5.5.2.3.1 A fumigated cargo transport unit shall be marked with a warning mark, as specified in 5.5.2.3.2, affixed at each access point in a location where it will be easily seen by persons opening or entering the cargo transport unit. This mark shall remain on the cargo transport unit until the following provisions are met:

(a) The fumigated cargo transport unit has been ventilated to remove harmful concentrations of fumigant gas; and

(b) The fumigated goods or materials have been unloaded.

5.5.2.3.2 The fumigation warning mark shall be rectangular and shall not be less than 300 mm wide and 250 mm high. The markings shall be in black print on a white background with lettering not less than 25 mm high. An illustration of this mark is given below.



5.5.2.3.3 If the fumigated cargo transport unit has been completely ventilated either by opening the doors of the unit or by mechanical ventilation after fumigation, the date of ventilation shall be marked on the fumigation warning mark.

5.5.2.3.4 When the fumigated cargo transport unit has been ventilated and unloaded, the fumigation warning mark shall be removed.

5.5.2.3.5 Class 9 placards (Model No.9, see 5.2.2.2.2) shall not be affixed to a fumigated cargo transport unit except as required for other Class 9 substances or articles packed therein.

5.5.2.4 Documentation

5.5.2.4.1 Documents associated with the transport of cargo transport units that have been fumigated and have not been completely ventilated before transport shall include the following information:

.1 UN 3359, fumigated cargo transport unit, 9, or UN 3359, fumigated cargo transport unit, class 9;

3.2 Shoreside fumigation operations: fumigated cargo transport units

3.2.1 Fumigated cargo transport units which have been ventilated

3.2.1.1 It is important to ensure that cargo transport units are properly ventilated by opening the doors and allowing the gas to escape. This can be a natural process, or can be accelerated by mechanical means such as blowers or extractors. The ventilation process can take many hours or even days.

3.2.1.2 When the cargo transport unit has been completely ventilated without unloading the cargo, the date of ventilation should be added to the fumigation warning mark in accordance with 5.5.2.3.3 of the IMDG Code. For such cargo transport units, a transport document and the instructions for disposal of any residual fumigant are not required.

3.2.1.3 Care should be taken even after a cargo transport unit has been declared as ventilated. Gas can be held in packages of cargo, then desorbed over a long period of time, even over many days, raising the level of gas inside the cargo transport unit to above the safe exposure level. Bagged cereals and cartons with large air spaces are likely to produce this effect. Alternatively, gas and the fumigant sachets or tablets can become "trapped" at the far end of a cargo transport unit by tightly-packed cargo.

3.2.2 Cargo transport units loaded without ventilation after fumigation (fumigation in transit)

3.2.2.1 A cargo transport unit containing cargo under fumigation should not be allowed on board until sufficient time has elapsed to allow the attainment of a reasonably uniform gas concentration throughout the cargo. Because of variations due to types and amounts of fumigants and commodities and temperature levels, the period between fumigant application and loading of the fumigated cargo transport unit on board the ship should be determined by the competent authority. Twenty-four hours is normally adequate for this purpose.

3.2.2.2 Transport of fumigated cargo transport units which have not been ventilated before loading onto the ship shall be in accordance with the provisions of the IMDG Code for UN 3359.

3.2.2.3 In column (17) (Properties and observations) of the Dangerous Goods list for UN 3359, the following information is given:

> "FUMIGATED CARGO TRANSPORT UNIT" is a closed cargo transport unit containing goods or materials that either are or have been fumigated within the unit. The fumigant gases used are either poisonous or asphyxiant. The gases are usually evolved from solid or liquid preparations distributed within the unit. See also 5.5.2."

3.2.3 Marking of the cargo transport unit

3.2.3.1 A fumigated cargo transport unit shall be marked with the warning mark, as specified in 5.5.2.3.2 of the IMDG Code. Class 9 placards shall not be affixed to the fumigated cargo transport units except as required by other class 9 substances or articles packed therein. This mark shall remain until the cargo has been unloaded. When the fumigated cargo transport unit is loaded with dangerous goods in addition to the fumigant, the cargo transport unit shall display the placards and marks relevant to these goods.

the Safety Data Sheet if available. The ventilation rate of the mechanical ventilation system should be at least two air changes per hour, based on the empty cargo space.

.6 If stowed under deck, equipment suitable for detecting the fumigant gas or gases used shall be carried on the ship, with instructions for its use.

3.4.2 Before a fumigated cargo transport unit is loaded to a ship under deck, special precautions are necessary. This should include the following:

.1 at least an officer and one other are to receive appropriate training and will be designated as the trained representatives of the master. The master, through his representative, is responsible for ensuring safe conditions in the occupied spaces of the ship; and

.2 the trained representatives should brief the crew before the fumigated cargo transport unit is loaded.

3.4.3 Most fumigant gases are heavier than air so care should be taken in the holds particularly when working on the tank tops.

3.4.4 The trained representatives of the master should be provided, and be familiar, with:

.1 the information in the relevant Safety Data Sheet (SDS), if available; and

.2 the recommendations of the fumigant manufacturer concerning methods of detection of the fumigant in air, its behaviour and hazards properties, symptoms of poisoning, relevant first aid and special medical treatment and emergency procedures.

3.4.5 The ship should carry:

.1 appropriate gas-detection equipment for the fumigant concerned, together with instructions for its use when the fumigated cargo transport unit is stowed under deck;

.2 instructions on disposal of residual fumigant material; and

.3 emergency response information regarding UN 3359 such as a copy of the latest version of the Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG).

