INTERNATIONAL MARITIME ORGANIZATION

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MARINE ENVIRONMENT PROTECTION COMMITTEE
59th session
Agenda item 24

MEPC 59/24/Add.1
28 July 2009
Original: ENGLISH

REPORT OF THE MARINE ENVIRONMENT PROTECTION COMMITTEE ON ITS FIFTY-NINTH SESSION

Attached are annexes 1 to 35 to the report of the Marine Environment Protection Committee on its fifty-ninth session (MEPC 59/24).

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ANNEX 1

RESOLUTION MEPC.178(59)
Adopted on 17 July 2009

CALCULATION OF RECYCLING CAPACITY FOR MEETING THE ENTRY-INTO-FORCE CONDITIONS OF THE HONG KONG INTERNATIONAL CONVENTION FOR THE SAFE AND ENVIRONMENTALLY SOUND RECYCLING OF SHIPS, 2009

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

NOTING that article 17 of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 (the Convention) provides that the Convention shall enter into force 24 months after the date on which the following conditions are met:

.1 not less than 15 States have either signed it without reservation as to ratification, acceptance or approval, or have deposited the requisite instrument of ratification, acceptance, approval or accession in accordance with article 16;

.2 the combined merchant fleets of the States mentioned in paragraph 1.1 constitute not less than 40 per cent of the gross tonnage of the world's merchant shipping; and

.3 the combined maximum annual ship recycling volume of the States mentioned in paragraph 1.1 during the preceding 10 years constitutes not less than 3 per cent of the gross tonnage of the combined merchant shipping of the same States,

RECOGNIZING that the responsibility for determining when these entry-into-force conditions have been fulfilled lies with the Secretary-General as Depositary,

INVITES the Secretary-General, when calculating the combined maximum annual ship recycling volume of Contracting States as required by article 17 of the Convention, to refer to annually published statistical data on recycled gross tonnage of shipping, on the following basis:

.1 for each Contracting State, extract the "annual ship recycling volume" for each of the preceding 10 years, by reference to the data on total gross tonnage provided in the table on disposals by country of breaking in that year's Lloyd's Register-Fairplay annual publication World Casualty Statistics; and

.2 determine "the maximum annual ship recycling volume" by selecting the highest value occurring in the 10-year period for each Contracting State.

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ANNEX 2

RESOLUTION MEPC.179(59)
Adopted on 17 July 2009

GUIDELINES FOR THE DEVELOPMENT OF THE INVENTORY OF HAZARDOUS MATERIALS

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by the international conventions for the prevention and control of marine pollution,

RECALLING ALSO that the International Conference on the Safe and Environmentally Sound Recycling of Ships held in May 2009 adopted the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 (the Hong Kong Convention) together with six Conference resolutions,

NOTING that regulations 5.1 and 5.2 of the Annex to the Hong Kong Convention require that ships shall have on board an Inventory of Hazardous Materials which shall be prepared and verified taking into account Guidelines, including any threshold values and exemptions contained in those Guidelines, developed by the Organization,

NOTING ALSO that regulation 5.3 of the Annex to the Hong Kong Convention requires that Part I of the Inventory of Hazardous Materials shall be properly maintained and updated throughout the operational life of the ship, taking into account the Guidelines developed by the Organization,

NOTING FURTHER that regulation 5.4 of the Annex to the Hong Kong Convention requires that the Inventory shall also incorporate Part II for operationally generated wastes and Part III for stores and shall be verified, taking into account the Guidelines developed by the Organization,

RECALLING that the International Conference on the Safe and Environmentally Sound Recycling of Ships, in its resolution 4, invited the Organization to develop Guidelines for global, uniform and effective implementation and enforcement of the relevant requirements of the Convention as a matter of urgency,

HAVING CONSIDERED, at its fifty-ninth session, the draft Guidelines for the development of the inventory of hazardous materials developed by the Working Group on Guidelines for Ship Recycling,

1. ADOPTS the Guidelines for the development of the inventory of hazardous materials as set out in the Annex to this resolution;

2. INVITES Governments to apply the Guidelines as soon as possible, or when the Convention becomes applicable to them; and

3. AGREES to keep the Guidelines under review.

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ANNEX

GUIDELINES FOR THE DEVELOPMENT OF THE INVENTORY OF HAZARDOUS MATERIALS

1 Introduction

1.1 Objectives of the Guidelines

These Guidelines provide recommendations for developing the Inventory of Hazardous Materials (hereinafter referred to as "the Inventory") to assist compliance with regulation 5 (Inventory of Hazardous Materials) of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 (hereinafter referred to as "the Convention").

1.2 Application of the Guidelines

These Guidelines have been developed to provide relevant stakeholders (e.g., shipbuilders, equipment suppliers, repairers, shipowners and ship management companies) with the essential requirements for practical and logical development of the Inventory.

1.3 Objectives of the Inventory

The objectives of the Inventory are to provide ship-specific information on the actual Hazardous Materials present on board, in order to protect health and safety and to prevent environmental pollution at Ship Recycling Facilities. This information will be used by the Ship Recycling Facilities in order to decide how to manage the types and amounts of materials identified in the Inventory of Hazardous Materials (regulation 9).

2 Definitions

The terms used in these Guidelines have the same meaning as those defined in the Convention, with the following additional definitions which apply to these Guidelines only.

"Homogeneous material" means a material of uniform composition throughout that cannot be mechanically disjointed into different materials, meaning that the materials cannot, in principle, be separated by mechanical actions such as unscrewing, cutting, crushing, grinding and abrasive processes.

"Product" means machinery, equipment, materials and applied coatings on board a ship.

"Supplier" means a company which provides products; which may be a manufacturer, trader or agency.

"Supply chain" means the series of entities involved in the supply and purchase of materials and goods, from raw materials to final product.

"Threshold level" is defined as the concentration value in homogeneous materials.

3 Requirements for the Inventory

3.1 Scope of the Inventory

The Inventory consists of:

Part I: Materials contained in ship structure or equipment;
Part II: Operationally generated wastes; and
Part III: Stores.

3.2 Materials to be listed in the Inventory

Appendix 1 of the Guidelines, "Items to be listed in the Inventory of Hazardous Materials", provides information on the Hazardous Materials that may be found on board a ship. Materials set out in appendix 1 should be listed in the Inventory. Each item in appendix 1 of these Guidelines is classified under "Table A", "Table B", "Table C" or "Table D" according to its properties:

.1 Table A comprises the materials listed in appendix 1 of the Convention;

.2 Table B comprises the materials listed in appendix 2 of the Convention;

.3 Table C (Potentially hazardous items) comprises items which are potentially hazardous to the environment and human health at Ship Recycling Facilities; and

.4 Table D (Regular Consumable Goods potentially containing Hazardous Materials) comprises goods which are not integral to a ship and are unlikely to be dismantled or treated at a Ship Recycling Facility.

Table A and Table B correspond to Part I of the Inventory. Table C corresponds to Parts II and III and Table D corresponds to Part III.

3.3 Materials not required to be listed in the Inventory

Materials listed in Table B that are inherent in solid metals or metal alloys, provided they are used in general construction, such as hull, superstructure, pipes, or housings for equipment and machinery are not required to be listed in the Inventory.

3.4 Standard format of the Inventory of Hazardous Materials

The Inventory should be developed on the basis of the standard format set out in appendix 2 of these Guidelines: "Standard format of the Inventory of Hazardous Materials". Examples of how to complete the Inventory are provided for guidance purposes only.

4 Requirements for development of the Inventory

4.1 Development of Part I of the Inventory for new ships

4.1.1 Part I of the Inventory for new ships should be developed at the design and construction stage.

4.1.2 Checking of materials listed in Table A

During the development of the Inventory (Part I), the presence of materials listed in Table A of appendix 1 should be checked and confirmed; the quantity and location of Table A materials should be listed in Part I of the Inventory. If such materials are used in compliance with the Convention, they should be listed in Part I of the Inventory. Any spare parts containing materials listed in Table A are required to be listed in Part III of the Inventory.

4.1.3 Checking of materials listed in Table B

If materials listed in Table B of appendix 1 are present in products above the threshold levels provided in Table B, the quantity and location of the products and the contents of the materials present in them should be listed in Part I of the Inventory. Any spare parts containing materials listed in Table B are required to be listed in Part III of the Inventory.

4.1.4 Process for checking of materials

The checking of materials as provided in paragraphs 4.1.2 and 4.1.3 above should be based on the "Material Declaration" furnished by the suppliers in the shipbuilding supply chain (e.g., equipment suppliers, parts suppliers, material suppliers).

4.2 Development of Part I of the Inventory for existing ships

In order to achieve comparable results for existing ships with respect to Part I of the Inventory, the following procedure should be followed.

The procedure is based on the following steps:

.1 collection of necessary information;

.2 assessment of collected information;

.3 preparation of visual/sampling check plan;

.4 onboard visual check and sampling check; and

.5 preparation of Part I of the Inventory and related documentation.

The determination of Hazardous Materials present on board existing ships should, as far as practicable, be conducted as prescribed for new ships, including the procedures described in section 6 and 7 of these Guidelines. Alternatively the procedures described in subsection 4.2 may be applied for existing ships, but these procedures should not be used for any new installation resulting from the conversion or repair of existing ships after the initial preparation of the Inventory.

The procedures described in subsection 4.2 should be carried out by the shipowner, who may draw upon expert assistance. Such an expert or expert party should not be the same as the person or organization authorized by the Administration to approve the Inventory.

Please refer to appendix 4: "Flow diagram for developing Part I of the Inventory for existing ships"; and appendix 5: "Typical example of development process for Part I of the Inventory for existing ships".

4.2.1 Collection of necessary information (Step 1)

The shipowner should identify, research, request, and procure all reasonably available documentation regarding the ship. Information that will be useful includes maintenance, conversion, and repair documents; certificates, manuals, ship's plans, drawings, and technical specifications; product information data sheets (such as Material Declarations); and hazardous material inventories or recycling information from sister ships. Potential sources of information could include previous shipowners, the ship builder, historical societies, classification society records, and ship recycling facilities with experience working with similar ships.

4.2.2 Assessment of collected information (Step 2)

The information collected in Step 1 above should be assessed. The assessment should cover all materials listed in Table A of appendix 1; materials listed in Table B should be listed as far as practicable. The results of the assessment should be reflected in the visual/sampling check plan.

4.2.3 Preparation of visual/sampling check plan (Step 3)

To specify the materials listed in appendix 1 of these Guidelines a visual/sampling check plan should be prepared taking into account the collated information and any appropriate expertise. The visual/sampling check plan based on the following three lists:

- List of equipment, system and/or area for visual check (any equipment, system and/or area specified regarding the presence of the materials listed in appendix 1 by document analysis should be entered in the List of equipment, system and/or area for visual check);

- List of equipment, system and/or area for sampling check (any equipment, system and/or area which cannot be specified regarding the presence of the materials listed in appendix 1 by document or visual analysis should be entered in the List of equipment, system and/or area as requiring sampling check. A sampling check is the taking of samples to identify the presence or absence of Hazardous Material contained in the equipment, systems, and/or areas, by suitable and generally accepted methods such as laboratory analysis); and

- List of equipment, system and/or area classed as "potentially containing Hazardous Material" (any equipment, system and/or area which cannot be specified regarding the presence of the materials listed in appendix 1 by document analysis may be entered in the List of equipment, system and/or area classed as "potentially containing Hazardous Material" without the sampling check. The prerequisite for this classification is a comprehensible justification as to the impossibility of conducting sampling without compromising the safety of the ship and its operational efficiency).

Visual/sampling checkpoints should be all points where:

- the presence of materials to be considered for the Inventory Part I as listed in appendix 1 is likely;

- the documentation is not specific; or

- materials of uncertain composition were used.

4.2.4 Onboard visual/sampling check (Step 4)

The onboard visual/sampling check should be carried out in accordance with the visual/sampling check plan. When a sampling check is carried out, samples should be taken and the sample points should be clearly marked on the ship plan and the sample results referenced. Materials of the same kind may be sampled in a representative manner. Such materials are to be checked to ensure that they are of the same kind. The sampling check should be carried out drawing upon expert assistance.

Any uncertainty regarding the presence of Hazardous Materials should be clarified by a visual/sampling check. Checkpoints should be documented in the ship's plan and may be supported by photographs.

If the equipment, system and/or area of the ship are not accessible for a visual check or sampling check, they should be classified as "potentially containing Hazardous Material". The prerequisite for such classification should be the same prerequisite as in section 4.2.3. Any equipment, system and/or area classed as "potentially containing Hazardous Material" may be investigated or subjected to a sampling check at the request of the shipowner during a later survey (e.g., during repair, refit or conversion).

4.2.5 Preparation of Part I of the Inventory and related documentation (Step 5)

If any equipment, system and/or area is classed as either "containing Hazardous Material" or "potentially containing Hazardous Material", their approximate quantity and location should be listed in Part I of the Inventory. These two categories should be indicated separately in the remarks column of the Inventory of Hazardous Materials.

4.2.6 Diagram of the location of Hazardous Materials on board a ship

Preparation of a diagram showing the location of the materials listed in Table A is recommended in order to help Ship Recycling Facilities gain a visual understanding of the Inventory.

4.3 Maintaining and updating Part I of the Inventory during operations

4.3.1 Part I of the Inventory should be appropriately maintained and updated, especially after any repair or conversion or sale of a ship.

