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RESOLUTION A.774(18)  
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GUIDELINES FOR PREVENTING THE INTRODUCTION OF UNWANTED  
AQUATIC ORGANISMS AND PATHOGENS FROM SHIPS' BALLAST  
WATER AND SEDIMENT DISCHARGES

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning prevention and control of marine pollution from ships,

RECALLING ALSO resolution 18 of the International Conference on Marine Pollution, 1973 requesting research into the role of ballast water as a medium for the spreading of epidemic disease bacteria,

NOTING the essential role that the carriage of ballast water performs in the safe and effective operation of ships,

RECOGNIZING that the discharge of ballast water and sediment has led to unplanned and unwanted introductions of harmful aquatic organisms, disease bacteria and viruses (hereafter referred to as harmful aquatic organisms) that are known to have caused injury to public health and property and to the environment,

RECOGNIZING ALSO the need to alert Member States to the significance of the problem and to seek international co-operative measures that can be safely used to minimize the probability that harmful aquatic organisms may be transported between geographic areas by way of ships' ballast water or sediment,

NOTING that the unwanted introduction of harmful aquatic organisms through the uncontrolled discharge of ballast water and sediment has important global implications that can be effectively, equitably and responsibly addressed through co-ordinated and co-operative action,

NOTING ALSO that Governments have a right to impose ballast water and sediment discharge measures to protect their waters from harmful aquatic organisms carried in ships' ballast water and sediment,

NOTING FURTHER the need for port States and Administrations to ensure that ballast water, loaded in their ports and harbours, or carried in their ships does not contain harmful aquatic organisms that pose a threat to the waters of other States,

HAVING CONSIDERED the Guidelines for Preventing the Introduction of Unwanted Aquatic Organisms and Pathogens from Ships' Ballast Water and Sediment Discharges adopted by the Marine Environment Protection Committee at its thirty-first session,

HAVING CONSIDERED ALSO that the United Nations Conference on Environment and Development (UNCED) in Chapter 17, Agenda 21, requested IMO to consider the adoption of appropriate rules on ballast water discharge to prevent the spread of non-indigenous organisms,

HAVING CONSIDERED FURTHER the results from the International Survey Questionnaire of Member States Relating to Ballast Water circulated following the thirty-third session of the Marine Environment Protection Committee (MEPC 34/17) and, in particular, noting that the uncontrolled discharge of ballast water containing harmful aquatic organisms not only remains a major international problem but is one which is expected to worsen,

1. ADOPTS the Guidelines for Preventing the Introduction of Unwanted Aquatic Organisms and Pathogens from Ships' Ballast Water and Sediment Discharges, which are set out at Annex to the present resolution;
2. URGES Governments to apply the Guidelines;
3. REQUESTS the Maritime Safety Committee to consider the safety aspects of the Guidelines, particularly with regard to stability and structural integrity;
4. REQUESTS the Marine Environment Protection Committee and the Maritime Safety Committee to keep the ballast water issue and the application of the above Guidelines under review with a view to further developing the Guidelines as a basis for a new Annex to MARPOL 73/78.

## ANNEX

### GUIDELINES FOR PREVENTING THE INTRODUCTION OF UNWANTED AQUATIC ORGANISMS AND PATHOGENS FROM SHIPS' BALLAST WATER AND SEDIMENT DISCHARGE

#### 1 Introduction

1.1 Studies carried out in several countries have shown that many species of bacteria, plants, and animals can survive in a viable form in the ballast water and sediment carried in ships, even after journeys of several weeks' duration. Subsequent discharge of contaminated ballast water or sediment, into the waters of port States, may result in the establishment of unwanted species which can seriously upset the existing ecological balance. Although other media have been identified for transferring organisms between geographically separated water bodies, ballast water discharge from ships appears to have been among the most prominent. The introduction of diseases may also arise as a result of port State waters being inoculated with large quantities of ballast water containing viruses or bacteria, thereby posing health threats to indigenous human, animal and plant life.

