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AMENDMENTS TO THE IMSBC CODE AND SUPPLEMENTS

Safe handling of solid bulk cargoes

Submitted by IBTA

SUMMARY

Executive summary: This document contains information regarding the consideration of the safe handling of solid bulk cargoes, in particular regarding specific hazard identification, risk assessment and control procedures. This document also takes into account the relevant recommendations in the *Revised recommendations for entering enclosed spaces aboard ships* (resolution A.1050(27)) and *Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds* (MSC.1/Circ.1264). Interested Member States and international organizations are welcome to contact IBTA, with a view to taking further action aimed at reducing the continuing loss of life and serious accidents involving solid bulk cargoes, particularly Group B cargoes, in the IMSBC Code.

Strategic direction, if applicable: Other work

Output: OW 9

Action to be taken: Paragraph 20

Related documents: MSC.1/Circ.1264 and resolution A.1050(27)

Background

1 At least 106 people lost their lives and many more were seriously injured in at least 71 accidents, which occurred during the carriage or handling of solid bulk cargoes on board ships between 1999 and April 2018. Some 88 people lost their lives in 55 accidents due to asphyxiation and/or carbon monoxide poisoning. Another 18 people lost their lives in 13 fire/explosion accidents. These accidents involved both ship and shore workers, with 36 shore workers losing their lives as well as 70 seafarers. Many of the injured suffered brain damage.

2 It is important to note that of the 88 people who lost their lives due to asphyxiation, 76 died on hold access ladders. Another 9 people died in the cargo holds and 3 in adjacent forecastle spaces. A total of 14 seafarers lost their lives when their ships sank following hydrogen gas explosions in the cargo holds. The gas explosions were also the cause of death of 2 people in the forecastle and another 2 in deck mast house spaces. On the basis of the information available, 42 accidents occurred on ships in port and 19 occurred at sea. Of the identifiable accidents in port, 38 occurred during unloading operations and 3 during loading operations.

3 Of the five adjacent space accidents, three occurred on small general cargo coastal bulker type ships, one on a handysize and one on a handymax bulk carrier. Of the 52 identifiable ships involved, 18 were general cargo/multi-purpose ships (coastal bulkers), 8 were handysize bulk carriers, 14 were handymax bulk carriers, 4 were handymax general cargo ships (forest product carriers), and 3 were panamax. One was a post panamax and 1 was a capesize.

4 The cargoes involved in these accidents included 58 cargoes classified in the IMSBC Code as Group B, 2 cargoes classified as Group C, 2 cargoes that are not listed in the Code, 3 grain cargoes and 3 whose classification is unknown. They included coal (20), wood products-general (15), wood pellets (6), wood chips (2), metal turnings (2), copper concentrate (2), zinc concentrate (2), zinc skimmings (1), pet coke (3), seed cake (1), ammonium nitrate based fertilizer (3), scrap metal (2), incinerator bottom ash (1), nut shells (1), palm kernel (1) and grain (3).

5 The data contained in annex 1 also indicates that the trend in the number of both "enclosed space accidents" and "fires/explosions involving solid bulk cargoes" is increasing. This is evidenced by the fact that between 2014 and April 2018, there were some 17 IMSBC Code Group B cargo related accidents resulting in 19 fatalities, a number of serious injuries and fires/explosions on EU/UK-flagged ships, and on ships in EU/UK ports and coastal waters.

6 These figures are based on accident investigation reports published by national authorities and in media reports, as contained in annex 1. It is likely that many more similar accidents have occurred on ships worldwide in the last 20 years, and that many more people have been killed and injured in accidents for which reports are not available or else have not been found in the course of the research for this submission.

Introduction

7 While there have been relatively few enclosed space accidents in recent years in ballast tanks, fuel tanks and similar spaces, accidents continue to occur in the cargo holds and adjacent spaces of ships carrying solid bulk cargoes. The repetitive patterns (these accidents continue to occur in the same way and in the same location on ships carrying solid bulk cargoes) clearly show that these accidents are not only due to the behaviour of the ship and shore personnel concerned, but also point to the need for more systematic and structured hazard identification and risk assessment procedures to be put in place for ships carrying solid bulk cargoes.

Discussions and considerations

8 The following proposals are considered:

- .1 section 3 of the IMSBC Code should be amended to include a specific requirement for a risk assessment to be carried out for each solid bulk cargo to be loaded, carried or unloaded with a view to determining if it possesses any chemical hazard which could give rise to a dangerous situation on the ship;
- .2 the *Revised recommendations for entering enclosed spaces aboard ships* (resolution A.1050(27)) should be amended to provide guidance on how these risk assessments should be carried out, as suggested below; or
- .3 alternatively, instead of amending the Revised recommendations as proposed above, initiating the development of a set of specific guidelines for systematically assessing the risks regarding and controlling the dangers to safety and health associated with the loading, unloading and shipping of solid bulk cargoes should be considered.