4.3.2 Updating of Part I of the Inventory in the event of new installation

If any machinery or equipment is added to, removed or replaced or the hull coating is renewed, Part I of the Inventory should be updated according to the requirements for new ships as stipulated in subsections 4.1.2 to 4.1.4. Updating is not required if identical parts or coatings are installed or applied.

4.3.3 Continuity of Part I of the Inventory

Part I of the Inventory should belong to the ship and the continuity and conformity of the information it contains should be confirmed, especially if the flag, owner or operator of the ship changes.

4.4 Development of Part II of the Inventory (operationally generated waste)

4.4.1 Once the decision to recycle a ship has been taken, Part II of the Inventory should be developed before the final survey, taking into account that a ship destined to be recycled shall conduct operations in the period prior to entering the Ship Recycling Facility in a manner that minimizes the amount of cargo residues, fuel oil and wastes remaining on board (regulation 8.2).

4.4.2 Operationally generated wastes to be listed in the Inventory

If the wastes listed in Part II of the Inventory provided in "Table C (Potentially hazardous items)" of appendix 1 are intended for delivery with the ship to a Ship Recycling Facility, the quantity of the operationally generated wastes should be estimated and their approximate quantities and locations should be listed in Part II of the Inventory.

4.5 Development of Part III of the Inventory (stores)

4.5.1 Once the decision to recycle has been taken, Part III of the Inventory should be developed before the final survey, taking into account the fact that a ship destined to be recycled shall minimize the wastes remaining on board (regulation 8.2). Each item listed in Part III should correspond to the ship's operations during its last voyage.

4.5.2 Stores to be listed in the Inventory

If the stores to be listed in Part III of the Inventory provided in Table C of appendix 1 are to be delivered with the ship to a Ship Recycling Facility, the unit (e.g., capacity of cans and cylinders), quantity and location of the stores should be listed in Part III of the Inventory.

4.5.3 Liquids and gases sealed in ship's machinery and equipment to be listed in the Inventory

If any liquids and gases listed in Table C of appendix 1 are integral in machinery and equipment on board a ship, their approximate quantity and location should be listed in Part III of the Inventory. However, small amounts of lubricating oil, anti-seize compounds and grease which are applied to or injected into machinery and equipment to maintain normal performance do not fall within the scope of this provision. For subsequent completion of Part III of the Inventory during the recycling preparation processes, the quantity of liquids and gases listed in Table C of appendix 1 required for normal operation, including the related pipe system volumes, should be prepared and documented at the design and construction stage. This information belongs to the ship, and continuity of this information should be maintained if the flag, owner or operator of the ship changes.

4.5.4 Regular consumable goods to be listed in the Inventory

Regular consumable goods, as provided in Table D of appendix 1should not be listed in Part I or Part II but should be listed in Part III of the Inventory if they are to be delivered with the ship to a Ship Recycling Facility. A general description including the name of item (e.g., TV set),

manufacturer, quantity and location should be entered in Part III of the Inventory. The check on materials provided for in paragraphs 4.1.2 and 4.1.3 of the Guidelines does not apply to regular consumable goods.

4.6 Description of location of Hazardous Materials on board

The locations of Hazardous Materials on board should be described and identified using the name of location (e.g., second floor of Engine-room, Bridge DK, APT, No.1 Cargo Tank, Frame number) given in the plans (e.g., General Arrangement, Fire and Safety Plan, Machinery Arrangement or Tank Arrangement).

4.7 Description of approximate quantity of Hazardous Materials

In order to identify the approximate quantity of Hazardous Materials, the standard unit used for the of Hazardous Materials should be kg, unless other units (e.g., m^3 for materials of liquid or gases, m^2 for materials used in floors or walls) are considered more appropriate. An approximate quantity should be rounded up to at least two significant figures.

5 Requirements for ascertaining the conformity of the Inventory

5.1 Design and construction stage

The conformity of Part I of the Inventory at the design and construction stage should be ascertained by reference to the collected "Supplier's Declaration of Conformity" described in section 7 and the related "Material Declarations" collected from suppliers.

5.2 Operational stage

Shipowners should implement the following measures in order to ensure the conformity of Part I of the Inventory:

.1 designate a person as responsible for maintaining and updating the Inventory (the designated person may be employed ashore or on board);

.2 the designated person, in order to implement subsection 4.3.2, should establish and supervise a system to ensure the necessary updating of the Inventory in the event of new installation;

.3 to maintain the Inventory including dates of changes or new deleted entries and the signature of the designated person; and

.4 provide related documents as required for the survey or sale of the ship.

6 Material Declaration

6.1 General

Suppliers to the shipbuilding industry should identify and declare whether or not the materials listed in Table A or Table B are present above the threshold level specified in appendix 1 of these Guidelines. However, this provision does not apply to chemicals which do not constitute a part of the finished product.

6.2 Information required in the declaration

At a minimum the following information is required in the Material Declaration:

.1 date of declaration;

.2 Material Declaration identification number;

.3 supplier's name;

.4 product name (common product name or name used by manufacturer);

.5 product number (for identification by manufacturer);

.6 declaration of whether or not the materials listed in Table A and Table B of appendix 1 of these Guidelines are present in the product above the threshold level stipulated in appendix 1 of these Guidelines; and

.7 mass of each constituent material listed in Table A and/or Table B of appendix 1 of these Guidelines if present above threshold level.

An example of a Material Declaration is shown in appendix 6.

7 Supplier's Declaration of Conformity

7.1 Purpose and scope

The purpose of the Supplier's Declaration of Conformity is to provide assurance that the related Material Declaration conforms to section 6.2, and to identify the responsible entity.

The Supplier's Declaration of Conformity remains valid as long as the products are present on board.

The supplier compiling the Supplier's Declaration of Conformity should establish a company policy[1]. The company policy on the management of the chemical substances in products which the supplier manufactures or sells should cover:

.a Compliance with law:

The regulations and requirements governing the management of chemical substances in products should be clearly described in documents which should be kept and maintained; and

.b Obtaining of information on chemical substance content:

In procuring raw materials for components and products, suppliers should be selected following an evaluation, and the information on the chemical substances they supply should be obtained.

[1] A recognized quality management system may be utilized.

7.2 Contents and format

The Supplier's Declaration of Conformity should contain the following:

.1 unique identification number;

.2 name and contact address of the issuer;

.3 identification of the subject of the Declaration of Conformity (e.g., name, type, model number, and/or other relevant supplementary information);

.4 statement of conformity;

.5 date and place of issue; and

.6 signature (or equivalent sign of validation), name and function of the authorized person(s) acting on behalf of the issuer.

An example of the Supplier's Declaration of Conformity is shown in appendix 7.

8 List of appendices

Appendix 1: Items to be listed in the Inventory of Hazardous Materials

Appendix 2: Standard format of the Inventory of Hazardous Materials

Appendix 3: Example of the development process for Part I of the Inventory for new ships

Appendix 4: Flow diagram for developing Part I of the Inventory for existing ships

Appendix 5: Example of the development process for Part I of the Inventory for existing ships

Appendix 6: Form of Material Declaration

Appendix 7: Form of Supplier's Declaration of Conformity

Appendix 8: Examples of Table A and Table B materials of appendix 1 with CAS-numbers

APPENDIX 1

ITEMS TO BE LISTED IN THE INVENTORY OF HAZARDOUS MATERIALS

TABLE A* Materials listed in appendix 1 of the Annex to the Convention

No.	Materials		Inventory			Threshold level
			Part I	Part II	Part III	
A-1	Asbestos		x			no threshold level
A-2	Polychlorinated biphenyls (PCBs)		x			no threshold level
A-3	Ozone Depleting Substances	CFCs	x			no threshold level
		Halons	x			
		Other fully halogenated CFCs	x			
		Carbon tetrachloride	x			
		1,1,1-Trichloroethane (Methyl chloroform)	x			
		Hydrochlorofluorocarbons	x			
		Hydrobromofluorocarbons	x			
		Methyl bromide	x			
		Bromochloromethane	x			
A-4	Anti-fouling systems containing organotin compounds as a biocide		x			2500 mg total tin/kg

TABLE B* Materials listed in appendix 2 of the Annex to the Convention

No.	Materials	Inventory			Threshold level
		Part I	Part II	Part III	
B-1	Cadmium and cadmium compounds	x			100 mg/kg
B-2	Hexavalent chromium and hexavalent chromium compounds	x			1,000 mg/kg
B-3	Lead and lead compounds	x			1,000 mg/kg
B-4	Mercury and mercury compounds	x			1,000 mg/kg
B-5	Polybrominated biphenyl (PBBs)	x			1,000 mg/kg
B-6	Polybrominated diphenyl ethers (PBDEs)	x			1,000 mg/kg
B-7	Polychlorinated naphthalenes (more than 3 chlorine atoms)	x			no threshold level
B-8	Radioactive substances	x			no threshold level
B-9	Certain shortchain chlorinated paraffins (Alkanes, C10-C13, chloro)	x			1%

* For materials in this Table with no threshold level, quantities occurring as unintentional trace contaminants should not be listed in Material Declarations and in the Inventory.

TABLE C Potentially hazardous items

No.	Properties		Goods	Inventory		
				Part I	Part II	Part III
C-1	Liquid	Oiliness	Kerosene			x
C-2			White spirit			x
C-3			Lubricating oil			x
C-4			Hydraulic oil			x
C-5			Anti-seize compounds			x
C-6			Fuel additive			x
C-7			Engine coolant additives			x
C-8			Antifreeze fluids			x
C-9			Boiler and feed water treatment and test re-agents			x
C-10			De-ioniser regenerating chemicals			x
C-11			Evaporator dosing and descaling acids			x
C-12			Paint stabilizers/rust stabilizers			x
C-13			Solvents/thinners			x
C-14			Paints			x
C-15			Chemical refrigerants			x
C-16			Battery electrolyte			x
C-17			Alcohol, methylated spirits			x
C-18	Gas	Explosives/ inflammables	Acetylene			x
C-19			Propane			x
C-20			Butane			x
C-21			Oxygen			x
C-22		Green House Gases	CO_2			x
C-23			Perfluorocarbons (PFCs)			x
C-24			Methane			x
C-25			Hydrofluorocarbon (HFCs)			x
C-27			Nitrous oxide(N_2O)			x
C-28			Sulfur hexafluoride (SF_6)			x
C-29	Liquid	Oiliness	Bunkers: fuel oil			x
C-30			Grease			x
C-31			Waste oil (sludge)		x	
C-32			Bilge		x	
C-33			Oily liquid cargo tank residues		x	
C-34			Ballast water		x	
C-35			Raw sewage		x	
C-36			Treated sewage		x	
C-37			Non-oily liquid cargo residues		x	
C-38	Gas	Explosibility/ inflammability	Fuel gas			x

TABLE C Potentially hazardous items

No.	Properties	Goods	Inventory		
			Part I	Part II	Part III
C-39	Solid	Dry cargo residues		x	
C-40		Medical waste/infectious waste		x	
C-41		Incinerator ash[2)]		x	
C-42		Garbage[2)]		x	
C-43		Fuel tank residues		x	
C-45		Oily solid cargo tank residues		x	
C-45		Oily/contaminated rags		x	
C-46		Batteries (incl. lead acid batteries)			x
C-47		Pesticides/insecticide sprays			x
C-48		Extinguishers			x
C-49		Chemical cleaner (incl. electrical equipment cleaner, carbon remover)			x
C-50		Detergent/bleacher (could be a liquid)			x
C-51		Miscellaneous medicines			x
C-52		Fire fighting clothing and equipment			x
C-53		Dry tank residues		x	
C-54		Cargo residues		x	
C-55		Spare parts which contain materials listed in Table A or Table B			x

2) Definition of garbage is identical to that in MARPOL Annex V. However, incinerator ash is classified separately because it may include hazardous substances or heavy metals.

TABLE D• Regular consumable goods potentially containing Hazardous Materials

No.	Properties	Example	Inventory		
			Part I	Part II	Part III
D-1	Domestic and accommodation appliances	Computers, refrigerators, printers, scanners, television sets, radio sets, video cameras, video recorders, telephones, consumer batteries, fluorescent lamps, filament bulbs, lamps			x

• This Table does not include ship specific equipment integral to ship operations, which has to be listed in Part I of the Inventory.

