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MSC/Circ.1095
18 June 2003

**REVISED MINIMUM SAFETY STANDARDS FOR SHIPS CARRYING LIQUIDS
IN BULK CONTAINING BENZENE**

1 The Maritime Safety Committee, at its sixty-first session (7 to 11 December 1992), recognized that chronic exposure to very low concentrations of benzene vapours in air, of the order of a few parts per million, may cause leukaemia.

2 The Committee, at its sixty-sixth session (28 May to 6 June 1996), desiring to protect the health of seafarers and to keep it at a level similar to that of shore-based workers engaged in similar tasks, approved MSC/Circ.752, by means of which it:

- .1 approved minimum safety standards for ships carrying mixtures the benzene content of which is 0.5 per cent or more; and
- .2 invited Member Governments to apply the standards as soon as possible.

3 The Committee, at its seventy-seventh session (28 May to 6 June 2003), noting that the diseases caused by the aforementioned exposure were still a source of great concern, agreed that MSC/Circ.752 was in need of revision, in particular with respect to cargo operations, which pose the largest risk of crew exposure to vapours from the products carried, and approved Revised minimum safety standards for ships carrying liquids in bulk containing benzene, as set out in the Annex, which also includes an example of precautions to be given to the crew in connection with loading and gas freeing operations.

4 Member Governments are invited to apply the annexed Revised minimum safety standards for ships carrying liquids in bulk containing benzene, including precautions to be given to the crew in connection with loading and gas-freeing operations appended thereto as soon as possible.

5 MSC/Circ.752 is hereby revoked.

ANNEX

REVISED MINIMUM SAFETY STANDARDS FOR SHIPS CARRYING LIQUIDS IN BULK CONTAINING BENZENE

Chronic exposure to very low concentrations of benzene vapours in air may *inter-alia* cause leukaemia. In order to protect the health of seafarers to the same level as that of shore-based workers performing comparable tasks, measures should be taken for all ships carrying bulk liquids containing benzene the content of which is 0.5% or more by mass. The following measures should be included as indicated hereunder.

1 Information to the master

1.1 Prior to loading, the shipper should provide both to the master and the Company, as defined in the ISM Code, a Material Safety Data Sheet (MSDS) formatted in accordance with resolution MSC.150(77), for cargoes containing benzene.

1.2 The cargoes that may contain benzene are, for example, the cargoes listed in Appendix I to Annex I to MARPOL 73/78, and the following bulk liquids:

- .1 benzene and benzene mixtures;
- .2 naphtha, varnish makers and paints (75%); and
- .3 white spirit.

2 Information to the crew

2.1 It is the responsibility of the master and the Company, that the crew is made aware of any work situation concerning operations involving liquids in bulk containing benzene that may impose a risk to their health. The crew should be informed of relevant safety precautions prior to cargo operations.

2.2 The appendix gives an example of precautions to be given to the crew in connection with loading and gas-freeing operations.

3 Occupational exposure limits¹

3.1 Crewmember exposure to airborne concentrations of benzene vapours should be within the following limits:

- .1 a Time Weighted Average (TWA) of one part of benzene per million parts of air by volume (1 ppm), over an eight-hour period, which covers the time a person is assumed to work in any 24-hour period; and
- .2 a Short Term Exposure Limit (STEL) of five parts of benzene per million parts of air (5 ppm) over any 15-minute period.

¹ Refer to the latest editions of the Tanker Safety Guide (Chemicals) (ICS) and the International Safety Guide for Oil Tankers & Chemicals (ISGOTT) (ICS, OCIMF and IAPH).

4 Air quality monitoring

4.1 The airborne concentration of benzene vapour should be measured by a trained² and properly protected person with an approved instrument, before any crew member is authorized to work in a given area. Such measuring should be continued whilst there is a risk of exposure to benzene vapours.

4.2 Alternative methods giving the same degree of safety may also be considered acceptable.

5 Personal protection

.1 Safety equipment

Ships carrying mixtures the benzene content of which is 0.5% or more should carry safety equipment equivalent to what is required in paragraph 14.2 of the IBC Code.

.2 Equipment for cargo operations on deck

Whenever direct or representative measurements indicate that the exposure limits are exceeded during normal cargo handling operations,³ crew required to work in the affected area should wear appropriate respiratory equipment to be used in accordance with the manufacturers instructions. Such equipment is indicated below,⁴ however the crewmember may select a higher level of protection:

- .1 *Half face piece:* in areas where the airborne concentration of benzene vapours is expected to exceed 1 ppm but not more than 10 ppm;
- .2 *Full face (filter) piece with cartridge:* in areas where the airborne concentration of benzene vapours is expected to exceed 10 ppm but not more than 50 ppm;
- .3 *Air supplied respirators:* in areas where the airborne concentration of benzene vapours is expected to exceed 50 ppm, but not more than 100 ppm;
- .4 *Pressure demand breathing apparatus and full protective clothing, resistant to chemical attack⁵:* in areas where the airborne concentration of benzene is expected to be greater than 100 ppm; and
- .5 *Personal protective equipment:* eye protection, impervious gloves and a protective apron should be readily available to crew members while sampling and gauging or when skin contact with the cargo is likely.