1.2 The potential for ballast water discharges to cause harm, was recognized by Resolution 18 of the International Conference on Marine Pollution, 1973, from which Conference emerged the MARPOL Convention. Resolution 18 called upon the World Health Organization, in collaboration with the International Maritime Organization, to carry out research into the role of ballast water as a medium for the spreading of epidemic disease bacteria.

1.3 It is the aim of these Guidelines to provide Administrations and Port State Authorities with guidance on procedures that will minimize the risk from the introduction of unwanted aquatic organisms and pathogens from ships' ballast water and sediment. The selection of an appropriate procedure will depend upon several factors, including the type or types of organisms being targeted, the level of risks involved, its environmental acceptability, and the economic and ecological costs involved.

1.4 The choice of procedures will also depend upon whether the measure is a short-term response to an identified problem or a long-term strategy aimed at completely eliminating the possibility of the introduction of species by ballast water. In the short term, operational measures such as ballast water exchange at sea may be appropriate where they have been shown to be effective and are accepted by Port State Authorities and Administrations. For the longer term, more effective strategies, possibly involving structural or equipment modifications to ships, may need to be considered.

#### 2 Definitions

For the purposes of these Guidelines, the following definitions apply:

"Administration" means the Government of the State under whose authority the ship is operating.

"Member States" means States that are Members of the International Maritime Organization.

"Organization" means the International Maritime Organization (IMO).

"Port State Authority" means any official or organization authorized by the Government of a port State to administer guidelines or enforce standards and regulations relevant to the implementation of national and international shipping control measures.

### 3 Application

The Guidelines can apply to all ships, however a Port State Authority shall determine the extent to which these Guidelines do apply.

### 4 General principles

4.1 Member States may adopt ballast water and sediment discharge procedures to protect the health of their citizens from foreign infectious agents, to safeguard fisheries and aquaculture production against similar exotic risks and to protect the environment generally.

4.2 Application of ballast water and sediment discharge procedures to minimize the risk of importing unwanted aquatic organisms and pathogens may range from regulations based upon quarantine laws to guidelines providing suggested measures for controlling or reducing the problem.

4.3 In all cases, a Port State Authority must consider the overall effect of ballast water and sediment discharge procedures on the safety of ships and those on board. Regulations or guidelines will be ineffective if compliance is dependent upon the acceptance of operational measures that put a ship or its crew at risk.

4.4 Ballast water and sediment discharge procedures should be practicable, effective, designed to minimize cost and delays to ships, and based upon these Guidelines whenever practicable.

4.5 The ability of aquatic organisms and pathogens to survive, after transportation in ballast water, may be reduced if significant differences in ambient conditions prevail - e.g. salinity, temperature, nutrients and light intensity.

4.6 If fresh water (FW), brackish water (BW) and fully saline water (SW) are considered, the following matrix provides, in most cases, an indication of the probability that aquatic organisms and pathogens will survive after being transferred.

PROBABILITY OF ORGANISMS SURVIVAL AND REPRODUCTION

Receiving Waters	Discharged Ballast	FW	BW	SW
	FW	HIGH	MED	LOW
	BW	MED	HIGH	HIGH
	SW	LOW	HIGH	HIGH

4.7 The duration of ballast water within an enclosed ballast tank will also be a factor in determining the number of surviving organisms. For example, even after 60 days some organisms may remain in ballast water in a viable condition.

4.8 Because some aquatic organisms and pathogens that may exist in sediments carried by ships can survive for several months or longer, disposal of such sediment should be carefully managed and reported to Port State Authorities.

4.9 In implementing ballast water and sediment discharge procedures, Port State Authorities should take account of all relevant factors.

## 5 Implementation

5.1 Member States, applying ballast water and sediment discharge procedures, should notify the Organization of specific requirements and provide to the Organization, for the information of other Member States and non-governmental organizations, copies of any regulations, standards or guidelines being applied.