APPENDIX 2

STANDARD FORMAT OF THE INVENTORY OF HAZARDOUS MATERIALS

Part I HAZARDOUS MATERIALS CONTAINED IN THE SHIP'S STRUCTURE AND EQUIPMENT

I-1 Paints and coating systems containing materials listed in Table A and Table B of appendix 1 of the Guidelines

No.	Application of paint	Name of paint	Location	Materials (classification in appendix 1)	Approx. quantity		Remarks
1	Anti-drumming compound	Primer, xx Co., xx primer #300	Hull part	Lead	35.00	kg	
2	Anti-fouling	xx Co., xx coat #100	Underwater parts	TBT	120.00	kg	

I-2 Equipment and machinery containing materials listed in Table A and Table B of appendix 1 of the Guidelines

No.	Name of equipment and machinery	Location	Materials (classification in appendix 1)	Parts where used	Approx. quantity		Remarks
1	Switch board	Engine control room	Cadmium	Housing coating	0.02	kg	
			Mercury	Heat gauge	<0.01	kg	less than 0.01kg
2	~~Diesel engine, xx Co., xx #150~~	~~Engine room~~	~~Cadmium~~	~~Bearing~~	~~0.02~~	~~kg~~	
3	Diesel engine, xx Co., xx #200	Engine-room	Cadmium	Bearing	0.01	kg	Revised by XXX on Oct. XX, 2008
4	Diesel generator (x 3)	Engine-room	Lead	Ingredient of copper compounds	0.01	kg	

I-3 Structure and hull containing materials listed in Table A and Table B of appendix 1 of the Guidelines

No.	Name of structural element	Location	Materials (classification in appendix 1)	Parts where used	Approx. quantity		Remarks
1	Wall panel	Accommodation	Asbestos	Insulation	2,500.00	kg	
2	Wall insulation	Engine control room	Lead	perforated plate	0.01	kg	cover for insulation material
			Asbestos	Insulation	25.00	kg	under perforated plates
3							

Part II OPERATIONALLY GENERATED WASTE

No.	Location[1)]	Name of item (classification in appendix 1) and detail (if any) of the item	Approx. quantity		Remarks
1	Garbage locker	Garbage (food waste)	35.00	kg	
2	Bilge tank	Bilgewater	15.00	m^3	
3	No.1 cargo hold	Dry cargo residues (iron ore)	110.00	kg	
4	No.2 cargo hold	Waste oil (sludge) (crude)	120.00	kg	
5	No.1 ballast tank	Ballast water	2,500.00	m^3	
		Sediments	250.00	kg	

Part III STORES

III-1 Stores

No.	Location[1)]	Name of item (classification in appendix 1)	Unit quantity		Figure		Approx. quantity		Remarks[2)]
1	No.1 fuel oil tank	Fuel oil (heavy fuel oil)	-		-		100.00	m^3	
2	CO_2 room	CO_2	100.00	kg	50	bottles	5,000.00	kg	
3	Workshop	Propane	20.00	kg	10	pcs	200.00	kg	
4	Medicine locker	Miscellaneous medicines	-		-		-		Details are shown in the attached list.
5	Paint stores	Paint, xx Co., #600	20.00	kg	5	pcs	100.00	kg	Cadmium containing.

III-2 Liquids sealed in ship's machinery and equipment

No.	Type of liquids (classification in appendix 1)	Name of machinery or equipment	Location	Approx. quantity		Remarks
1	Hydraulic oil	Deck crane hydraulic oil system	Upper deck	15.00	m^3	
		Deck machinery hydraulic oil system	Upper deck and bosun store	200.00	m^3	
		Steering gear hydraulic oil system	Steering gear room	0.55	m^3	
2	Lubricating oil	Main engine system	Engine-room	0.45	m^3	
3	Boiler water treatment	Boiler	Engine-room	0.20	m^3	

III-3 Gases sealed in ship's machinery and equipment

No.	Type of gases (classification in appendix 1)	Name of machinery or equipment	Location	Approx. quantity		Remarks
1	HFC	AC system	AC room	100.00	kg	
2	HFC	Refrigerated provision chamber machine	AC room	50.00	kg	

III-4 Regular consumable goods potentially containing Hazardous Materials

No.	Location[1)]	Name of item	Quantity	Remarks
1	Accommodation	Refrigerators	1	
2	Accommodation	Personal computers	2	

1) The location of a Part II or Part III item should be entered in order based on its location, from a lower level to an upper level and from a fore part to an aft part. The location of Part I items is recommended to be described similarly, as far as practicable.
2) In column "Remarks" for Part III items, if Hazardous Materials are integrated in products, the approximate amount of the contents should be shown as far as possible.

APPENDIX 3

EXAMPLE OF THE DEVELOPMENT PROCESS FOR PART I OF THE INVENTORY FOR NEW SHIPS

1 Objective of the typical example

This example has been developed to give guidance and to facilitate understanding of the development process for Part I of the Inventory of Hazardous Materials for new ships.

2 Development flow for Part I of the Inventory

Part I of the Inventory should be developed using the following 3 steps. However, the order of these steps is flexible and can be changed depending on the schedule of shipbuilding:

.1 collection of Hazardous Materials information;
.2 utilization of Hazardous Materials information; and
.3 preparation of the Inventory (by filling out standard format).

3 Collection of Hazardous Materials information

3.1 Data collection process for Hazardous Materials

Materials Declaration (MD) and Supplier's Declaration of Conformity (SDoC) for products from suppliers (tier 1 suppliers) should be requested and collected by the shipbuilding yard. Tier 1 suppliers may request from their suppliers (tier 2 suppliers) the relevant information if they cannot develop the MD based on the information available. Thus the collection of data on Hazardous Materials may involve the entire shipbuilding supply chain (Figure 1).

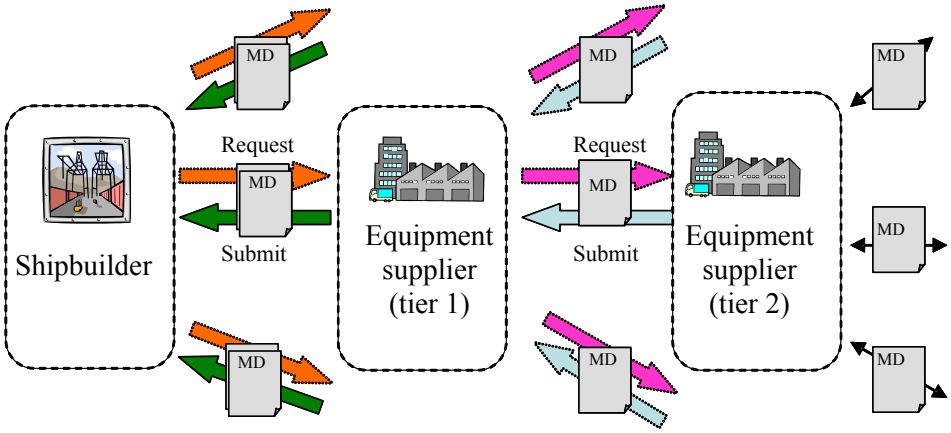


Figure 1 – Process of MD (and SDoC) collection showing involvement of supply chain

3.2 Declaration of Hazardous Materials

Suppliers should declare whether or not the Hazardous Materials listed in Table A and Table B in the MD are present in concentrations above the threshold levels specified for each "homogeneous material" in a product.

3.2.1 Materials listed in Table A

If one or more materials listed in Table A are found to be present in concentrations above the specified threshold level according to the MD, the products which contain these materials shall not be installed on a ship. However, if the materials are used in a product in accordance with an exemption specified by the Convention (e.g., new installations containing hydrochlorofluorocarbons (HCFCs) before 1 January 2020), the product should be listed in the Inventory.

3.2.2 Materials listed in Table B

If one or more materials listed in Table B are found to be present in concentrations above the specified threshold level according to the MD, the products should be listed in the Inventory.

3.3 Example of "Homogeneous Materials"

Figure 2 shows an example of four homogeneous materials which constitute a cable. In this case, sheath, intervention, insulator and conductor are all individual homogeneous materials.

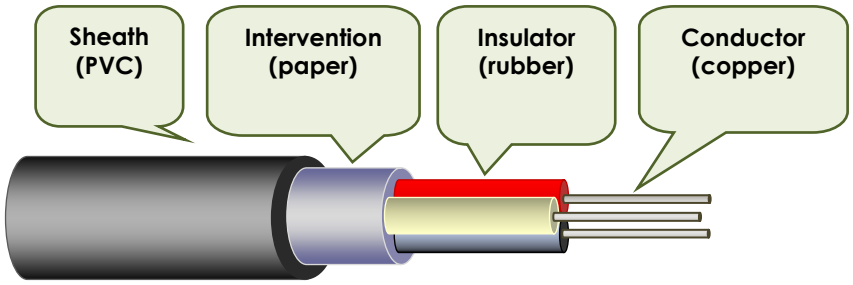


Figure 2 – Example of Homogeneous Materials (cable)

4 Utilization of Hazardous Materials information

Products which contain Hazardous Materials in concentrations above the specified threshold levels should be clearly identified in the MD. The approximate quantity of the Hazardous Materials should be calculated if the mass data for Hazardous Materials are declared in the MD using a unit which cannot be directly utilized in the Inventory.

5 Preparation of Inventory (by filling out standard format)

The information received for the Inventory, as contained in Table A and Table B of appendix 1of these Guidelines, ought to be structured and utilized according to the following categorization for Part I of the Inventory:

1.1 Paints and coating systems;
1.2 Equipment and machinery; and
1.3 Structure and hull.

5.1 "Name of equipment and machinery" column

5.1.1 Equipment and machinery

The name of each equipment or machinery should be entered in this column. If more than one Hazardous Material is present in the equipment or machinery, the row relating to that equipment or machinery should be appropriately divided such that all of the Hazardous Materials contained in the piece of equipment or machinery are entered. If more than one item of equipment or machinery is situated in one location, both name and quantity of the equipment or machinery should be entered in the column. For identical common or mass-produced items, such as bolts, nuts and valves, there is no need to list each item individually. An example is shown in Table 1.

Table 1 – Example showing more than one item of equipment or machinery situated in one location

No.	Name of equipment and machinery	Location	Materials (classification in appendix 1)	Parts where used	Approx. quantity		Remarks
	Main engine	Engine-room	Lead	Piston pin bush	0.75	kg	
			Mercury	Thermometer charge air temperature	0.01	kg	
	Diesel generator (x 3)	Engine-room	Mercury	Thermometer	0.03		

5.1.2 Pipes and cables

The names of pipes and of systems, including electric cables, which are often situated in more than one compartment of a ship, should be described using the name of the system concerned. A reference to the compartments where these systems are located is not necessary as long as the system is clearly identified and properly named.

5.2 "Approximate quantity" column

The standard unit for approximate quantity of solid Hazardous Materials should be kg. If the Hazardous Materials are liquids or gases, the standard unit should be either m^3 or kg. An approximate quantity should be rounded up to at least two significant figures. If the Hazardous Material is less than 10 g, the description of the quantity should read "<0.01 kg".

Table 2 – Example of a switchboard

No.	Name of equipment and machinery	Location	Materials (classification in appendix 1)	Parts where used	Approx. quantity		Remarks
	Switchboard	Engine control room	Cadmium	Housing coating	0.02	kg	
			Mercury	Heat gauge	<0.01	kg	less than 0.01kg

5.3 "Location" column

5.3.1 Example of a location list

It is recommended to prepare a location list which covers all compartments of a ship based on the ship's plans (e.g., General Arrangement, Engine-room Arrangement, Accommodation and Tank Plan) and on other documentation on board, including certificates or spare parts' lists. The description of the location should be based on a location such as a deck or room to enable easy identification. The name of the location should correspond to the ship's plans so as to ensure consistency between the Inventory and the ship's plans. Examples of names of locations are shown in Table 3.

Table 3 – Examples of location names

(A) Primary classification	(B) Secondary classification	(C) Name of location
All over the ship		
Hull part	Fore part	Bosun store
		…
	Cargo part	No.1 Cargo Hold/Tank
		No.1 Garage deck
		…
	Tank part	Fore Peak Tank
		No.1 WBT
		No.1 FOT
		…
		Aft Peak Tank
	Aft part	Steering Gear Room
		Emergency Fire Pump Space
		…
	Superstructure	Accommodation
		Compass deck
		Nav. Bridge deck
		…
		Wheel House
		Engine Control Room
		Cargo Control Room
		…
	Deck house	Deck House
		…

(A) Primary classification	(B) Secondary classification	(C) Name of location
Machinery part	Engine-room	Engine-room
		Main Floor
		2nd Floor
		…
		Generator Space/Room
		Purifier Space/Room
		Shaft Space/Room
		Engine Casing
		Funnel
		Engine Control Room
		…
	Pump-room	Pump-room
		…
Exterior part	Superstructure	Superstructure
	Upper deck	Upper deck
	Hull shell	Hull shell
		bottom
		under waterline
		…

5.3.2 Description of location of pipes and electrical systems

Locations of pipes and systems, including electrical systems and cables situated in more than one compartment of a ship, should be described for each system concerned. If they are situated in a number of compartments, the most practical of the following two options should be used:

a) listing of all components in the column; or

b) description of the location of the system using an expression such as those shown under "primary classification" and "secondary classification" in Table 3.

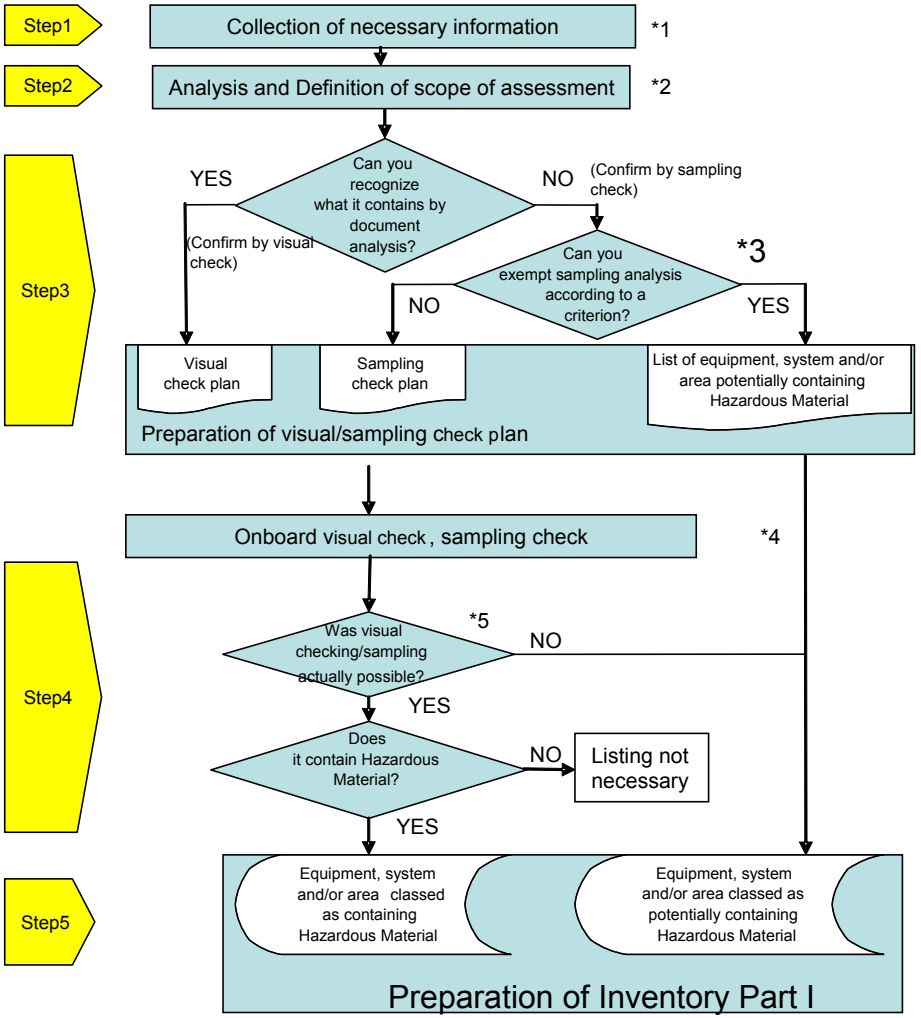
A typical description of a pipe system is shown in Table 4.