Considerations for section 3 of IMSBC Code

9 The following texts are considered for insertion in the appropriate parts of section 3 of the IMSBC Code:

- "**3.2.3.1** Prior to loading any solid bulk cargo, a competent person should make a written preliminary assessment of the proposed cargo, taking due account of the information provided regarding the class, group, characteristics, hazards and required conditions for carriage and handling for the proposed cargo. Current, valid information about the cargo is provided either in the shipper's declaration (Form for Cargo Information) and in the individual schedule for the cargo in appendix 1 of this Code; or where a cargo is not listed in the Code, in the certificate issued by the competent authority of the port of loading in accordance with section 1.3.
- 3.2.3.2** If the cargo is Group B (UN Class or MHB), then a formal risk assessment should be carried out, taking account of the cargo class and group and the hazard information, weather precautions, loading precautions and other relevant information provided.
- 3.2.3.3** If the material is flammable, combustible or liable to spontaneous combustion; or is liable to emit a toxic or flammable gas or to cause oxygen depletion in the cargo space or in any adjacent space, then all hold access hatches should be secured against entry and warning signs be posted.
- 3.2.4** Prior to entry into an enclosed space aboard a ship, appropriate procedures shall be followed, taking into account the recommendations developed by the Organization. It is to be noted that, after a cargo space or tank has been tested and generally found to be safe for entry, small areas may exist where oxygen is deficient or toxic fumes are still present.
- 3.2.4.1** Before any personnel are authorized to enter any cargo space containing any Group B solid bulk cargo, the master or delegated competent person should:
 - .1 carry out a risk assessment of the cargo, the physical characteristics of the cargo space(s) concerned and the operations to be carried out;

- .2 where it is necessary for shore personnel to enter any such spaces for the purpose of loading, stowing, unloading, surveying, inspecting or sampling the cargo, the risk assessment should be carried out jointly with the terminal representative with responsibility for operations conducted on board the particular ship or with other responsible shore personnel; and
- .3 identify and agree the precautions required during entry and the enclosed space entry permit arrangements to be used."

Considerations for the Revised recommendations for entering enclosed spaces aboard ships (resolution A.1050(27))

10 The following proposals are considered:

- .1 It is proposed to insert the following text in the "Preamble":

"Investigations into the circumstances of enclosed space accidents have shown that a failure to systematically identify the hazards, assess the risks and implement an appropriate entry procedure is a significant factor in many accidents";
- .2 It is proposed to amend the definition of "enclosed space" by inserting a fourth characteristic as follows:

".4 contains or has the potential to contain a hazardous atmosphere or lack of oxygen",

or similar wording;
- .3 It is proposed to list cargo spaces separately to the other spaces listed in the definition; and
- .4 In paragraph 2.2, it is proposed to amend the definition of "adjacent connected space" by inserting "frequently visited working areas and stores, such as forecastle head spaces".

Remark

11 The inclusion of this fourth characteristic would align the IMSBC Code definition of enclosed spaces with the definition used in the national laws and regulations of many government authorities worldwide. While definitions vary from country to country, almost all contain a reference to the need to consider the possibility of a hazardous or oxygen deficient atmosphere in the space, in addition to the three characteristics included in the definition in the IMSBC Code. Countries that embrace the need to consider the risk of a hazardous atmosphere in their definition of enclosed or confined spaces in their legislation include the United Kingdom; Ireland and many other EU Member States; United States; Canada; Australia; New Zealand; South Africa; China; Japan; Republic of Korea; Hong Kong, China; and also the International Labour Organization. The nature of solid bulk shipping means that ships can carry different cargoes on every loaded voyage, with the holds empty on ballast voyages between cargoes. These cargoes may be Group A, Group B, Group A and B, or Group C. Cargo spaces and adjacent spaces are likely to contain a hazardous atmosphere when Group B or Group A and B cargoes are carried but safe when carrying a Group A or Group C cargo or when they are empty. This changing between hazardous cargoes, non-hazardous cargoes and empty

hold conditions can lead to a failure to identify and control the risks when a hazardous cargo is actually carried.

Definitions

12 The following texts are proposed to replace the relevant definition below:

"2.1 *Enclosed space* means a space which has any of the following characteristics:

- .1 limited openings for entry and exit;
- .2 inadequate ventilation;
- .3 is not designed for continuous worker occupancy; and
- .4 contains or has the potential to contain a hazardous atmosphere or lack of oxygen;

and includes, but is not limited to:

- .1 cargo spaces and adjacent connected spaces; and
- .2 double bottoms, fuel tanks, ballast tanks, cargo pump-rooms, cargo compressor rooms, cofferdams, chain lockers, void spaces, duct keels, inter-barrier spaces, boilers, engine crankcases, engine scavenge air receivers, sewage tanks, and adjacent connected spaces. This list is not exhaustive and a list should be produced on a ship-by-ship basis to identify enclosed spaces.

2.2 Adjacent connected space means a normally unventilated space which is not used for cargo but which may share the same atmospheric characteristics with the enclosed space such as, but not limited to, cargo space access ways and frequently visited working areas and stores, such as forecastle head spaces."