5.2 Administrations and non-governmental shipping organizations should provide the widest possible distribution of information on ballast water and sediment discharge procedures being applied to shipping by Port State Authorities. Failure to do so may lead to unnecessary delays for ships seeking entry to port States where ballast water and sediment discharge procedures are being applied.

5.3 In accordance with paragraph 5.2 above, ship operators and ships' crews should be familiar with the requirements of Port State Authorities with respect to ballast water and sediment discharge procedures, including information that will be needed to obtain entry clearance. In this respect, Masters should be made aware that penalties may be applied by Port State Authorities for failure to comply with national requirements.

5.4 Member States and non-governmental organizations should provide to the Organization, for circulation, details of any research and development studies that they carry out, with respect to the control of aquatic organisms and pathogens in ballast water and sediment found in ships.

5.5 Administrations are encouraged to report to the Organization incidences where compliance with ballast water and sediment discharge procedures required by Port State Authorities have resulted in ship safety problems, unacceptably high costs, or delays to ships.

5.6 Member States should provide, to the Organization, details of annual compliance records for ballast water and sediment discharge procedures that they are applying. These records should report all incidences of non-compliance with regulations or guidelines and cite, by ship's name, official number and flag, all non-complying vessels.

5.7 Member States should notify the Organization of any local outbreaks of infectious diseases or water-borne organisms, that have been identified as a cause of concern to health and environmental authorities in other countries, and for which ballast water or sediment discharges may be vectors of transmission. This information should be relayed by the Organization, without delay, to all Member States and non-governmental organizations. Member States should ensure that problem species, endemic to their waters, are not being transferred from locally loaded ballast water. Masters of ships should be notified of the existence of problem species, including local outbreaks of phytoplankton blooms, and advised to exchange or treat their ballast water and sediment accordingly.

5.8 Member States should determine the environmental sensitivity of their waters to the extent deemed necessary. Ballast water and sediment discharge procedures should take into account the environmental sensitivity of these waters.

## 6 Ship operational procedures

6.1 When loading ballast, every effort should be made to ensure that only clean ballast water is being taken on and that the uptake of sediment with the ballast water is minimized. Where practicable, ships should endeavour to avoid taking on ballast water in shallow water areas, or in the vicinity of dredging operations, to reduce the likelihood that the water will contain silt, which may harbour the cysts of unwanted aquatic organisms and pathogens, and to otherwise reduce the probability that unwanted aquatic organisms and pathogens are present in the water. Areas where there is a known outbreak of diseases, communicable through ballast water, or in which phytoplankton blooms are occurring, should be avoided wherever practicable as a source of ballast.

6.2 When taking on ballast water, records of the dates, geographical locations, salinity and amount of ballast water taken on should be recorded in the ship's log book. To enable monitoring by the Organization and Port State Authorities, a report in the format shown in the appendix to these Guidelines should be completed by the ship's Master and made available to the Port State Authority. Procedures to be followed by the ship should be described in detail in the ship's operational manual. The sample used to determine the salinity of loaded ballast water should be obtained, wherever possible, from the ballast tanks themselves or from a supply piping tap. Surface sea water samples should not be taken as indicative of the water in the ballast tanks since seawater salinity may vary significantly with depth.

6.3 Subject to accessibility, all sources of sediment retention such as anchors, cables, chain lockers and suction wells should be cleaned routinely to reduce the possibility of spreading contamination.

## 7 Strategies for preventing the introduction of unwanted aquatic organisms and pathogens from ship's ballast water and sediment discharges

### 7.1 General

7.1.1 In determining appropriate strategies for ballast water and sediment discharge procedures, the following criteria, inter alia, should be taken into account:

- operational practicability;
- effectiveness;
- seafarer and ship safety;
- environmental acceptability;
- water and sediment control;
- monitoring; and
- cost effectiveness.