Table 4 – Example of description of a pipe system

No.	Name of equipment and machinery	Location	Materials (classification in appendix 1)	Parts where used	Approx. quantity	Remarks
	Ballast water system	Engine-room, Hold parts				

APPENDIX 4

FLOW DIAGRAM FOR DEVELOPING PART I OF THE INVENTORY FOR EXISTING SHIPS



*1 : Documents may include any certificates, manuals, ship's plans drawings, technical specifications and information from sister and/or similar ships.

*2 : The assessment should cover all materials listed in Table A of Appendix 1 of the Guideline; the materials listed in Table B should be listed as far as practicable.
It is impossible to assess all equipment and areas including those which are assumed not to contain Hazardous Materials described above.
Using analysis of available documents based on knowledge and experience, it must be made clear which equipment and/or area should be included in the scope of the assessment.

*3 : Equipment, system and/or areas which cannot be specified as containing materials listed in appendix 1 of these guidelines on the basis of documents can be listed in the List of equipment, system and/or area classed as "potentially containing Hazardous Material" without the sampling check. The prerequisite for this classification is a comprehensible justification of the conclusion, such as the impossibility to conduct samplings without compromising ship safety and operational efficiency.

*4 : Sampling Check. This means sampling and identification of Hazardous Material contained in the equipment, systems, and/or areas, by laboratory analysis. The sampling check should be applied where the presence of Prohibited and Restricted Hazardous Material is assumed but cannot be recognized by analysis of the available documentation.

*5 : When equipment, systems and/or areas of a ship are not accessible for visual check or sampling check, this equipment, system and/or area is classified as "potentially containing Hazardous Material".

APPENDIX 5

EXAMPLE OF THE DEVELOPMENT PROCESS FOR PART I OF THE INVENTORY FOR EXISTING SHIPS

1 Introduction

In order to develop Part I of the Inventory of Hazardous Materials for existing ships, documents of the individual ship as well as the knowledge and experience of specialist personnel (experts) is required. An example of the development process for Part I of the Inventory of Hazardous Materials for existing ships is useful to understand the basic steps as laid out in the Guidelines and to ensure a unified application. However, attention should be paid to variations in different types of ships[1)].

Compilation of Part I of the Inventory of Hazardous Material for existing ships involves the following 6 steps which are described in paragraph 4.2 and appendix 4 of these Guidelines.

Step 1: Collection of necessary information;
Step 2: Assessment of collected information;
Step 3: Preparation of visual/sampling check plan;
Step 4: Onboard visual/sampling check; and
Step 5: Preparation of Part I of the Inventory and related documentation.

1) The example of a 28,000 gross tonnage bulk carrier constructed in 1985 is used in this appendix.

2 Step 1: Collection of necessary information

2.1 Sighting of available documents

A practical first step is to collect detailed documents for the ship. The shipowner should try to collate documents normally retained onboard the ship or by the shipping company as well as relevant documents that the shipyard, manufacturers, or classification society may have. The following documents should be used when available:

Ship's specification
General Arrangement
Machinery Arrangement
Spare Parts and Tools List
Piping Arrangement
Accommodation Plan
Fire Control Plan
Fire Protection Plan
Insulation Plan (Hull and Machinery)
International Anti-Fouling System Certificate
Related manuals and drawings
Information from other inventories and/or sister or similar ships, machinery, equipment, materials and coatings
Results of previous visual/sampling checks and other analysis

If the ship has undergone conversions or major repair work, it is necessary to identify as far as possible the modifications from the initial design and specification of the ship.

2.2 Indicative list

It is impossible to check all equipment, systems, and/or areas on board the ship to determine the presence or absence of Hazardous Materials. The total number of parts on board may exceed several thousand. In order to take a practical approach, an "Indicative list" should be prepared that identifies the equipment, system, and/or area on board that is presumed to contain Hazardous Materials. Field interviews with the shipyard and suppliers may be necessary to prepare such lists. A typical example of an "Indicative list" is shown below:

2.2.1 Materials to be checked and documented

Hazardous Materials, as identified in appendix 1 of these Guidelines, should be listed in Part I of the Inventory for existing ships. Appendix 1 of the Guidelines contains all the materials concerned. Table A shows those which are required to be listed and Table B shows those which should be listed as far as practical.

2.2.2 Materials listed in Table A

Table A lists the following four materials:

Asbestos
Polychlorinated biphenyls (PCBs)
Ozone depleting substances
Anti-fouling systems containing organotin compounds as a biocide

2.2.2.1 Asbestos

Field interviews were conducted with over 200 Japanese shipyards and suppliers regarding the use of asbestos in production. "Indicative lists" for asbestos developed on the basis of this research are shown below:

Structure and/or equipment	Component
Propeller shafting	Packing with low pressure hydraulic piping flange
	Packing with casing
	Clutch
	Brake lining
	Synthetic stern tubes
Diesel engine	Packing with piping flange
	Lagging material for fuel pipe
	Lagging material for exhaust pipe
	Lagging material turbocharger
Turbine engine	Lagging material for casing
	Packing with flange of piping and valve for steam line, exhaust line and drain line
	Lagging material for piping and valve of steam line, exhaust line and drain line

Structure and/or equipment	Component
Boiler	Insulation in combustion chamber
	Packing for casing door
	Lagging material for exhaust pipe
	Gasket for manhole
	Gasket for hand hole
	Gas shield packing for soot blower and other hole
	Packing with flange of piping and valve for steam line, exhaust line, fuel line and drain line
	Lagging material for piping and valve of steam line, exhaust line, fuel line and drain line
Exhaust gas economizer	Packing for casing door
	Packing with manhole
	Packing with hand hole
	Gas shield packing for soot blower
	Packing with flange of piping and valve for steam line, exhaust line, fuel line and drain line
	Lagging material for piping and valve of steam line, exhaust line, fuel line and drain line
Incinerator	Packing for casing door
	Packing with manhole
	Packing with hand hole
	Lagging material for exhaust pipe
Auxiliary machinery (pump, compressor, oil purifier, crane)	Packing for casing door and valve
	Gland packing
	Brake lining
Heat exchanger	Packing with casing
	Gland packing for valve
	Lagging material and insulation
Valve	Gland packing with valve, sheet packing with piping flange
	Gasket with flange of high pressure and/or high temperature
Pipe, duct	Lagging material and insulation
Tank (fuel tank, hot water, tank, condenser), other equipments (fuel strainer, lubricant oil strainer)	Lagging material and insulation
Electric equipment	Insulation material
Airborne asbestos	Wall, ceiling
Ceiling, floor and wall in accommodation area	Ceiling, floor, wall
Fire door	Packing, construction and insulation of the fire door
Inert gas system	Packing for casing, etc.
Air-conditioning system	Sheet packing, lagging material for piping and flexible joint

Structure and/or equipment	Component
Miscellaneous	Ropes Thermal insulating materials Fire shields/fire proofing Space/duct insulation Electrical cable materials Brake linings Floor tiles/deck underlay Steam/water/vent flange gaskets Adhesives/mastics/fillers Sound damping Moulded plastic products Sealing putty Shaft/valve packing Electrical bulkhead penetration packing Circuit breaker arc chutes Pipe hanger inserts Weld shop protectors/burn covers Fire-fighting blankets/clothing/equipment Concrete ballast

2.2.2.2 Polychlorinated biphenyl (PCBs)

Worldwide restriction of PCBs began on 17 May 2004 as a result of the implementation of the Stockholm Convention, which aims to eliminate or restrict the production and use of persistent organic pollutants. In Japan, domestic control began in 1973, with the prohibition of all activities relating to the production, use and import of PCBs. Japanese suppliers can provide accurate information concerning their products. The "Indicative list" of PCBs has been developed as shown below:

Equipment	Component of equipment
Transformer	Insulating oil
Condenser	Insulating oil
Fuel heater	Heating medium
Electric cable	Covering, insulating tape
Lubricating oil	
Heat oil	Thermometers, sensors, indicators
Rubber/felt gaskets	
Rubber hose	
Plastic foam insulation	
Thermal insulating materials	
Voltage regulators	
Switches/reclosers/bushings	
Electromagnets	
Adhesives/tapes	
Surface contamination of machinery	
Oil-based paint	
Caulking	
Rubber isolation mounts	

Equipment	Component of equipment
Pipe hangers	
Light ballasts (component within fluorescent light fixtures)	
Plasticizers	
Felt under septum plates on top of hull bottom	

2.2.2.3 Ozone depleting substances

The "Indicative list" for Ozone depleting substances is shown below. Ozone depleting substances have been controlled according to the Montreal Protocol and MARPOL Convention. Although almost all substances have been banned since 1996, HCFC can still be used until 2020.

Materials	Component of equipment	Period for use of ODS in Japan
CFCs (R11, R12)	Refrigerant for refrigerators	Until 1996
CFCs	Urethane formed material	Until 1996
	Blowing agent for insulation of LNG carriers	Until 1996
Halons	Extinguishing agent	Until 1994
Other fully halogenated CFCs	The possibility of usage in ships is low	Until 1996
Carbon tetrachloride	The possibility of usage in ships is low	Until 1996
1,1,1-Trichloroethane (Methyl chloroform)	The possibility of usage in ships is low	Until 1996
HCFC (R22, R141b)	Refrigerant for refrigerating machine	It is possible to use it until 2020
HBFC	The possibility of usage in ships is low	Until 1996
Methyl bromide	The possibility of usage in ships is low	Until 2005

2.2.2.4 Organotin compounds

Organotin compounds include Tributyl tins (TBT), Triphenyl tins (TPT) and Tributyl tin oxide (TBTO). Organotin compounds have been used as anti-fouling paint on ships' bottoms and the International Convention on the Control of Harmful Anti-Fouling Systems on Ships (AFS Convention) stipulates that all ships shall not apply or re-apply organotin compounds after 1 January 2003, and that, after 1 January 2008, all ships shall either not bear such compounds on their hulls or shall bear a coating that forms a barrier preventing such compounds from leaching into the sea. The above-mentioned dates may have been extended by permission of the Administration bearing in mind that the AFS Convention entered into force on 17 September 2008.

2.2.3 Materials listed in Table B

For existing ships it is not obligatory for materials listed in Table B to be listed in Part I of the Inventory. However, if they can be identified in a practical way, they should be listed in the Inventory, because the information will be used to support ship recycling processes. The Indicative list of materials listed in Table B is shown below:

Materials	Component of equipment
Cadmium and cadmium compounds	Nickel-cadmium battery, plating film, bearing
Hexavalent chromium compounds	Plating film
Mercury and mercury compounds	Fluorescent light, mercury lamp, mercury cell, liquid-level switch, gyro compass, thermometer, measuring tool, manganese cell, pressure sensors, light fittings, electrical switches, fire detectors
Lead and lead compounds	Lead-acid storage battery, corrosion-resistant primer, solder (almost all electric appliances contain solder), paints, preservative coatings, cable insulation, lead ballast, generators
Polybrominated biphenyls (PBBs)	Non-flammable plastics
Polybrominated diphenyl ethers (PBDE)	Non-flammable plastics
Polychlorinated naphthalenes	Paint, lubricating oil
Radioactive substances	Fluorescent paint, ionic type smoke detector, level gauge
Certain shortchain chlorinated paraffins	Non-flammable plastics

3 Step 2: Assessment of collected information

Preparation of a checklist is an efficient method for developing the Inventory for existing ships in order to clarify the results of each step. Based on collected information including the "Indicative list" mentioned in Step 1, all equipment, systems, and/or areas onboard assumed to contain Hazardous Materials listed in Tables A and B should be included in the checklist. Each listed equipment, system, and/or area on board should be analysed and assessed for its Hazardous Materials content.

The existence and volume of Hazardous Materials may be judged and calculated from the Spare parts and tools list and the Maker's drawings. The existence of asbestos contained in floors, ceilings and walls may be identified from Fire Protection Plans, while the existence of TBT in coatings can be identified from the International Anti-Fouling System Certificate, Coating scheme and the History of Paint.