In addition, the ship should carry at least four sets of appropriate respiratory protective equipment; and when the fumigated cargo transport unit is stowed on deck, appropriate gas-detection equipment for the fumigant concerned, together with instructions for its use.

3.4.6 Prior to the arrival of the ship, generally not less than 24 h in advance, the master should inform the appropriate authorities of the country of destination and ports of call that fumigation in transit is being carried out. The information should include the type of fumigant used, the date of fumigation and cargo spaces carrying fumigated cargo transport units.

5.4 As moisture is required for the reaction to take place, when a cargo transport unit is opened at sea the level of moisture in the air may restart the reaction.

5.5 After the Magnesium or Aluminium Phosphide reacts with moisture to generate Phosphine, a residue of magnesium or aluminium hydroxide remains. This is a light powdery grey substance like ash. Hopefully, this has been retained in some kind of packaging so that it can be removed safely. If, however, there is a residue over the cargo, the crew must avoid breathing in this residue or getting it into their eyes or mouth. If not, they are still at risk of being poisoned by the residue, which may still be able to generate some Phosphine.

5.6 It should be noted that there are certain commodities (e.g., edible nuts) where a small amount of fumigant is put in cotton wool and placed inside each bag. These items are then dangerous because their handling brings the fumigant close to the face.

5.7 Personnel should be made aware that not every fumigated cargo transport unit is declared and, hence, not marked as such. There are indicators for fumigated cargo transport units like tapes on vents or the door joints, a possible "fishy garlic" smell of Phosphine and packets or piles of powdery residue inside the cargo transport unit.

6 FUMIGATION DETECTION

6.1 General

6.1.1 The most effective method of protection is to carry out gas tests before the cargo transport unit is opened. As a minimum, it is recommended to test for Phosphine and Methyl bromide as the two most common fumigants used. If gas is found, the cargo transport unit should be put aside for ventilation.

6.2 Stain tube gas test equipment

6.2.1 Glass stain tube equipment is simple in design and use, robust and reliable. A test for Phosphine and Methyl bromide can be carried out by a person standing outside the cargo transport unit using a lance inserted into the cargo transport unit doorway. In practice, air is drawn by small hand-held bellows through a glass tube containing impregnated crystals which react with the gas for which the test is being done. If the air is contaminated by the gas in question, the crystals change colour. The function is not affected by moisture, but care has to be taken to warm the tubes to above 0°C in sub-zero temperatures. Also a reasonable degree of light is required to detect the colour change of the crystals. The tubes should be used in accordance with the manufacturer's instructions. In particular, they shall not be used after their expiry date.

6.3 Electronic (photo-ionisation gas testing equipment)

6.3.1 Gas tests can be carried out that detect the presence of gases and their concentration levels. Similarly, equipment can confirm that there is a safe level of oxygen within the cargo transport unit. At the present time, the technology is such that both the quantification and discrimination are poor. There are frequent false positives due to cross sensitivities and readings are not accurate enough for determining safe exposure levels. Therefore, these instruments are used for preliminary screening.

APPENDIX

Ensure suitability of cargo transport unit for fumigation operations and minimize escape of fumigants

Fumigate Cargo Transport Unit

Has the CTU been completely ventilated?

Yes → Ventilated cargo transport unit Subject only to the fumigation warning mark with the date of ventilation

No → Cargo transport units loaded without ventilation after fumigation (fumigation in transit)

Mark and Document

- The transport document shall specify UN 3359, the proper shipping name (fumigated cargo transport unit), the class (9), the date and time and the type and amount of fumigant used
- to be declared on the special list/manifest/stowage plan

In the absence of the fumigation warning mark as described above, indications for both declared and non-declared fumigated cargo transport units.

- Taped doors/vents
- Packets/piles of powdery residue
- Odour
- Nature, origin and destination of cargo
- Other warning signs

When opening cargo transport units

- Risk assess whether safe to enter the cargo transport unit
- Awareness/marking of residual hazard
- Importance of proper ventilation (venting can take many hours)
- Front to back unloading of cargo transport units
- Avoid "tunnelling" into cargo transport units to retrieve packages
- Remove any marking when the cargo transport unit is fully unloaded and cleaned

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หนังสือเวียนของคณะกรรมการความปลอดภัยทางทะเล ที่ MSC.1/Circ.1396

ข้อแก้ไขเพิ่มเติมข้อแนะนำในการใช้สารกำจัดศัตรูพืชในเรืออย่างปลอดภัยสำหรับการรมยาในระวางสินค้า

(Amendment to the recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds)

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MSC.1/Circ.1396
16 June 2011

AMENDMENT TO THE RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS APPLICABLE TO THE FUMIGATION OF CARGO HOLDS (MSC.1/CIRC.1264)

1 The Maritime Safety Committee, at its eighty-fourth session (7 to 16 May 2008), approved the Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds (MSC.1/Circ.1264), which apply to the carriage of solid bulk cargoes, including grain, in pursuance of the requirement of SOLAS regulation VI/4.

2 The Maritime Safety Committee, at its eighty-ninth session (11 to 20 May 2011), approved the following amendment to section 5 (Safety Precautions – General) of the aforementioned Recommendations, as prepared by the Sub-Committee on Dangerous Goods, Solid Cargoes and Containers (DSC) at its fifteenth session:

"**5.3 Fire risk**

5.3.1 When Phosphine generating formulations are used to fumigate, any collected residue may ignite."

3 Member Governments are invited to bring the above amendment to the Recommendations to the attention of competent authorities, seafarers, fumigators, fumigant and pesticide manufacturers and others concerned.