7.1.2 Approaches that may be effective in controlling the incidence and introduction of aquatic organisms and pathogens, include:

- the non-release of ballast water;
- ballast water exchange and sediment removal at sea or in areas designated as acceptable for the purpose by the Port State Authority;
- ballast water management practices aimed at preventing or minimizing the uptake of contaminated water or sediment in ballasting and deballasting operations; and
- discharge of ballast water into shore-based facilities for treatment or controlled disposal.

7.1.3 In considering which particular approach, or combination of approaches to use, Port State Authorities should have regard to the factors listed in paragraph 7.1.1.

### 7.2 Non-release of ballast water

The most effective means of preventing the introduction of unwanted aquatic organisms and pathogens from ships' ballast waters and sediments is to avoid, wherever possible, the discharge of ballast water.

### 7.3 Ballast water exchange and sediment removal

7.3.1 In the absence of more scientifically based means of control, exchange of ballast water in deep ocean areas or open seas currently offers a means of limiting the probability that fresh water or coastal species will be transferred in ballast water. Responsibility for deciding on such action must rest with the Master, taking into account prevailing safety, stability and structural factors and influences at the time.

7.3.2 Unlike coastal and estuarine waters that are rich in nutrients and life forms, deep ocean water or open seas contain few organisms. Those that do exist are unlikely to adapt readily to a new coastal or fresh water environment, hence the probability of transferring unwanted organisms, through ballast water discharges, can be greatly reduced by ocean or open sea ballast exchanges preferably in water depths of 2,000 m or more. In those cases where ships do not encounter water depths of at least 2,000 m, exchange of ballast water should occur well clear of coastal and estuarine influences. There is evidence to suggest that, despite contact with water of high salinity, the cysts of some organisms can survive for protracted periods in the sediment within ballast tanks and elsewhere on a ship. Hence, where ballast water exchange is being used as a control measure, care should be taken to flush out ballast tanks, chain lockers and other locations where silt may accumulate, to dislodge and remove such accumulations, wherever practicable.

7.3.3 Care should also be taken when removing sediment deposits while a ship is in port or in coastal waters to ensure that the sediment is not disposed of directly into adjacent waters. Sediment should be removed to land-fill locations designated by the port State Authority or, alternatively, sterilized to kill all living organisms that it may contain prior to being discharged into local water bodies or otherwise disposed.

7.3.4 Ships likely to be required to exchange ballast during a voyage should take into account the following requirements:

- .1 stability to be maintained at all times to values not less than those recommended by the Organization (or required by the Administration);
- .2 longitudinal stress values not to exceed those permitted by the ship's classification society with regard to prevailing sea conditions; and
- .3 exchange of ballast in tanks or holds where significant structural loads may be generated by sloshing action in the partially filled tank or hold to be carried out in favourable sea and swell conditions such that the risk of structural damage is minimized.

7.3.5 Where the requirements of paragraph 7.3.4 cannot be met during an "at sea" exchange of ballast water, a "flow through" exchange of ballast water may be an acceptable alternative for those tanks. Procedures for exchange of this type should be approved by the Administration.

7.3.6 Where the requirements of paragraph 7.3.4 can be met during an "at sea" exchange of ballast water, before taking on exchange ballast water, tanks should be drained until pump suction is lost. This will minimize the likelihood of residual organism survival.

7.3.7 Where a port State Authority requires that an "at sea" exchange of ballast water be made, and, due to weather, sea conditions or operational impracticability such action cannot be taken, the ship should report this fact to the port State Authority prior to entering its national waters, so that appropriate alternative action can be arranged.

7.3.8 Alternative action will also be necessary in those instances where ships may not leave a continental shelf during their voyage. Unless specific alternative instructions have been issued by a port State Authority applying ballast water and sediment controls, ships should report non-compliance prior to entering the port State's waters.



7.3.9 Port State Authorities applying ballast water exchange and sediment removal procedures may require ships to complete a ballast water control form or some other acceptable system of reporting. A model form for this purpose is in the appendix. Port State Authorities should arrange for such reporting forms to be distributed to ships, together with instructions for completion of the form and procedures for its return to the appropriate authorities.