Example of weight calculation

No.	Hazardous Materials	Location/Equipment/ Component	Reference	Calculation
1.1-2	TBT	Flat bottom/paint	History of coatings	
1.2-1	Asbestos	Main engine/ Exh. pipe packing	Spare parts and tools list	250g x 14 sheet = 3.50 kg
1.2-3	HCFC	Ref. provision plant	Maker's drawings	20kg x 1 cylinder = 20 kg
1.2-4	Lead	Batteries	Maker's drawings	6 kg x 16 unit = 96 kg
1.3-1	Asbestos	Engine-room ceiling	Accommodation plan	

When a component or coating is determined to contain Hazardous Materials, a "Y" should be entered in the column for "Result of document analysis" in the checklist, to denote "Contained". Likewise, when an item is determined not to contain Hazardous Materials, the entry "N" should be made in the column to denote "Not contained". When a determination cannot be made as to the Hazardous Materials content, the column should be completed with the entry "Unknown".

Checklist (Step 2)

ANALYSIS AND DEFINITION OF SCOPE OF ASSESSMENT FOR "SAMPLE SHIP"

No.	Tbl A/B	Hazardous Materials *1	Location	Name of equipment	Component	Quantity			Manufacturer/brand name	Result of DOC *2	Procedure of check *3	Result of check *4	Reference/DWG No.
						Unit (kg)	No.	Total (kg)					
Inventory Part I-1													
1	A	TBT	Top side	Painting & coating	A/F paints			NIL	Paints Co./marine P1000	N			On Aug. 200X, sealer coat applied to all over submerged area before tin free coating.
2	A	TBT	Flat bottom				3000m^2		Unknown AF	Unknown			
Inventory Part I-2													
1	A	Asbestos	Lower deck	Main engine	Exh.pipe packing	0.25	14		Diesel Co.	Y			M-100
2	A	Asbestos	3rd deck	Aux.boiler	Lagging		12		Unknown lagging	Unknown			M-300
3	A	Asbestos	Engine room.	Piping/flange	Packing					PCHM			
4	A	HCFC	2nd deck	Ref. provision plant	Refrigerant (R22)	20.00	1		Reito Co.	Y			Maker's dwg
5	B	Lead	Nav. Br.deck	Batteries		6	16		Denchi Co.	Y			E-300
Inventory Part I-3													
1	A	Asbestos	Upper deck	Back deck ceilings	Engine room ceiling		20m^2		Unknown ceiling	Unknown			O-25

Notes

*1 Hazardous Materials: Material classification
*2 Result of documents analysis: Y=Contained, N=Not contained, Unknown, PCHM=potentially containing Hazardous Material.
*3 Procedure of check: V=Visual check, S=Sampling check
*4 Result of check: Y=Contained, N=Not contained, PCHM

4 Step 3: Preparation of visual/sampling check plan

Each item classified as "Contained" or "Not contained" in Step 2 should be subjected to a visual check on board, and the entry "V" should be made in the "Check procedure" column to denote "Visual check".

For each item categorized as "unknown", a decision should be made as to whether to apply a sampling check. However, any item categorized as "unknown" may be classed as "potentially containing Hazardous Material" provided comprehensive justification is given, or if it can be assumed that there will be little or no effect on disassembly as a unit and later ship recycling and disposal operations. For example, in the following checklist, in order to carry out a sampling check for "Packing with aux. boiler" the shipowner needs to disassemble the auxiliary boiler in a repair yard. The costs of this check are significantly higher than the later disposal costs at a Ship Recycling Facility. In this case, therefore, the classification as "potentially containing Hazardous Material" is justifiable.

Checklist (Step 3)

ANALYSIS AND DEFINITION OF SCOPE OF ASSESSMENT FOR "SAMPLE SHIP"

No.	Tbl A/B	Hazardous Materials *1	Location	Name of Equipment	Component	Quantity			Manufacturer/Brand name	Result of DOC *2	Procedure of check *3	Result of check *4	Reference/DWG No.
						Unit (kg)	No.	Total (kg)					
Inventory Part I-1													
1	A	TBT	Top side	Painting & coating	A/F paints			NIL	Paints Co./marine P1000	N	V		On Aug. 200X, sealer coat applied to all over submerged area before tin free coating.
2	A	TBT	Flat bottom				3000m^2		Unknown AF	Unknown	S		
Inventory Part I-2													
1	A	Asbestos	Lower deck	Main engine	Exh.pipe packing	0.25	14		Diesel Co.	Y	V		M-100
2	A	Asbestos	3rd deck	Aux.boiler	Lagging		12		Unknown lagging	Unknown	S		M-300
3	A	Asbestos	Engine room	Piping/flange	Packing					PCHM	V		
4	A	HCFC	2nd deck	Ref. provision plant	Refrigerant (R22)	20.00	1		Reito Co.	Y	V		Maker's dwg
5	B	Lead	Nav. Br.deck	Batteries		6	16		Denchi Co.	Y	V		E-300
Inventory Part I-3													
1	A	Asbestos	Upper deck	Back deck ceilings	Engine room ceiling		20m^2		Unknown ceiling	Unknown	S		O-25

Notes

*1 Hazardous Materials: Material classification
*2 Result of documents analysis: Y=Contained, N=Not contained, Unknown, PCHM=potentially containing Hazardous Material
*3 Procedure of check: V=Visual check, S=Sampling check
*4 Result of check: Y=Contained, N=Not contained, PCHM

Before any visual/sampling check on board is conducted, a "visual/sampling check plan" should be prepared. An example of such a plan is shown below.

To prevent any incidents during the visual/sampling check, a schedule should be established to eliminate interference with other ongoing work on board. To prevent potential exposure to Hazardous Materials during the visual/sampling check, safety precautions should be in place on board. For example, sampling of potential asbestos containing materials could release fibres into the atmosphere. Therefore, appropriate personnel safety and containment procedures should be implemented prior to sampling.

Items listed in the visual/sampling check should be arranged in sequence so that the onboard check is conducted in a structured manner (e.g., from a lower level to an upper level and from a fore part to an aft part).

Example of visual/sampling check plan

Name of ship	XXXXXXXXXX
IMO Number	XXXXXXXXXX
Gross Tonnage	28,000 GT
L x B x D	xxx.xx × xx.xx × xx.xx m
Date of delivery	dd.mm.1987
Shipowner	XXXXXXXXXX
Contact point (Tel.,Fax, E-mail, address)	XXXXXXXXXX Tel: XXXX-XXXX Fax: XXXX-XXXX E-mail: abcdefg@hijk.co.net
Check schedule	Visual check： dd, mm, 200X Sampling check： dd, mm, 200X
Site of check	XX shipyard, No. Dock
In charge of check	XXXX XXXX
Check engineer	XXXX XXXX, YYYY YYYY, ZZZZ ZZZZ
Sampling engineer	Person with specialized knowledge of sampling
Sampling method and anti-scattering measure for asbestos	Wet the sampling location prior to cutting and allow it to harden after cutting to prevent scatter. Notes: Workers performing sampling activities shall wear protective equipment.
Sampling of fragments of paints	Paints suspected to contain TBT should be collected and analysed from load line, directly under bilge keel and flat bottom near amidships.
Laboratory	QQQQ QQQQ
Chemical analysis method	Method by ISO/DIS 22262-1 Bulk materials--Part 1: Sampling and qualitative determination of asbestos in commercial bulk materials and ISO/CD 22262-2 Bulk materials – Part 2: Quantitative determination of asbestos by gravimetric and microscopic methods. ICP Luminous analysis (TBT)
Location of visual/sampling check	Refer to lists for visual/sampling check

Listing for equipment, system and/or area for visual check
See attached "Analysis and definition of scope of investigation for sample ship"

List of equipment, system and/or area for sampling check				
Location	Equipment, machinery and/or zone	Name of parts	Materials	Result of doc. checking
Upper Deck	Back deck ceilings	Engine-room ceiling	Asbestos	Unknown
Engine-room	Exhaust gas pipe	Insulation	Asbestos	Unknown
Engine-room	Pipe/flange	Gasket	Asbestos	Unknown
Refer to attached "Analysis and definition of scope of investigation for sample ship" and "Location plan of Hazardous Materials for sample ship"				

List of equipment, system and/or area classed as PCHM				
Location	Equipment, machinery and/or zone	Name of part	Material	Result of doc. checking
Floor	Propeller cap	Gasket	Asbestos	PCHM
Engine-room	Air operated shut-off valve	Gland packing	Asbestos	PCHM
Refer to attached "Analysis and definition of scope of investigation for sample ship" and "Location plan of Hazardous Materials for sample ship"				

This plan is established in accordance with the Guidelines for the development of the Inventory of Hazardous Materials

Prepared by： XXXX XXXX

Tel.： YYYY-YYYY

E-Mail： XXXX@ZZZZ.co.net

□Document check□date/place□
dd, mm, 200X at XX Lines Co. Ltd.

□Preparation date of plan□dd. mm, 200X

5 Step 4: Onboard visual/sampling check

The visual/sampling check should be conducted according to the plan. Check points should be marked in the ship's plan or recorded with photographs.

A person taking samples should be protected by the appropriate safety equipment relevant to the suspected type of hazardous materials encountered. Appropriate safety precautions should also be in place for passengers, crewmembers and other persons on board, to minimize the potential exposure to hazardous materials. Safety precautions could include the posting of signs or other verbal or written notification for personnel to avoid such areas during sampling. The personnel taking samples should ensure compliance with relevant national regulations.

The results of visual/sampling checks should be recorded in the checklist. Any equipment, systems and/or areas of the ship that cannot be accessed for checks should be classified as "potentially containing Hazardous Material". In this case, the entry in the "Result of check" column should be "PCHM".

6 Step 5: Preparation of Part I of the Inventory and related documentation

6.1 Development of Part I of the Inventory

The results of the check and the estimated quantity of Hazardous Materials should be recorded on the checklist. Part I of the Inventory should be developed with reference to the checklist.

6.2 Development of location diagram of Hazardous Materials

With respect to Part I of the Inventory, the development of a location diagram of Hazardous Materials is recommended in order to help the Ship Recycling Facility gain a visual understanding of the Inventory.

Checklist (Step 4 and Step 5)

ANALYSIS AND DEFINITION OF SCOPE OF ASSESSMENT FOR "SAMPLE SHIP"

No.	Tbl A/B	Hazardous Materials *1	Location	Name of equipment	Component	Quantity			Manufacturer/brand name	Result of DOC *2	Procedure of check *3	Result of check *4	Reference/DWG No.
						Unit (kg)	No.	Total (kg)					
Inventory Part I-1													
1	A	TBT	Top side	Painting & coating	A/F paints			NIL	Paints Co./marine P1000	N	V	N	On Aug. 200X, sealer coat applied to all over submerged area before tin free coating.
2	A	TBT	Flat bottom			0.02	3000m^2	60.00	Unknown AF	Unknown	S	Y	
Inventory Part I-2													
1	A	Asbestos	Lower deck	Main engine	Exh.pipe packing	0.25	14	3.50	Diesel Co.	Y	V	Y	M-100
2	A	Asbestos	3rd deck	Aux.boiler	Lagging		12		Unknown lagging	Unknown	S	N	M-300
3	A	Asbestos	Engine room	Piping/flange	Packing					PCHM	V	PCHM	
4	A	HCFC	2nd deck	Ref. provision plant	Refrigerant (R22)	20.00	1	20.00	Reito Co.	Y	V	Y	Maker's dwg
5	B	Lead	Nav. Br.deck	Batteries		6	16	96.00	Denchi Co.	Y	V	Y	E-300
Inventory Part I-3													
1	A	Asbestos	Upper deck	Back deck ceilings	Engine room ceiling	0.19	20m^2	3.80	Unknown ceiling	Unknown	S	Y	O-25

Notes

*1 Hazardous Materials: Material classification
*2 Result of documents analysis: Y=Contained, N=Not contained, Unknown, PCHM=potentially containing Hazardous Material
*3 Procedure of check: V=Visual check, S=Sampling check
*4 Result of check: Y=Contained, N=Not contained, PCHM

Example of the Inventory for existing ships

Inventory of Hazardous Materials
for "Sample Ship"

Particulars of the "Sample Ship"

Distinctive number or letters	XXXXNNN
Port of registry	Port of World
Type of vessel	Bulk carrier
Gross Tonnage	28,000 GT
IMO number Name of shipbuilder	NNNNNNN xx Shipbuilding Co. Ltd
Name of shipowner	yy Maritime SA
Date of delivery	MM/DD/1988

This inventory was developed in accordance with the Guidelines for the development of the Inventory of Hazardous Materials.