² See also paragraph 8

³ The recommendations regarding air purifying masks apply to operational uses of respiratory equipment for the purposes of protection during normal cargo handling operations and are not to be confused with those provisions specified in 14.2.8 of the IBC Code.

⁴ There are existing standards for respiratory protection equipment. These standards include: American National Standard for Respiratory Protection (ANSI Z88.2 – 1992); and the British Standard for Respiratory Protection Devices, Valved Filtering Half Masks to Protect Against Gases or Gases and Particles (BS EN 405: 1993).

⁵ Refer to SOLAS regulation II/2-19

6 Maintenance of equipment for personal protection

The equipment for personal protection should be maintained and replaced in accordance with the manufacturers' instructions and in accordance with paragraph 14.2.6 of the IBC Code. Maintenance records should be kept on board.

7 Entering into enclosed spaces

Explicit instructions⁶ from the master or a responsible officer are required before any entry into hazardous enclosed spaces. The hazards likely to be encountered should be evaluated and it should be ensured that all precautionary measures are taken. It should also be ensured that a responsible person is in attendance during the period of entry and while the space is occupied.

8 Training⁷

Crewmembers who might be exposed to benzene vapours should be given proper training, which should include:

- .1 the respiratory hazard and the effect on the wearer if the respirator is not used properly;
- .2 the engineering and administrative controls being used and the need for respirators to provide protection;
- .3 the reason for selecting a particular type of respirator;
- .4 the function, capabilities, and limitations of the selected respirator; and
- .5 the method of donning the respirator and checking that it fits and is operational.

9 Medical monitoring

Crewmembers potentially exposed to benzene vapour inhalation should be submitted to a programme of regular suitable medical checks on their health. The results of such checks should be kept on record under normal confidential practices in the medical profession.

10 Ship/shore connections

Prior to disconnecting, efficient and complete draining^{*} and purging of all pipes, hoses and hard arms used for cargo handling should be ensured.

11 Precautions during cargo operations

Cargo loading, tank cleaning and gas-freeing are those procedures on board a tanker that expose the crew to the largest risk of exposure to vapours from the products carried, both in the accommodation

⁶ Refer to Recommendations for entering enclosed spaces aboard ships, adopted by the Organization by resolution A.864(20).

⁷ Refer to the provisions of the International Convention on Standards of Training Certification and Watchkeeping for Seafarers, 1978, as amended, and in particular to the "Mandatory minimum requirements for the training and qualifications of masters, officers and ratings on tankers" – regulation V/1 of the annex to that Convention – and to section A-V/1 of the STCW Code (paragraphs 15 to 21).

* Note: In accordance with MARPOL regulation II/7(3), drainage back into the cargo tanks is not allowed

and on open deck. It is, therefore, essential during these operations that all:

- .1 openings to the accommodation are closed or battened down;
- .2 ventilation in the accommodation is either re-circulated or shut down; and
- .3 work on deck follows the provisions given in paragraph 5.2.

12 Controlled tank venting system

12.1 Vapours displaced from the tank during loading, tank cleaning, tank breathing and gas-freeing should be emitted through a controlled tank venting system complying with either SOLAS regulation II-2/16.3.2, or paragraph 8.3.2 of the IBC Code, or paragraph 2.14.2 of the BCH Code, as applicable.

12.2 Whenever a vapour emission control system is available ashore, vapours displaced from the tank during loading should be returned to that system (vapour return).

13 Cargo measurements and sampling

All cargo related measurements (e.g., ullage, temperature and sampling) should be carried out in a closed mode to minimize the risk of exposing the crew and shore personnel to harmful vapours. When this is not possible, personal protection equipment should be worn.

14 Contaminated clothes

Working clothes should not be brought into the accommodation. Therefore, whenever possible, all working clothes should be removed and put in designated lockers prior to the crew entering the accommodation. The IBC Code, chapter 14, and the BCH Code, paragraph 3.16, deals extensively with personnel protection, including storage of protective equipment and working clothes.

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APPENDIX

**EXAMPLE OF PRECAUTIONS TO BE GIVEN TO THE CREW IN CONNECTION
WITH LOADING AND GAS-FREEING OPERATIONS**

- 1 All doors leading from the outside to the accommodation and to the engine room should be closed and kept closed during these operations. Only one door on the windward side/nearest to the cargo control room is to be used as an access.*
- 2 All doors inside the accommodation shall be kept closed during the operation.
- 3 The ventilation to the accommodation shall be stopped/re-circulated and the fire flaps kept closed*.
- 4 Vapour concentrations on deck shall be measured prior to any work being undertaken.
- 5 The crew working on deck shall wear appropriate protective equipment.
- 6 Only work related to cargo handling is allowed on deck.
- 7 Presence of personnel in the engine room shall be kept to a minimum during these operations.
- 8 Bring no working clothes into the accommodation.

* To be modified to the actual ship.