Safety management for entry into enclosed space

13 The following amendments are considered:

.1 paragraph 3.3.1 should be replaced with the following:

"**3.3.1** Competent and responsible persons should be trained, using standards acceptable to the Administration, in:

- .1 enclosed space hazard recognition, evaluation, measurement, control and elimination; and
- .2 assessing all relevant information about the solid bulk cargo to be loaded, including the information provided in the sources listed in 10.3.2."

.2 paragraph 3.3.2 should be replaced with the following:

"3.3.2 Crew members should be trained, as appropriate, in:

- .1 enclosed space safety, including familiarization with onboard procedures for recognizing, evaluating and controlling hazards associated with entry into enclosed spaces; and
- .2 the onboard procedures for identifying, risk assessing and controlling hazards associated with the loading, carriage and discharge of solid bulk cargoes."

Assessment of risk

14 The following amendments are considered:

- .1 paragraph 4.2 should be amended by inserting "current cargo" as well as "previous cargo carried in the preliminary risk assessment"; and
- .2 paragraph 4.3 should be amended by inserting the following requirement:

"The details of the preliminary assessment should be to be recorded and kept on board. A standard checklist¹ should be used."

Authorization of entry

15 It is considered that paragraph 5.2 should be amended by inserting the following requirement after the text "the use of an entry permit system, which may include the use of a checklist":

"should always be used where the preliminary assessment identifies a risk to health or life".

General precautions

16 It is considered that paragraph 6.1 should be amended by inserting the following text in the recommendations:

- .1 access hatch lids leading to cargo spaces containing solid bulk cargoes and entry doors to adjacent spaces should at all times be secured against entry unless the spaces have been assessed and declared safe for entry; and
- .2 hold entry access hatch lids should have warning signs posted where the preliminary assessment indicates a risk to health or life. These warning signs should indicate the nature of the hazard and the date and time of posting. These signs should be removed when the space is declared safe for entry."

¹ An example checklist is set out in annex 2 to this document.

Testing the atmosphere

17 It is considered that a new paragraph 7.1.1 should be inserted after the existing paragraph 7.1, as follows:

"In relation to the atmospheric testing of cargo spaces containing solid bulk cargoes and adjacent spaces, account should be taken of the information provided in the shipper's declaration, in the individual schedule for the cargo or from other sources regarding the particular gases likely to be emitted by the cargo concerned or any risk of oxygen depletion, or both.

Gases emitted by certain solid bulk cargoes may not be detectable by the standard sensors (oxygen, flammables (methane), carbon monoxide and hydrogen sulphide) fitted in typical multi-gas detectors. Further advice should be obtained where the manufacturer's instructions indicate that the detector may not be suitable for any particular gas that could be emitted by the cargo. Detectors should be suitable for use in an oxygen depleted atmosphere."

Precautions during entry

18 It is considered that a new paragraph 8.4.1 should be inserted after the existing paragraph 8.4 to ensure that particular care is also taken when loading, carrying or discharging Group B solid bulk cargoes, as atmospheric conditions in the cargo holds may change at any time.

Hazards related to specific types of ships or cargo

19 It is considered that the following new paragraphs should be inserted after the existing paragraph 10.3 (Solid bulk):

"10.3.1 Dangerous atmospheres may develop in cargo spaces and adjacent spaces on ships carrying solid bulk cargoes covered by the IMSBC Code and also grain cargoes covered by the Grain Code. The dangers may include flammability, toxicity, oxygen depletion or self-heating, as identified in the shipper's declaration.

10.3.2 The IMSBC Code defines cargoes which possess a chemical hazard that could give rise to a dangerous situation on a ship as Group B. They may be classified as either dangerous goods in accordance with IMDG Code (part 2) criteria or as materials hazardous only in bulk (MHB) in accordance with section 9 of the IMSBC Code.

10.3.3 For additional hazard information about a specific cargo, reference should be made to:

- .1 the shipper's form for cargo information;
- .2 the individual schedules in appendix 1 of the IMSBC Code;
- .3 its UN classification number, as applicable;
- .4 its MHB characteristics or notational reference, as applicable;

- .5 the certificate issued to the master by the competent authority of the port of loading stating the characteristics of the cargo and the required conditions for carriage (reference IMSBC Code section 1.3) for cargoes not listed in the IMSBC Code;
- .6 Safety Data Sheet (SDS), if provided, taking due account of the fact that it may not consider potential hazards of material stowed in bulk in ships' holds; and
- .7 human experience or other factors where the need to consider other chemical hazards needs to be taken into account.