Attachment:
1: Inventory of Hazardous Materials
2: Assessment of collected information
3: Location diagram of Hazardous Materials

* Prepared by XYZ (Name & address)(mm/dd/20XX)

Inventory of Hazardous Materials : "Sample Ship"

Part I HAZARDOUS MATERIALS CONTAINED IN THE SHIP'S STRUCTURE AND EQUIPMENT

I-1 Paints and coating systems containing materials listed in Table A and Table B of appendix 1 of the Guidelines

No.	Application of paint	Name of paint	Location *1	Materials (classification in appendix 1)	Approx. quantity		Remarks
1	AF paint	Unknown paints	Flat bottom	TBT	60.00	kg	Confirmed by sampling
2							
3							

I-2 Equipment and machinery containing materials listed in Table A and Table B of appendix 1 of the Guidelines

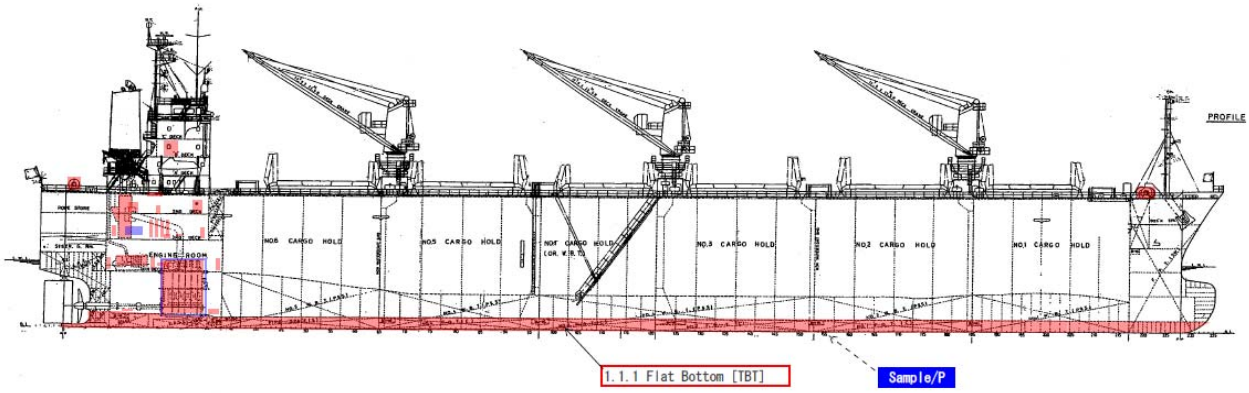
No.	Name of equipment and machinery	Location *1	Materials (classification in appendix 1)	Parts where used	Approx. quantity		Remarks
1	Main engine	Lower floor	Asbestos	Exh. pipe packing	3.50	kg	
2	Aux. boiler	3rd deck	Asbestos	Unknown packing	10.00	kg	PCHM (potentially containing Hazardous Material)
3	Piping/flange	Engine-room	Asbestos	Packing	50.00	kg	PCHM
4	Ref. provision plant	2nd deck	HCFC	Refrigerant (R22)	20.00	kg	
5	Batteries	Navig. Bridge deck	Lead		96.00	kg	

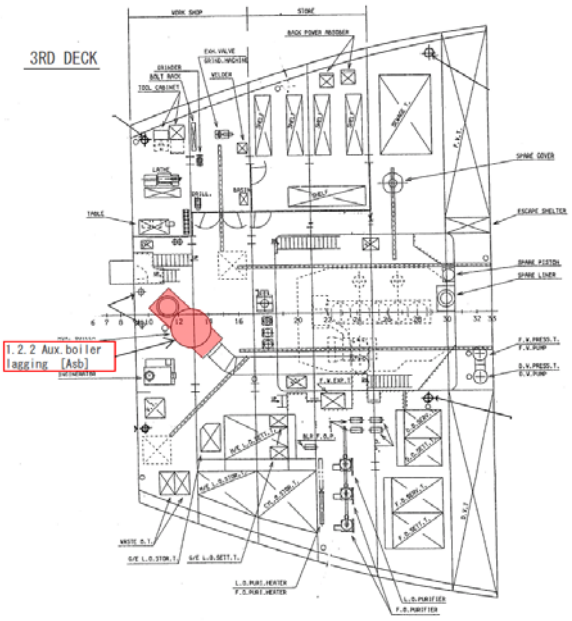
I-3 Structure and hull containing materials listed in Table A and Table B of appendix 1 of the Guidelines

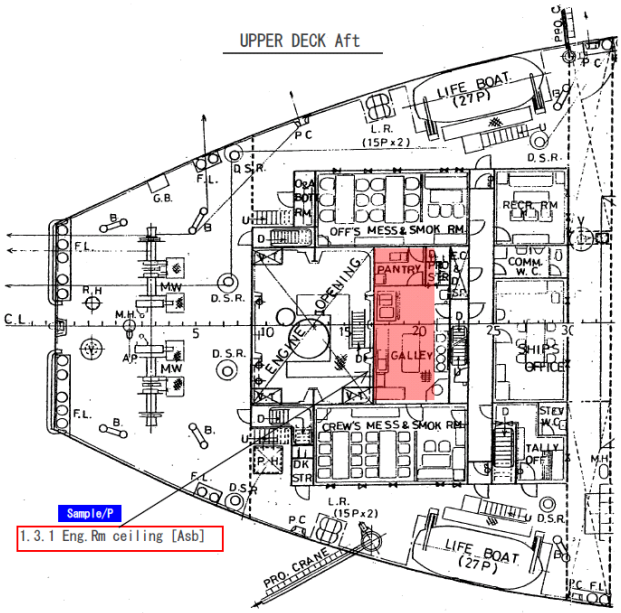
No.	Name of structural element	Location *1	Materials (classification in appendix 1)	Parts where used	Approx. quantity		Remarks
1	Back deck ceiling	Upper deck	Asbestos	Engine-room ceiling (A class)	3.80	kg	Confirmed by sampling
2							
3							

*1 Each item should be entered in order based on its location, from a lower level to an upper level and from a fore part to an aft part.

Example of location diagram of Hazardous Materials







APPENDIX 6

FORM OF MATERIAL DECLARATION

<Date of declaration>

Date	

<MD ID number>

MD- ID-No.	

<Other information>

Remark 1	
Remark 2	
Remark 3	

<Supplier (respondent) information>

Company name	
Division name	
Address	
Contact person	
Telephone number	
Fax number	
E-mail address	
SDoC ID no.:	

<Product information>

Product name	Product number	Delivered unit			Product information
		Amount	Unit		

<Materials information>

	Unit
This materials information shows the amount of hazardous materials contained in	1		(unit: piece, kg, m, m^2, m^3, etc) of the product.

Table	Material name		Threshold level	Present above threshold level	If yes, material mass		If yes, information on where it is used
				Yes / No	Mass	Unit	
Table A (materials listed in appendix 1 of the Convention)	Asbestos	Asbestos	no threshold level				
	Polychlorinated biphenyls (PCBs)	Polychlorinated biphenyls (PCBs)	no threshold level				
	Ozone depleting substance	Chlorofluorocaobons (CFCs)	no threshold level				
		Halons					
		Other fully halogenated CFCs					
		Carbon tetrachloride					
		1,1,1-Trichloroethane					
		Hydrochlorofluorocaobons					
		Hydrobromofluorocaobons					
		Methyl bromide					
		Bromochloromethane					
	Anti-fouling systems containing organotin compounds as a biocide		2,500 mg total tin/kg				

Table	Material name	Threshold level	Present above threshold level	If yes, material mass		If yes, information on where it is used
			Yes / No	Mass	Unit	
Table B (materials listed in appendix 2 of the Convention)	Cadmium and cadmium compounds	100 mg/kg				
	Hexavalent chromium and hexavalent chromium compounds	1,000 mg/kg				
	Lead and lead compounds	1,000 mg/kg				
	Mercury and mercury compounds	1,000 mg/kg				
	Polybrominated biphenyl (PBBs)	1,000 mg/kg				
	Polybrominated dephenyl ethers (PBDEs)	1,000 mg/kg				
	Polychloronaphthalenes (Cl >= 3)	no threshold level				
	Radioactive substances	no threshold level				
	Certain shortchain chlorinated paraffins	1%				

APPENDIX 7

FORM OF SUPPLIER'S DECLARATION OF CONFORMITY

Supplier's Declaration of Conformity for Material Declaration management

1) Identification number: _____

2) Issuer's name: _____

Issuer's address: _____

3) Object(s) of the declaration: _____

_____

_____

4) The object(s) of the declaration described above is in conformity with the following documents：

	Document No.:	Title:	Edition/date of issue
5)	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

6) Additional information： _____

_____

Signed for and on behalf of:

_____

_____

(Place and date of issue)

7) _____ _____

(Name, function) (Signature)

APPENDIX 8

EXAMPLES OF TABLE A AND TABLE B MATERIALS OF APPENDIX 1 WITH CAS NUMBERS

*This list is developed with reference to Joint Industry Guide No.101.

*This list is not exhaustive; it represents examples of chemicals with known CAS numbers and may require periodical updating.

Table	Material Category	Substances	CAS Numbers
Table A (materials listed in appendix 1 of the Convention)	Asbestos	Asbestos	1332-21-4
		Actinolite	77536-66-4
		Amosite (Grunerite)	12172-73-5
		Anthophyllite	77536-67-5
		Chrysotile	12001-29-5
		Crocidolite	12001-28-4
		Tremolite	77536-68-6
	Polychlorinated biphenyls (PCBs)	Polychlorinated biphenyls	1336-36-3
		Aroclor	12767-79-2
		Chlorodiphenyl (Aroclor 1260)	11096-82-5
		Kanechlor 500	27323-18-8
		Aroclor 1254	11097-69-1
	Ozone depleting substances/isomers (they may contain isomers that are not listed here)	Trichlorofluoromethane (CFC11)	75-69-4
		Dichlorodifluoromethane (CFC12)	75-71-8
		Chlorotrifluoromethane (CFC 13)	75-72-9
		Pentachlorofluoroethane (CFC 111)	354-56-3
		Tetrachlorodifluoroethane (CFC 112)	76-12-0
		Trichlorotrifluoroethane (CFC 113)	354-58-5
		1,1,2 Trichloro-1,2,2 trifluoroethane	76-13-1
		Dichlorotetrafluoroethane (CFC 114)	76-14-2
		Monochloropentafluoroethane (CFC 115)	76-15-3
		Heptachlorofluoropropane (CFC 211)	422-78-6
			135401-87-5
		Hexachlorodifluoropropane (CFC 212)	3182-26-1
		Pentachlorotrifluoropropane (CFC 213)	2354-06-5
			134237-31-3
		Tetrachlorotetrafluoropropane (CFC 214) 1,1,1,3-Tetrachlorotetrafluoropropane	29255-31-0 2268-46-4
		Trichloropentafluoropropane (CFC 215) 1,1,1-Trichloropentafluoropropane 1,2,3-Trichloropentafluoropropane	1599-41-3 4259-43-2 76-17-5
		Dichlorohexafluoropropane (CFC 216)	661-97-2
		Monochloroheptafluoropropane (CFC 217)	422-86-6
		Bromochlorodifluoromethane (Halon 1211)	353-59-3
		Bromotrifluoromethane (Halon 1301)	75-63-8
		Dibromotetrafluoroethane (Halon 2402)	124-73-2
		Carbon tetrachloride (Tetrachloromethane)	56-23-5
		1,1,1, - Trichloroethane (methyl chloroform) and its isomers except 1,1,2-trichloroethane	71-55-6
		Bromomethane (Methyl bromide)	74-83-9
		Bromodifluoromethane and isomers (HBFC's)	1511-62-2
		Dichlorofluoromethane (HCFC 21)	75-43-4
		Chlorodifluoromethane (HCFC 22)	75-45-6
		Chlorofluoromethane (HCFC 31)	593-70-4
		Tetrachlorofluoroethane (HCFC 121) 1,1,1,2-tetrachloro-2-fluoroethane (HCFC 121a) 1,1,2,2-tetracloro-1-fluoroethane	134237-32-4 354-11-0 354-14-3

*This list is developed with reference to Joint Industry Guide No.101.

*This list is not exhaustive; it represents examples of chemicals with known CAS numbers and may require periodical updating.

Table	Material Category	Substances	CAS Numbers
		Trichlorodifluoroethane (HCFC 122)	41834-16-6
		1,2,2-trichloro-1,1-difluoroethane	354-21-2
		Dichlorotrifluoroethane(HCFC 123)	34077-87-7
		Dichloro-1,1,2-trifluoroethane	90454-18-5
		2,2-dichloro-1,1,1-trifluroethane	306-83-2
		1,2-dichloro-1,1,2-trifluroethane (HCFC-123a)	354-23-4
		1,1-dichloro-1,2,2-trifluroethane (HCFC-123b)	812-04-4
		2,2-dichloro-1,1,2-trifluroethane (HCFC-123b)	812-04-4
		Chlorotetrafluoroethane (HCFC 124)	63938-10-3
		2-chloro-1,1,1,2-tetrafluoroethane	2837-89-0
		1-chloro-1,1,2,2-tetrafluoroethane (HCFC 124a)	354-25-6
		Trichlorofluoroethane (HCFC 131)	27154-33-2; (134237-34-6)
		1-Fluoro-1,2,2-trichloroethane	359-28-4
		1,1,1-trichloro-2-fluoroethane (HCFC131b)	811-95-0
		Dichlorodifluoroethane (HCFC 132)	25915-78-0
		1,2-dichloro-1,1-difluoroethane (HCFC 132b)	1649-08-7
		1,1-dichloro-1,2-difluoroethane (HFCF 132c)	1842-05-3
		1,1-dichloro-2,2-difluoroethane	471-43-2
		1,2-dichloro-1,2-difluoroethane	431-06-1
		Chlorotrifluoroethane (HCFC 133)	1330-45-6
		1-chloro-1,2,2-trifluoroethane	1330-45-6
		2-chloro-1,1,1-trifluoroethane (HCFC-133a)	75-88-7
		Dichlorofluoroethane(HCFC 141)	1717-00-6; (25167-88-8)
		1,1-dichloro-1-fluoroethane (HCFC-141b)	1717-00-6
		1,2-dichloro-1-fluoroethane	430-57-9
		Chlorodifluoroethane (HCFC 142)	25497-29-4
		1-chloro-1,1-difluoroethane (HCFC142b)	75-68-3
		1-chloro-1,2-difluoroethane (HCFC142a)	25497-29-4
		Hexachlorofluoropropane (HCFC 221)	134237-35-7
		Pentachlorodifluoropropane (HCFC 222)	134237-36-8
		Tetrachlorotrifluropropane (HCFC 223)	134237-37-9
		Trichlorotetrafluoropropane (HCFC 224)	134237-38-0
		Dichloropentafluoropropane, (Ethyne, fluoro-) (HCFC 225)	127564-92-5; (2713-09-9)
		2,2-Dichloro-1,1,1,3,3-pentafluoropropane(HCFC 225aa)	128903-21-9
		2,3-Dichloro-1,1,1,2,3-pentafluoropropane (HCFC 225ba)	422-48-0
		1,2-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC 225bb)	422-44-6
		3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC 225ca)	422-56-0
		1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC 225cb)	507-55-1
		1,1-Dichloro-1,2,2,3,3-pentafluoropropane(HCFC 225cc)	13474-88-9
		1,2-Dichloro-1,1,3,3,3-pentafluoropropane (HCFC 225da)	431-86-7
		1,3-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC 225ea)	136013-79-1
		1,1-Dichloro-1,2,3,3,3-pentafluoropropane(HCFC 225eb)	111512-56-2
		Chlorohexafluoropropane (HCFC 226)	134308-72-8
		Pentachlorofluoropropane (HCFC 231)	134190-48-0
		Tetrachlorodifluoropropane (HCFC 232)	134237-39-1
		Trichlorotrifluoropropane (HCFC 233)	134237-40-4
		1,1,1-Trichloro-3,3,3-trifluoropropane	7125-83-9
		Dichlorotetrafluoropropane (HCFC 234)	127564-83-4
		Chloropentafluoropropane (HCFC 235)	134237-41-5
		1-Chloro-1,1,3,3,3-pentafluoropropane	460-92-4
		Tetrachlorofluoropropane (HCFC 241)	134190-49-1
		Trichlorodifluoropropane (HCFC 242)	134237-42-6