7.3.10 In those cases where a ship arrives at a port without having carried out an "at sea" ballast water exchange, or has otherwise failed to carry out any alternative procedures acceptable to port State Authorities, the ship may be required to proceed to an approved location to carry out the necessary exchange, treat the ballast water "in situ", seal the ballast tanks against discharge in the port State's waters, pump the ballast water to a shore reception facility, or prove, by laboratory analysis, that the ballast water is acceptable.

7.3.11 To facilitate administration of ballast water exchange and sediment removal procedures on board ships, a responsible officer familiar with those procedures should be appointed to maintain appropriate records and to ensure that all ballast water exchange and sediment removal procedures are followed and recorded. Written ballast water and sediment removal procedures should be included in the ship's operational manual.

7.3.12 Port State Authorities applying ballast water exchange and sediment discharge procedures may wish to monitor compliance with, and effectiveness of, their controls.

7.3.13 Effectiveness monitoring may also be undertaken by port State Authorities, by taking and analysing ballast water and sediment samples from ships complying with prescribed exchange procedures, to test for the continued survival of unwanted aquatic organisms and pathogens.

7.3.14 Where ballast water or sediment sampling for compliance or effectiveness monitoring is being undertaken, port State Authorities should minimize delays to ships when taking such samples. Use of plankton nets, either by a vertical tow through ballasted deep tanks or cargo holds, or by attachment to an open firemain hydrant, suitably cross-connected to the ballast main, is one suggested means of ballast water sampling. Sediment samples may be taken from areas where sediment is most likely to accumulate, such as around outlet pipes, bulkhead and hold corners, etc., to the extent that these are accessible. Appropriate safety precautions must be employed wherever the taking of water or sediment samples requires tank entry.

7.3.15 Port State Authorities may also wish, subject to relevant safety considerations, to sample sediment in suction wells, chain lockers or other areas where sediment may accumulate.

7.3.16 In some cases, ships bound for ports which apply strategies for preventing the introduction of unwanted aquatic organisms and pathogens from ships' ballast water and sediments may avoid "at sea" exchange of ballast water, or other control procedures, by having their ballast water or harbour source samples analysed by a laboratory that is acceptable to the port State Authority. Where sampled and analysed ballast or harbour source water is found to be free from unwanted aquatic organisms or pathogens, an analyst's certificate, attesting to that fact, should be made available to port State Authorities. When analysis of ballast or harbour source water or sediment is being used as a control procedure, port State Authorities should provide Administrations with a target listing of unwanted aquatic organisms or pathogens.

7.3.17 Port State Authorities may sample or require samples to analyse ballast water and sediment, before permitting a vessel to proceed to discharge its ballast water in environmentally sensitive locations. In the event that unwanted aquatic organisms or pathogens are found to be present in the samples, ships may be prohibited from discharging ballast or sediment, except to shore reception facilities or in designated marine areas.

#### 7.4 Ballast water management practices

7.4.1 Port State Authorities may allow the use of appropriate ballast water management practices, aimed at preventing or minimizing the uptake and discharge of contaminated water or sediment in ballasting and deballasting operations. Such practices may be used when adjudged as reducing the risks of introducing unwanted aquatic organisms and pathogens to a level acceptable to Port State Authorities, who, for this purpose, may set conditions with which such practices need to comply.

7.4.2 Such conditions should include appropriate ballast water management plans, training of ships' officers and crew, and the nomination of key control personnel.

#### 7.5 Shore reception facilities

7.5.1 Where adequate shore reception facilities exist, discharge of ship's ballast water in port into such facilities may provide an acceptable means of control. Port State Authorities utilizing this strategy should ensure that the discharged ballast water has been effectively treated before release. Any treatment used should itself be environmentally acceptable.

7.5.2 Reception facilities should be made available for the safe disposal of tank sediment when ships are undergoing repair or refit. Sediment, removed from ballast tanks and other areas of accumulation, should be disposed of in accordance with paragraph 7.3.3 above.