10.3.4 The company should ensure that procedures are included among the key shipboard operations concerning the safety of the ship and persons on board for:

- .1 carrying out a preliminary risk assessment of each solid bulk cargo proposed for loading;
- .2 where the preliminary assessment indicates that the cargo presents a risk to health or life, carrying out a formal risk assessment of the cargo to be loaded, carried or unloaded;
- .3 reviewing the initial risk assessment as required to take account of possible changes in the condition of the cargo during the course of loading, carriage and unloading;
- .4 providing crew members with current information on the hazards that have been identified and the risk control measures to be implemented;
- .5 where the risk assessment indicates that the cargo to be unloaded presents chemical hazards which could give rise to a dangerous situation on the ship, providing appropriate information to the discharge port or terminal on the current condition of both the cargo and the atmosphere within the cargo spaces concerned; and
- .6 carrying out joint risk assessments with representatives of the ports or terminals carrying out the loading or unloading of such solid bulk cargoes in accordance with their requirements and national regulations.

10.3.5 The master should ensure that the shipper has provided all the appropriate information on the cargo, as required by section 4 of the IMSBC Code, to enable the precautions necessary for the proper stowage and safe carriage of the cargo to be put into effect.

10.3.6 The master should ensure that a written preliminary assessment is carried out of the solid bulk cargo to be loaded to determine:

- .1 if it is Group A, B or C, or A and B cargo; or any other potentially hazardous cargo; and

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- .2 if Group B or A and B, or grain, the specific characteristics and hazards listed for the particular solid bulk cargo should be identified, including any risk of:
 - .2.1 fire due to the cargo's flammable or combustible properties;
 - .2.2 spontaneous combustion or self-heating;
 - .2.3 toxic or flammable gas emissions due to being wetted;
 - .2.4 oxidising of the cargo;
 - .2.5 toxicity or corrosion dangers; and
 - .2.6 oxygen depletion.

10.3.7 If Group B or A and B, or grain, the master should ensure that:

- .1 access to cargo spaces containing these cargoes and adjacent spaces is secured to prevent entry until the atmosphere has been tested, confirmed safe and entry has been authorised;
- .2 the required risk assessments are carried out by competent and responsible person(s) with the required training (see 3.3.1), knowledge and experience in the handling of solid bulk cargoes;
- .3 before any personnel are authorised to enter any cargo space containing any Group B solid bulk cargo, a risk assessment is carried out of:
 - .1 the cargo concerned;
 - .2 the physical characteristics of the cargo space(s) to be entered, including hold access trunks and ladders;
 - .3 spaces adjacent to the cargo spaces, including frequently visited working areas and stores such as forecastle head spaces, deck stores and mast houses;
 - .4 the ventilation of cargo spaces, hold access trunks and adjacent spaces; and
 - .5 the operations to be carried out;
- .4 crew members are kept fully briefed by the master or his/her trained representative on the hazards, if any, associated with each bulk cargo to be loaded, carried or unloaded, the cargo spaces and adjacent spaces concerned, and the risk control measures identified;
- .5 this information is displayed in a visible place on board and is accessible to the crew;

- .6 port or terminal managers or representatives are provided with appropriate information on the current condition of the cargo and cargo spaces on board prior to commencement of unloading to enable the facility put any necessary precautions into effect;
- .7 a joint risk assessment is carried and enclosed space entry procedures agreed with the terminal manager or representative before any shore personnel are permitted to any enter cargo spaces on board for the purpose of inspecting, sampling, stowing, trimming, unloading of any solid bulk cargo; or for the recovery and removal of cargo residues;
- .8 all cargo spaces and adjacent spaces are adequately ventilated;
- .9 hold access hatch lids remain secured to prevent entry until the atmosphere in all areas of the particular cargo space has been tested, confirmed safe and an entry permit is posted, as oxygen deficient areas and gas pockets may remain in hold access trunks and ladders, and other areas for some time after the hold hatch covers have been opened;
- .10 there is strict compliance with the recommendations provided in the shipper's declaration or the individual schedule for the cargo regarding the weather precautions to be observed, as many Group B cargoes will interact with water to become spontaneously flammable, or give off flammable or toxic gases when wet;
- .11 hot work including welding, cutting, burning and the use of impact tools is not carried out in or near any cargo space containing Group B cargo, or any adjacent space. Smoking must be prohibited;
- .12 Enclosed working spaces such as storerooms, carpenter's shop, passageways, tunnels, etc., are regularly monitored for the presence of oxygen, carbon monoxide, methane, hydrogen or other flammable gasses. Methane and hydrogen are lighter than air and may accumulate above the cargo in the holds, particularly in the head spaces and access ladder trunks in the fore and aft ends of the holds, and in adjacent spaces; and
- .13 all electrical equipment, other than those of approved intrinsically safe type, in the cargo spaces and adjacent spaces to be used for the carriage of group B cargoes that are flammable or can emit flammable gasses, are electrically isolated. This situation should be maintained while the cargo is on board unless the atmosphere in the space concerned is tested and confirmed to be gas free."

Action requested of the Sub-Committee

20 The Sub-Committee is invited to note the information provided.

ANNEX 1

ENCLOSED SPACE ACCIDENTS INVOLVING SOLID BULK CARGOES 1999-2018

1 This document is intended to provide information on enclosed space entry incidents involving solid bulk cargoes that have occurred between 1999 and April 2018. It is not intended to be a definitive record of these accidents, as it is based on information gathered from a range of sources including flag and port state accident investigation reports, IMO sources, the Mariners' Alerting and Reporting Scheme (MARS), P&I Club and media reports of accidents for which investigation reports have yet to be completed or published, as listed below.