*This list is developed with reference to Joint Industry Guide No.101.

*This list is not exhaustive; it represents examples of chemicals with known CAS numbers and may require periodical updating.

Table	Material Category	Substances	CAS Numbers
		Dichlorotrifluoropropane (HCFC 243) 1,1-dichloro-1,2,2-trifluoropropane 2,3-dichloro-1,1,1-trifluoropropane 3,3-Dichloro-1,1,1-trifluoropropane	134237-43-7 7125-99-7 338-75-0 460-69-5
		Chlorotetrafluoropropane (HCFC 244) 3-chloro-1,1,2,2-tetrafluoropropane	134190-50-4 679-85-6
		Trichlorofluoropropane (HCFC 251) 1,1,3-trichloro-1-fluoropropane	134190-51-5 818-99-5
		Dichlorodifluoropropane (HCFC 252)	134190-52-6
		Chlorotrifluoropropane (HCFC 253) 3-chloro-1,1,1-trifluoropropane (HCFC 253fb)	134237-44-8 460-35-5
		Dichlorofluoropropane (HCFC 261) 1,1-dichloro-1-fluoropropane	134237-45-9 7799-56-6
		Chlorodifluoropropane (HCFC 262) 2-chloro-1,3-difluoropropane	134190-53-7 102738-79-4
		Chlorofluoropropane (HCFC 271) 2-chloro-2-fluoropropane	134190-54-8 420-44-0
	Organotin compounds (tributyl tin, triphenyl tin, tributyl tin oxide)	Bis(tri-n-butyltin) oxide	56-35-9
		Triphenyltin N,N'-dimethyldithiocarbamate	1803-12-9
		Triphenyltin fluoride	379-52-2
		Triphenyltin acetate	900-95-8
		Triphenyltin chloride	639-58-7
		Triphenyltin hydroxide	76-87-9
		Triphenyltin fatty acid salts (C=9-11)	47672-31-1
		Triphenyltin chloroacetate	7094-94-2
		Tributyltin methacrylate	2155-70-6
		Bis(tributyltin) fumarate	6454-35-9
		Tributyltin fluoride	1983-10-4
		Bis(tributyltin) 2,3-dibromosuccinate	31732-71-5
		Tributyltin acetate	56-36-0
		Tributyltin laurate	3090-36-6
		Bis(tributyltin) phthalate	4782-29-0
		Copolymer of alkyl acrylate, methyl methacrylate and tributyltin methacrylate(alkyl; C=8)	-
		Tributyltin sulfamate	6517-25-5
		Bis(tributyltin) maleate	14275-57-1
		Tributyltin chloride	1461-22-9
		Mixture of tributyltin cyclopentanecarboxylate and its analogs (Tributyltin naphthenate)	-
		Mixture of tributyltin 1,2,3,4,4a, 4b, 5,6,10,10adecahydro-7-isopropyl-1, 4a-dimethyl-1-phenanthlenecarboxylate and its analogs (Tributyltin rosin salt)	-
		Other tributyl tins & triphenyl tins	-
Table B (Materials listed in appendix 2 of the Convention)	Cadmium/cadmium compounds	Cadmium	7440-43-9
		Cadmium oxide	1306-19-0
		Cadmium sulfide	1306-23-6
		Cadmium chloride	10108-64-2
		Cadmium sulfate	10124-36-4
		Other cadmium compounds	-
	Chromium VI compounds	Chromium (VI) oxide	1333-82-0
		Barium chromate	10294-40-3
		Calcium chromate	13765-19-0
		Chromium trioxide	1333-82-0

*This list is developed with reference to Joint Industry Guide No.101.

*This list is not exhaustive; it represents examples of chemicals with known CAS numbers and may require periodical updating.

Table	Material Category	Substances	CAS Numbers
		Lead (II) chromate	7758-97-6
		Sodium chromate	7775-11-3
		Sodium dichromate	10588-01-9
		Strontium chromate	7789-06-2
		Potassium dichromate	7778-50-9
		Potassium chromate	7789-00-6
		Zinc chromate	13530-65-9
		Other hexavalent chromium compounds	-
	Lead/lead compounds	Lead	7439-92-1
		Lead (II) sulfate	7446-14-2
		Lead (II) carbonate	598-63-0
		Lead hydrocarbonate	1319-46-6
		Lead acetate	301-04-2
		Lead (II) acetate, trihydrate	6080-56-4
		Lead phosphate	7446-27-7
		Lead selenide	12069-00-0
		Lead (IV) oxide	1309-60-0
		Lead (II,IV) oxide	1314-41-6
		Lead (II) sulfide	1314-87-0
		Lead (II) oxide	1317-36-8
		Lead (II) carbonate basic	1319-46-6
		Lead hydroxidcarbonate	1344-36-1
		Lead (II) phosphate	7446-27-7
		Lead (II) chromate	7758-97-6
		Lead (II) titanate	12060-00-3
		Lead sulfate, sulphuric acid, lead salt	15739-80-7
		Lead sulphate, tribasic	12202-17-4
		Lead stearate	1072-35-1
		Other lead compounds	-
	Mercury /mercury compounds	Mercury	7439-97-6
		Mercuric chloride	33631-63-9
		Mercury (II) chloride	7487-94-7
		Mercuric sulfate	7783-35-9
		Mercuric nitrate	10045-94-0
		Mercuric (II) oxide	21908-53-2
		Mercuric sulfide	1344-48-5
		Other mercury compounds	-
	Polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs)	Bromobiphenyl and its ethers	2052-07-5 (2-Bromobiphenyl)
			2113-57-7 (3-Bromobiphenyl
			92-66-0 (4-Bromobiphenyl)
			101-55-3 (ether)
		Decabromobiphenyl and its ethers	13654-09-6
			1163-19-5 (ether)
		Dibromobiphenyl and its ethers	92-86-4
			2050-47-7 (ether)
		Heptabromobiphenylether	68928-80-3
		Hexabromobiphenyl and its ethers	59080-40-9
			36355-01-8 (hexabromo-1,1'-biphenyl)
			67774-32-7 (Firemaster FF-1)
			36483-60-0 (ether)
		Nonabromobiphenylether	63936-56-1
		Octabromobiphenyl and its ethers	61288-13-9
			32536-52-0 (ether)

*This list is developed with reference to Joint Industry Guide No.101.

*This list is not exhaustive; it represents examples of chemicals with known CAS numbers and may require periodical updating.

Table	Material Category	Substances	CAS Numbers
		Pentabromobidphenyl ether (note: commercially available PeBDPO is a complex reaction mixture containing a variety of brominated diphenyloxides.	32534-81-9 (CAS number used for commercial grades of PeBDPO)
		Polybrominated biphenyls	59536-65-1
		Tetrabromobiphenyl and its ethers	40088-45-7
			40088-47-9 (ether)
		Tribromobiphenyl ether	49690-94-0
	Polychlorinated naphthalenes	Polychlorinated naphthalenes	70776-03-3
		Other polychlorinated naphthalenes	-
	Radioactive substances	Uranium	-
		Plutonium	-
		Radon	-
		Americium	-
		Thorium	-
		Cesium	7440-46-2
		Strontium	7440-24-6
		Other radioactive substances	-
	Certain shortchain chlorinated paraffins (with carbon length of 10-13 atoms)	Chlorinated paraffins (C10-13)	85535-84-8
		Other short chain chlorinated paraffins	-

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ANNEX 3

STATEMENT BY FRIENDS OF THE EARTH INTERNATIONAL CONCERNING THE ADOPTION OF THE HONG KONG CONVENTION

In May in Hong Kong, FOEI was present at the adoption of the IMO Convention on Ship Recycling with many of our colleagues representing several environmental and human rights organisations – all members of the NGO Platform on Shipbreaking. Several were from Bangladesh, representing Bangladesh Supreme Court environmental lawyers, trade unions and activists working on the ground in Chittagong. At the Hong Kong Conference we uttered profound disappointment with the adopted Convention because we believe it will fail to fulfil its mandate, namely *"generate real changes in the conditions under which end-of-life ships are dismantled so as to protect workers and the environment from the adverse impacts of hazardous waste and dangerous working practices"*. With no economic incentive to push liability upstream to the polluters; no mandatory third party auditing of ship recycling facilities; and not even condemning the most unacceptable practice of shipbreaking – the beaching method – the IMO will not reverse current practice of unsafe and polluting shipbreaking.

Since May at least three workers have died on shipbreaking yards; one in India; two in Bangladesh – and a little more than a week ago we received further disturbing news from Chittagong: as reported in the Daily Star and many other Bangladeshi newspapers, 2 weeks ago more than 15,000 mangrove trees were cut on this Bangladeshi beach to make room for an additional five shipbreaking yards. This is an environmental disaster for the local community, only weeks before the cyclone and monsoon season. This forest, which would have protected Bangladesh against the threats of climate change – flooding and erosion – has now been destroyed.

This development shows that current practices will not change, therefore we urge the Correspondence Group on Guidelines for Ship Recycling to take this development into consideration when discussing the Guidelines for ship recycling facilities. And lastly, we ask that this intervention be attached to the final report of MEPC 59.

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ANNEX 4

STATEMENT BY THE DELEGATION OF CANADA ON THE PROPOSAL OF THE NORTH AMERICAN EMISSION CONTROL AREA AND CANADA'S RATIFICATION OF MARPOL ANNEX VI

"Canada fully endorses the proposal to designate an Emission Control Area for nitrogen oxides, sulphur oxides and particulate matter, in United States and Canadian waters.

Canada and the United States have coordinated this proposal, in line with our common interests, shared geography and interrelated economies. Our joint submittal, in MEPC 59/6/5, addresses each of the criteria required by Appendix III to MARPOL Annex VI.

Ships are significant contributors to adverse air quality in the United States and Canada. Improving ship emissions to Emission Control Area standards in these areas will yield substantial health and environmental benefits in Canada and the United States.

Significant improvements are also expected for sensitive ecosystems that are damaged by ship emissions.

The costs of implementing and complying with the proposed Emission Control Area are expected to be small, both absolutely, and compared to the costs of achieving similar emission reductions through additional controls on land-based sources.

We invite the Committee to review this proposal with a view toward approving the proposed Emission Control Area for adoption at MEPC 60.

In light of the proposed Emission Control Area, there have been questions regarding Canada's progress with regard to MARPOL Annex VI. Canada would like to report on the progress we are making in this regard.

The Government of Canada has a policy to consult Canada's elected national legislative body, the House of Commons, regarding the ratification of treaties and conventions. This is similar to procedures used historically in the United Kingdom and Australia.

The Government observes a waiting period of 21 sitting days for consultation before taking any action to bring that convention into effect. Canada intends to table this Convention with Canada's Parliament on 14 September 2009.

This process would apply to Canada's ratification of Annexes IV, V and VI to the International Convention for the Prevention of Pollution from Ships and other maritime conventions, including the Anti-fouling Systems Convention.

Canada currently has legislation and regulations in place to implement the current Annex VI, and these other instruments.

Canada is continuing its work towards ratifying MARPOL Annex VI to be a full partner with the United States for the proposed Emission Control Area.

Significant work has been achieved by Canada to advance and promote conformity with international instruments in its regulatory system.

The Government of Canada is expected to announce further progress this fall after consultation with Parliament with a view towards ratification of MARPOL Annex VI and other conventions."