7.5.3 Member States should provide the Organization and ships with information on the locations, capacities, availability of, and any applicable fees relevant to, reception facilities being provided for the safe disposal of ballast water and removed sediment.

### 8 Training, education and ships management plans

8.1 Administrations and non-governmental shipping organizations should ensure that ships' crews are made aware of the ecological and health hazards posed by the indiscriminate loading and discharging of ballast water and of the need to maintain tanks and equipment, such as anchors, cables and hawse pipes, free from sediment.

8.2 Training curricula for ships' crews should include instruction on the application of ballast water and sediment discharge procedures, based upon the information contained in these Guidelines. Instruction should also be provided on the maintenance of log book records, indicating the dates and times of ballast water loading, exchange or discharge, salinity and the geographical location where such operations are carried out.

8.3 Ships' crews should receive adequate instruction on the methods of ballast water and sediment discharge procedures being applied on their ship, including appropriate safety training in the relevant procedures.

8.4 Ballast water management plans should be incorporated in ships' operational manuals for the guidance of the ships' crews. Such plans should include, but not necessarily be limited to, information on the following:

- ballast water loading and discharging procedures and precautions;
- ballast water and sediment sampling and testing;
- controls applied by port State Authorities;
- reporting and information requirements;
- exchange and treatment options or requirements;
- crew safety guidelines;
- sediment disposal arrangements; and
- crew education and training.

8.5 Ships' operational manuals should include reference to these Guidelines and to the need to comply with any ballast water and sediment discharge procedures imposed by port State Authorities.

## 9 Future considerations

9.1 There is a clear need to research and develop revised and additional measures, particularly as new information on organisms and pathogens of concern becomes available. Areas for further research include, inter alia:

- treatment by chemicals and biocides;
- heat treatment;
- oxygen deprivation control;
- tank coatings;
- filters; and
- ultraviolet light disinfection.

It must be made clear, however, that there is a lack of research knowledge and practical experience on the cost, safety, effectiveness and environmental acceptability of these possible approaches. Any proposed chemical or biocidal treatments should be environmentally safe and in compliance with international conventions. Authorities carrying out or commissioning research studies into these or other relevant areas are encouraged to work co-operatively and provide information on the results to the Organization.

9.2 In the longer term and to the extent possible, changes in ship design may be warranted to prevent the introduction of unwanted aquatic organisms and pathogens from ships. For example, subdivision of tanks, piping arrangements and pumping procedures should be designed and constructed to minimize uptake and accumulation of sediment in ballast tanks.

9.3 Classification societies are urged to include provisions for ballast water and sediment discharge procedures in their rule requirements.

APPENDIX

BALLAST WATER CONTROL REPORT FORM

(To be completed by ship's Master prior to arrival and provided to Port State Authority upon request)

NAME OF SHIP: .....

PORT OF REGISTRY: .....

OFFICIAL NO. OR  
CALL SIGN: .....

OWNERS/OPERATORS: .....

AGENT: .....

IMO GUIDELINES CARRIED? Yes  NO

CONTROL ACTION TAKEN?  Non-release of ballast  
 Ballast water exchange  
 Ballast water management practices  
 Use of shore reception facilities  
 Other (specify) .....  
.....  
 Nil

INFORMATION ON BALLAST WATER BEING CARRIED

Tank Location	Qty Tons	Geographic origin of carried ballast		Salinity of original sample (specific gravity)	Intended discharge Port		If exchanged, where was ballast loaded?		Salinity of reballasted sample (specific gravity)	Controls used where ballast not exchanged
		Lat.	Long.		Place	Date	Lat.	Long.		
FORE PEAK										
AFT PEAK										
DOUBLE BOTTOM										
WING TANKS										
SIDE TANKS										
DEEP TANKS										
CARGO HOLDS										
OTHER (SPECIFY)										

MASTER'S NAME: .....  
(PLEASE PRINT)

MASTER'S SIGNATURE: .....

DATE: .....

PORT LOCATION: .....