2 The conclusions reached and resulting recommendations do not imply any presumptions of blame or liability. It is also not intended to be a full and complete list of such accidents worldwide and it is likely that the actual number of such accidents is much greater than what is listed here.

3 The research indicates that some 106 people, including at least 70 seafarers and 36 shore workers died between 1997 to April 2018 due to asphyxiation or explosions on ships carrying solid bulk cargoes. The majority of those who died lost their lives on the access ladders of cargo holds containing cargoes classified as Group B in the IMSBC Code.

4 Of the 88 people who died due to asphyxiation, 76 died on hold access ladders or in hold access trunks. Another nine died in cargo holds and 3 in adjacent spaces. A further 18 people died in explosions. The cargoes involved were all covered by the IMSBC Code, apart from three accidents involving oxygen depletion in holds containing grain cargoes.

5 The data also clearly shows that the number and frequency of these accidents is increasing. The numbers include at least 21 solid bulk cargo related accidents on EU flag ships or in EU ports or coastal waters between 2011 and April 2018. These accidents resulted in 19 fatalities due asphyxiation in cargo hold accesses and one in an adjacent space (15 crew/five shore workers), six cargo fires and one explosion.

6 If this continuing heavy loss of life is to be avoided, then more systematic, standardized hazard identification and risk assessment procedures need to be put in place, and implemented by every ship and every port facility involved in shipping of solid bulk cargo.

7 International Dry Bulk Terminals Group (DBTG)/International Dry Bulk Terminals Association (IBTA) is submitting a paper to IMO proposing a number of amendments to the IMSBC Code and supplements in relation to the safe handling of solid bulk cargoes which would make it mandatory for a systematic, standardized, risk assessment to be carried out whenever the loading, carriage and unloading of solid bulk cargoes is proposed or planned.

8 As the ports or terminals carrying out the loading and unloading of solid bulk cargoes are not entitled to be provided with the shipper's form for cargo information for the solid bulk cargo to be loaded or unloaded, and are also not entitled to receive a safety data sheet (SDS) for the material, DBTG / IBTA will also make submissions proposing that:

- .1 the shipper's form for cargo information be provided to the loading and discharging facilities and to any other parties involved in the handling of solid bulk cargo, as well as to the master of the ship loading it, or their representative; and

- .2 IMO consider the recommendation made in COMMISSION REGULATION (EU) 2015/830 of 28 May 2015 that "additional safety and environmental information is required to address the needs of seafarers and other transport workers in the bulk transport of dangerous goods in seagoing or inland navigation bulk carriers or tank-vessels subject to International Maritime Organization (IMO) or national regulations" and consider making the provision of SDS mandatory for solid bulk cargoes in the same way as they are for bulk liquid chemicals covered by the IBC Code.

ANALYSIS OF ACCIDENTS		
71 accidents identified involving solid bulk cargoes on board ships between 1999–2018, resulting in:		
HOW MANY FATALITIES?	106	Total Fatalities Numerous serious injuries, including brain injury, to both ship and shore personnel
WHY?	88	Deaths due asphyxiation or carbon monoxide poisoning
	18	Deaths due cargo related explosions
WHAT TYPE OF ACCIDENT?	55	Enclosed space related accidents
	16	Fire/Explosion related accidents
WHO WERE INVOLVED?	70	Seafarer fatalities
	36	Shore worker fatalities (all asphyxiation)
WHERE DID ASPHYXIATION ACCIDENTS OCCUR?	51	Asphyxiation in hold access trunks and ladders (76 fatalities)
	2	Asphyxiation in cargo holds (9 fatalities)
	2	Asphyxiation in adjacent forecastle (3 fatalities)
WHERE DID FIRE / EXPLOSION ACCIDENTS OCCUR	3	Explosions in cargo holds (8 fatalities)
	1	Explosion on deck (6 fatalities)
	1	Explosion in adjacent space (deck mast house) (2 fatalities)
	2	Explosions in adjacent space (forecastle) (2 fatalities)
	9	Fires in cargo holds (No fatalities)
WHERE WAS SHIP WHEN ACCIDENT OCCURRED?	19	At Sea (30 fatalities)
	42	In Port (64 fatalities)
	10	N/A (12 fatalities)
WHAT WERE THEY DOING? (Of 59 Identified)	3	Loading operations
	38	Unloading operations
	18	At Sea
WHAT CARGOES WERE THEY HANDLING?	58	Group B cargoes include: Coal (20); Petcoke (3); DRI (3) Wood Products – General (15) Wood Pellets (6); Wood Chips (2); Steel Turnings (2) Copper Conc. (2); Zinc Conc. (2); Zinc Skimmings(1) Seed Cake (1); Palm Kernel (1)
	5	Group C cargoes include: Ammonium Nitrate Based Fertilizer; Scrap Metal
	2	Cargoes not listed in IMSBC Code (Incinerator Bottom Ash, Nut Shells)
	3	Grain cargoes
	3	Information not available

WHAT TYPE OF SHIPS WERE INVOLVED? (Of 52 Identified)	18	General cargo/Multi-purpose ships (coastal bulkers)
	8	Handysize bulk carriers (20-40,000t dwt)
	14	Handymax bulk carriers (40-65,000t dwt)
	4	Handymax general cargo ships (forest product carriers)
	6	Panamax bulk carriers
	1	Post-Panamax bulk carrier
	1	Capesize bulk carrier.

Enclosed Space Accidents Involving Solid Bulk Cargoes 1999 – 2009								
YEAR	PORT	SHIP (FLAG)	DEAD	INJURED**	CAUSE	LOCATION	CARGO	CLASS/ GROUP
1. 1999	At Sea	MAIF No.8 (Bahamas)	1 Crew		Asphyxia	Hold Access	Steel Turnings	B
2. 2000	Derry/ Londonderry	Diamond Bulker (Philippines)	2 Shore		Asphyxia	Hold Access	Coal	B
3. 2000	At Sea	Balyiskiy-107 (Russia)	1 crew		Asphyxia	Hold Access	Timber	B
4. 2000	At Sea	MAIF No.20	1 Crew		Asphyxia	Hold Access	Coal	B
5. 2001	N/A	MAIF No.29 (Liberia)	1 Crew		Asphyxia	Hold Access	Coal	B
6. 2002	Dar Es Salaam	MAIF No.40	1 Crew		Asphyxia	Hold Access	Grain	Grain
7. 2002	Rotterdam	Weaver Arrow (H.K)	1 Shore	3 Shore	Asphyxia	Hold Access	Wood Pellets	B
8. 2003	N/A	MAIF No.48 (Hong Kong)	1 Crew		Asphyxia	Hold Access	Timber	B
9. 2004	In Port	MAIF No.52 (Finland)	2 Crew		Asphyxia	Hold Access	Timber	B
10. 2004	N/A	MAIF No.54 (Vanuatu)	1 Crew		Asphyxia	Hold Access	N/A	N/A
11. 2004	N/A	MARS 200404	4 Shore		Asphyxia	Hold	Logs	B
12. 2005	Grovon, Sweden	Eken (Sweden)	1 Crew		Asphyxia	Hold Access	Logs	B
13. 2005	Port Everglades	Saga Voyager (Hong Kong)	1 Crew		Asphyxia	Hold Access	Timber	B
14. 2006	N/A	MAIF No.67 (RMI)	1 Crew		Asphyxia	Hold Access	Coal	B
15. 2006	N/A	MAIF No.70 (RMI)	1 Crew		Asphyxia	Hold Access	Coal	B
16. 2006	Skellefteham Sweden	Noren (Sweden)	1 Crew		Asphyxia	Hold Access	Wood Chips	B
17. 2006	Helsingorg Sweden	Saga Spray (Hong Kong)	1 Crew	12 People	Asphyxia	Hold Access	Wood Chips	B

Enclosed Space Accidents Involving Solid Bulk Cargoes 1999 – 2009								
YEAR	PORT	SHIP (FLAG)	DEAD	INJURED**	CAUSE	LOCATION	CARGO	CLASS/ GROUP
18. 2007	N/A	MAIF No.84 RMI	1 Crew		Asphyxia	Hold Access	Pet Coke	B
19. 2007	Timra Sweden	Fembria (<i>Isle of Man</i>)	2 Crew		Asphyxia	Hold Access	Logs	B
20. 2007	Bornholm, Denmark	Amirante (<i>St. Vin. & G.</i>)	2 Crew		Asphyxia	Hold Access	Wood Pellets	B
21. 2008	Bilbao	MAIF No. 96 (Liberia)	1 Shore		Asphyxia	Hold Access	N/A	N/A
22. 2008	N/A	MAIF No. 99 Norway	2 Crew		Asphyxia	Hold Access	N/A	N/A
23. 2008	At Sea UK	Sava Lake (<i>Latvia</i>)	2 Crew		Asphyxia	Adj. Space Forecastle	Metal Turnings	B
24. 2008	Mobile Alabama	Celerina (Switzerland)	1 Shore		Asphyxia	Hold Access	Coal	B
25. 2009	N/A	MARS 200954	1 Crew		Asphyxia	Hold Access	Copper Conc.	B
26. 2009	Saganoseki Japan	Singapore Grace (<i>Hong Kong</i>)	3 Shore 36		Asphyxia	Hold Access	Copper Conc.	B
27. N/A	In Port	Bulk Carrier 1 Practice/UK P&I	5 Shore		Asphyxia	Hold Access	Maize	Grain
28. 2010	Port Marsden, N.Z.	TPC Wellington (<i>Panama</i>)	2 Crew		Asphyxia	Hold Access	Logs	B
29. 2011	Kotka, Finland	Andante (<i>Gibraltar</i>)	1 Crew	1 Crew	Asphyxia	Hold Access	Timber	B
30. 2013	At Sea (<i>Israel</i>)	Sa. Vanguard (<i>Hong Kong</i>)	1 Crew		Asphyxia	Hold Access	Coal	B
31. 2013	N/A	MARS - 201459	1 Crew		Asphyxia	Hold Access	Coal	B
32. 2014	At Sea (<i>Denmark</i>)	Lady Irina (<i>Netherlands</i>)	1 Crew		Asphyxia	Adj. Space Forecastle	Wood Pellets	B
33. 2014	At Sea North Sea	Hudsonborg (<i>Netherlands</i>)	1 Crew		Asphyxia	Hold Access	Zinc Conc.	B

Enclosed Space Accidents Involving Solid Bulk Cargoes 1999 – 2009								
YEAR	PORT	SHIP (FLAG)	DEAD	INJURED**	CAUSE	LOCATION	CARGO	CLASS/ GROUP
34. 2014	<i>Gibraltar</i>	<i>Sea Lady</i> (RMI)	1 Crew		Asphyxia	Hold Access	Coal	B
35. 2014	Ferrol, Spain	<i>Hanjin Sines</i> (Panama)	1 Shore		Asphyxia	Hold Access	Coal	B
36. 2014	<i>Vitoria Brazil</i>	<i>UBC Tokyo</i> (Cyprus)	1 Crew		Asphyxia	Hold Access	Pet Coke	B
37. 2014	<i>Montoir, France</i>	<i>Stara Planina</i> (Malta)	1 Crew		Asphyxia	Hold Access	Seed Cake	B
38. 2015	<i>Kobe Japan</i>	<i>Triton Swan</i> (Panama)	1 Crew 1 Shore		Asphyxia	Hold Access	Grain	Grain
39. 2015	<i>At Sea</i>	<i>Sally Ann C</i> (Isle of Man)	3 Crew		Asphyxia	Hold Access	Timber	B
40. 2015	Hanstholm Denmark	<i>Corina</i> (Poland)	1 Crew		Asphyxia	Hold Access	Wood Pellets	B
41. 2015	Antwerp	<i>Saga Frontier</i> (Hong Kong)	3 Shore		Asphyxia	Hold Access	Coal	B
42. 2015	Goole, UK	<i>Suntis</i> (Germany)	3 Crew		Asphyxia	Hold Access	Timber	B
43. 2015	Drepano, Greece	<i>Kosmas V</i> (Panama)	1 Crew	3 Crew	Asphyxia	Hold Access	Coal	B
44. 2015	Mylaki Greece	<i>Lambay</i> (Liberia)	1 Crew		Asphyxia	Hold Access	Pet Coke	B
45. 2015	Fancheng China	<i>Ionic</i> (Greece)	1 Crew 1 Shore		Asphyxia	Hold Access	Zinc CONC?	B
46. 2016	Humen, China	<i>Pekin</i> (Hong Kong)	2 Shore		Asphyxia	Hold Access	Logs	B
47. 2017	Sohar	N/A	3 Shore		Asphyxia	Hold Access	Timber	B
48. 2017	N/A	<i>N/A (UK P&I)</i>	1 Crew	1 Crew	Asphyxia	Hold Access	Coal	B
49. 2017	Chittagong	<i>Latika Naree</i> (Thailand)	2 shore		Asphyxia	Hold Access	Logs	B
50. N/A	N/A	IMO Reports	1 Crew		Asphyxia	Hold Access	Coal	B

Enclosed Space Accidents Involving Solid Bulk Cargoes 1999 – 2009								
YEAR	PORT	SHIP (FLAG)	DEAD	INJURED**	CAUSE	LOCATION	CARGO	CLASS/ GROUP
51. N/A	At Sea	IMO Reports	2 Crew		Asphyxia	Hold Access	Coal	B
52. 2018	Oxelosund, Sweden	Declan Duff (Panama)	1 Shore		Asphyxia	Hold Access	Coal	B
53. 2018	Gujarat, India	Feng Hui Hai (Hong Kong)	2 Crew		Asphyxia	Hold Access	Coal	B
54. 2018	Kalimantan, Indonesia	Sumiei (Indonesia)	5 shore		Asphyxia	Hold	Palm Kernel	B or C
55. 2018	Napier New Zealand	Nord Yilan (Panama)	Nil	6 Shore	Asphyxia (CO)	Hold	Logs	B
Total Fatalities due Asphyxiation or CO Poisoning 1999-2018								88 People

Fires / Explosions Involving Solid Bulk Cargoes 1999 – April 2018								
YEAR	PORT	SHIP (FLAG)	DEAD	INJURED	CAUSE	LOCATION	CARGO	GROUP
1. 1999	At Sea	Karteria (Malta)	2 Crew		Explosion	Cargo Holds	DRI	B
2. 2003	At Sea	Adamandas (Cyprus)	Nil		Explosion	Cargo Holds	DRI	B
3. 2004	At Sea	YTHAN (RMI)	6 Crew		Explosion	Cargo Holds	DRI	B
4. 2000	At Sea	Thor Emile (Denmark)	6 crew		Explosion	Deck	Zinc Skimmings	B
5. 2007	At Sea (Spain)	Osterdijk (Ant. & Bar.)			Fire	Cargo Holds	A.N based Fertilizer	C
6. N/A	N/A	Bulk Carrier 2 Practice /UK P&I	2 Crew		Explosion	Adj. Space Masthouse	Coal	B

Fires / Explosions Involving Solid Bulk Cargoes 1999 – April 2018								
YEAR	PORT	SHIP (FLAG)	DEAD	INJURED	CAUSE	LOCATION	CARGO	GROUP
7. 2015	At Sea (Germany)	Purple Beach (Malta)			Fire	Cargo Holds	A.Nbased Fertilizer	C
8. 2015	At Sea (Japan)	Soya Maru (Belize)			Fire	Cargo Holds	Scrap Metal	
9. 2016	Venice Italy	Star Maria (RMI)			Fire	Cargo Holds	Coal	B
10.2016	Gydia Poland	Olga Topic (Liberia)			Fire	Cargo Holds	Nut Shells (Biomass)	Not Listed
11.2016	Liverpool UK	V Due (Malta)			Fire	Cargo Hold	Wd.Pellets (No Adds)	B
12.2017	South Shields, UK	Flevoborg (Netherlands)			FIRE	Cargo Holds	Wood Pellets	B
13.2017	At Sea (Canary Isl.)	Cheshire (UK)			FIRE	Cargo Holds	A.Nbased Fertilizer	C
14.2017	Iskenderun Turkey	Global Laguna (Panama)			Fire	Cargo Holds	Steel Scrap	N/A
15.2017	At Sea (Azores)	Tamar (RMI)	2 Crew		Explosion	Adj. Space Forecastle	Coal	B
16.2017	Plymouth UK	Nortrader (Ant.& Barbuda)		1	Explosion	Adj.Space Forecastle	Inc. Ash (U-IBA)	Not Listed
Total Fatalities due Fire or Explosions								18 People

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ANNEX 2

RISK ASSESSMENT CHECKLIST FOR SOLID BULK CARGO

Risk Assessment Checklist for Solid Bulk Cargo									
Ship	Name:					Date:			
Terminal / Port	Name:					Time:			
Cargo	BCSN:			Class:		Group:			
Cargo Hold Access	IF Group B or A & B, have all cargo holds been secured against entry? YES: NO:								
Cargo Hazards	Flammable solid:			Combustible:			Flammable Gasses:		
	Oxidising:			Oxygen Depleting:			Toxic:		
	Radioactive:			Corrosive:			Other:		
	Dusty:			Subsidiary Risk:					
Safety & Hazard Information	IMSBC Code:			Shipper's Information:			Safety Data Sheet/Other:		
Cargo Handling	Equipment:			Hazards and Controls:					
Weather	<ul style="list-style-type: none"> • Affect of wetting on cargo: • Action to be taken if risk of cargo being wetted due rain/snow/other: 								
Atmospheric Testing Requirements	Flammable Gasses: Methane:..... Hydrogen:..... Other:.....			Toxic Gasses: Carbon Monoxide (CO):... Carbon Dioxide (CO2):..... Hydrogen Sulphide:..... Other:.....			Oxygen: Depletion:..... Excess:.....		
	Pre- Entry Test Required:.....			Test Intervals:.....			Personal Monitors Required:.....		
Test Instruments	Make:			Id. Number:			Calibration due:		
Cargo Holds to be Entered	No.1#	No.2#	No.3#	No.4#	No.5#	No.6#	No.7#	No.8#	No.9#

Hold Accesses, Ladders / Stairs	Open Type? Boxed/Enclosed Type?			Hazards:			Controls:		
Adjacent Spaces	Names of Spaces:.....						Potential Hazards:.....		
Ventilation	Status:			Mechanical:			Natural:		
PPE and other safety equipment	Safety Helmet	Safety Boots	Hi-Vis Clothing	Gloves	Dust Mask	Personal Gas Monitor	Other:		
Fumigation	Have holds been assessed by an authorized fumigator-in-charge and approved as gas free and safe for entry?						N/A	YES	NO
Enclosed Space Entry Permit	Is Hold Entry Permit Required? (see IMSBC Code (2018) p.570)						N/A	YES	NO
Attendant Person:	Is Attendant Person Required?						N/A	YES	NO
Rescue Plan	Is Rescue Plan in place for holds / spaces to be loaded/unloaded ?						N/A	YES	NO
	Is Rescue Team familiar with holds and hold accesses?						N/A	YES	NO
	Is Rescue Equipment available?						N/A	YES	NO
Emergency Communications	Are appropriate arrangements for enclosed space entry in place?						N/A	YES	NO
Signed: Master / Ch. Officer:.....									
						Date /Time.....			
Signed: Terminal Representative:.....									
						Date /Time.....			
Signed: Attendant Person:									
						Date /Time.....			
Initialed: Persons entering hold:									