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ANNEX 5

RESOLUTION MEPC.180(59)
Adopted on 17 July 2009

AMENDMENTS TO THE SURVEY GUIDELINES UNDER THE HARMONIZED SYSTEM OF SURVEY AND CERTIFICATION FOR THE REVISED MARPOL ANNEX VI

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by the international conventions for the prevention and control of marine pollution,

RECALLING ALSO that MARPOL Annex VI entered into force on 19 May 2005,

RECALLING FURTHER resolution A.997(25) by which the Assembly adopted the Survey Guidelines under the Harmonized System of Survey and Certification, 2007 (the Survey Guidelines),

NOTING that the Assembly, when adopting resolution A.997(25), requested the Maritime Safety Committee and the Marine Environment Protection Committee to keep the Survey Guidelines under review and amend them as necessary,

NOTING ALSO that the revised MARPOL Annex VI was adopted by resolution MEPC.176(58) which is expected to enter into force on 1 July 2010,

RECOGNIZING the need to amend the Survey Guidelines in accordance with provisions of the revised MARPOL Annex VI,

HAVING CONSIDERED the amendments to the Survey Guidelines for the revised MARPOL Annex VI prepared by the Sub-Committee on Bulk Liquids and Gases at its thirteenth session and reviewed by the Sub-Committee on Flag State Implementation at its seventeenth session,

1. ADOPTS the amendments to the Survey Guidelines under the Harmonized System of Survey and Certification for the revised MARPOL Annex VI, as set out in the Annex to the present resolution;

2. INVITES Governments carrying out surveys required by the revised MARPOL Annex VI, to follow the provisions of the Survey Guidelines, as amended by this resolution, from 1 July 2010; and

3. AGREES that, at a later stage, the amendments to the Survey Guidelines, as adopted by this resolution, be adopted as amendments to those adopted by resolution A.997(25).

ANNEX

AMENDMENTS TO THE SURVEY GUIDELINES UNDER THE HARMONIZED SYSTEM OF SURVEY AND CERTIFICATION FOR THE REVISED MARPOL ANNEX VI

1 In section **GENERAL**:

.1 in paragraph 2.8.1, the existing text "MARPOL Annex VI, regulation 5(1)(a)" is replaced as follows:

"MARPOL Annex VI, regulation 5.1.1"

.2 in paragraph 2.8.3, the existing text "MARPOL Annex VI, regulation 5(1)(b)" is replaced as follows:

"MARPOL Annex VI, regulation 5.1.2"

.3 in paragraph 2.8.4, the existing text "MARPOL Annex VI, regulation 5(1)(c)" is replaced as follows:

"MARPOL Annex VI, regulation 5.1.3"

.4 in paragraph 2.8.5, the existing text "MARPOL Annex VI, regulation 5(1)(d) "is replaced as follows:

"MARPOL Annex VI, regulation 5.1.4"

.5 in paragraph 2.8.7, the existing text "MARPOL Annex VI, regulation 5(1)(d)" is replaced as follows:

"MARPOL Annex VI, regulation 5.1.5"

.6 in paragraph 3.2, the existing text "Annex VI, regulation 19" is replaced as follows:

"Annex VI, regulation 5"

.7 in paragraph 4.8.1, the existing text "MARPOL Annex VI, regulation 6(1)" is replaced as follows:

"MARPOL Annex VI, regulation 5.3.3"

.8 in paragraph 5.2:

.1 in the references, the existing text "MARPOL Annex VI, regulation 9(3)" is replaced as follows:

"MARPOL Annex VI, regulation 9.3"

.2 in the guideline, the existing text "MARPOL Annex VI, regulations 9(4) and (5)" is replaced as follows:

"MARPOL Annex VI, regulations 9.5 and 9.6"

.3 in the guideline, the existing text "MARPOL Annex VI regulation 9(2)(b)" is replaced as follows:

"MARPOL Annex VI, regulation 9.2.2"

.9 in paragraph 5.4, the existing text "MARPOL Annex VI regulation 9(6)" is replaced as follows:

"MARPOL Annex VI, regulation 9.6"

.10 in paragraph 5.5, the existing text "MARPOL Annex VI regulation 9(7)" is replaced as follows:

"MARPOL Annex VI, regulation 9.7"

.11 in paragraph 5.6, the existing text "MARPOL Annex VI regulation 9(8)(a)" is replaced as follows:

"MARPOL Annex VI, regulation 9.9.1"

2 In Annex 3 "SURVEY GUIDELINES UNDER THE MARPOL CONVENTION", section 4 is replaced as follows:

(A) **4** **GUIDELINES FOR THE SURVEYS FOR THE INTERNATIONAL AIR POLLUTION PREVENTION CERTIFICATE AND THE NO_X TECHNICAL CODE**

(AI) **4.1** **Initial surveys** – see part "General", section 4.1

(AI) 4.1.1 For air pollution prevention the examination of plans and designs should consist of:

(AI) 4.1.1.1 examining the arrangements for systems using ozone-depleting substances (regu1ation 12 of Annex VI);

(AI) 4.1.1.2 examining the arrangements for NO_x emission control, if applicable (regulation 13 of Annex VI);

(AI) 4.1.1.3 examining the arrangements for SO_x and particulate matter control, if applicable (regulation 14 of Annex VI);

(AI) 4.1.1.4 examining the arrangements for vapour collection systems, if applicable (regulation 15 of Annex VI and MSC/Circ.585);

(AI) 4.1.1.5 examining the arrangements for shipboard incinerators, if applicable (regulation 16 of Annex VI).

(AI) 4.1.2 For air pollution prevention the survey should consist of:

(AI) 4.1.2.1 Ozone-depleting substances (regulation 12 of Annex VI):

(AI) 4.1.2.1.1 confirming, if applicable, the satisfactory installation and operation of systems using ozone depleting substances;

(AI) 4.1.2.1.2 confirming that no installation or equipment containing ozone depleting substances has been installed after 19 May 2005, other than hydro-chlorofluorocarbons (regulation 12.3.1 of Annex VI);

(AI) 4.1.2.1.3 confirming that no installation or equipment containing hydro-chlorofluorocarbons are fitted after 1 January 2020 (regulation 12.3.2 of Annex VI).

(AI) 4.1.2.2 Nitrogen oxide emissions from marine diesel engines (regulation 13 of Annex VI):

(AI) 4.1.2.2.1 confirming that all marine diesel engines which are required to be certified are pre-certified in accordance with section 2.2 of the NO_x Technical Code to the required Tier and installed in accordance with the approved duty cycle.

(AI) 4.1.2.2.1.1 If engine parameter check method is used:

(AI) 4.1.2.2.1.1.1 an onboard verification survey in accordance with section 6.2 of the NO_x Technical Code.

(AI) 4.1.2.2.1.2 If the simplified method is used:

(AI) 4.1.2.2.1.2.1 an onboard verification survey in accordance with section 6.3 of the NO_x Technical Code.

(AI) 4.1.2.2.1.3 If direct measurement and monitoring method is used (for existing ships only):

(AI) 4.1.2.2.1.3.1 an onboard verification survey, in accordance with section 6.4 of the NO_x Technical Code.

(AI) 4.1.2.2.1.4 For marine diesel engines of an output more than 5,000 kW and a per cylinder displacement at or above 90 litres/cylinder installed on ships constructed between 1 January 1990 and 31 December 1999, check whether:

.1 an approved method exists;
.2 an approved method is not commercially available; or
.3 that an approved method is installed and where this is the case, that there is an approved method file,

and apply the verification procedures as given in the approved method file.

(AI) 4.1.2.3 Sulphur Oxides and Particulate Matter (regulation 14 of Annex VI):

(AI) 4.1.2.3.1 confirming, if appropriate, that:

.1 satisfactory arrangements are in place for using compliant fuel as required; or

.2 satisfactory installation and operation of the fuel switching arrangements are in place when tanks are provided for different grades of fuel; or

.3 satisfactory installation and operation of the exhaust gas cleaning system or other technological methods are examined, (regulation 4 of Annex VI).

(AI) 4.1.2.4 Volatile Organic Compounds (regulation 15 of Annex VI) (if applicable):

(AI) 4.1.2.4.1 confirming the satisfactory installation of the vapour collection piping;

(AI) 4.1.2.4.2 confirming the satisfactory installation and operation of the means provided to eliminate the collection of condensation in the system, such as drains in low points of the line end;

(AI) 4.1.2.4.3 confirming the satisfactory installation and operation of the isolation valves at the vapour manifolds;

(AI) 4.1.2.4.4 confirming that the ends of each line are properly identified as vapour collection lines;

(AI) 4.1.2.4.5 confirming that the vapour collection flanges are in accordance with the IMO guidelines and industrial standards.

(AI) 4.1.2.5 Shipboard Incinerators (regulation 16 of Annex VI) (installed on or after 1 January 2000):

(AI) 4.1.2.5.1 confirming the satisfactory installation and operation of each incinerator;

(AI) 4.1.2.5.2 confirming that the manufacturer's name, incinerator model number/type and capacity in heat units per hour is permanently marked on the incinerator.

(AI) 4.1.3 For air pollution prevention the check that certificates and other relevant documentation have been placed on board should consist of:

(AI) 4.1.3.1 the provision of (AA) 4.2.2.2 as applicable except (AA) 4.2.2.2.14.

(AI) 4.1.4 For air pollution prevention the completion of the initial survey should consist of:

(AI) 4.1.4.1 after satisfactory survey, issuing the International Air Pollution Prevention Certificate.

(AA) **4.2** **Annual surveys** – see "General", section 4.2

(AA) 4.2.1 For air pollution prevention the examination of current certificates and other records should consist of:

(AA) 4.2.1.1 checking the validity, as appropriate, of the Cargo Ship Safety Equipment Certificate, the Cargo Ship Safety Radio Certificate and the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate;

(AA) 4.2.1.2 checking the validity of the Safety Management Certificate (SMC) and that a copy of the Document of Compliance (DOC) is on board, where applicable;

(AA) 4.2.1.3 checking the validity of the International Load Line Certificate or International Load Line Exemption Certificate;

(AA) 4.2.1.4 checking the validity of the International Oil Pollution Prevention Certificate;

(AA) 4.2.1.5 checking the certificates of class, if the ship is classed with a classification society;

(AA) 4.2.1.6 checking, when appropriate, the validity of the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk or the Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk;

(AA) 4.2.1.7 checking that the ship's complement complies with the Minimum Safe Manning Document (SOLAS 74/88, regulation V/13(b));

(AA) 4.2.1.8 checking that the master, officers and ratings are certificated as required by the STCW Convention;

(AA) 4.2.1.9 checking whether any new equipment has been fitted and, if so, confirming that it has been approved before installation and that any changes are reflected in the appropriate certificate.

(AA) 4.2.2 For air pollution prevention the annual survey should consist of the following:

(AA) 4.2.2.1 General:

(AA) 4.2.2.1.1 confirm that no changes have been made or any new equipment installed which would affect the validity of the certificate;

(AA) 4.2.2.2 Documentation:

(AA) 4.2.2.2.1 confirm that there is an Ozone Depleting Substances Record Book, if applicable (regulation 12.6 of Annex VI);

(AA) 4.2.2.2.2 confirm that there are Engine International Air Pollution Prevention (EIAPP) Certificates for each marine diesel engine, required to be certified, as described in chapter 2.1 of the NO_x Technical Code;

(AA) 4.2.2.2.3 confirm that there is on board an approved Technical File for each marine diesel engine required to be certified;

(AA) 4.2.2.2.4 confirm that there is a record book of engine parameters for each marine diesel engine required to be certified in the case where the engine parameter check method is used as a means of onboard NO_x verification (NO_x Technical Code, paragraph 6.2.3);

(AA) 4.2.2.2.5 confirm that there is an approved onboard monitoring manual for each marine diesel engine required to be certified in the case where the direct measurement and monitoring method is to be used as a means of onboard NO_x verification (NO_x Technical Code, paragraph 6.4.17.1);

(AA) 4.2.2.2.6 confirm that there are written procedures covering fuel change over, where applicable;

(AA) 4.2.2.2.7 confirm that there is a record of fuel changeover, where applicable, and that this record should take the form of a log-book as prescribed by the Administration (regulation 14.6 of Annex VI)[1];

(AA) 4.2.2.2.8 confirm that there is for each Exhaust Gas Cleaning System (EGCS)-SO_x either a SO_x Emission Control Area (SECA[2]) Compliance Certificate for the EGCS-SO_x, or an Onboard Monitoring Manual (OMM) as appropriate, plus in either cases a SECA Compliance Plan (regulation 4 of Annex VI) or approved documentation in respect of other technological means of achieving compliance;

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1 When not prescribed by the Administration, this information could be contained in the engine-room log-book, the deck log-book, the official log-book, the oil record book or a separate log-book solely for this purpose.

2 This will need to be updated when the exhaust gas cleaning system guidelines are updated to take into account the revised Annex VI for consistency against for the terminology used in the revised guideline.

(AA) 4.2.2.2.9 confirm that there is a VOC Management Plan, if required (regulation 15.6 of Annex VI);

(AA) 4.2.2.2.10 confirm that there is a transfer procedure, if required, for the VOC collection system;

(AA) 4.2.2.2.11 confirm that there is, if required, an IMO Type Approval Certificate for each incinerator on board (regulation 16.6.1 of Annex VI);

(AA) 4.2.2.2.12 confirm that there is an instruction manual for each incinerator if required (regulation 16.7 of Annex VI);

(AA) 4.2.2.2.13 confirm that records documenting training of the crew in operating each incinerator, if required;

(AA) 4.2.2.2.14 confirm that there are the required bunker delivery notes on board and the required fuel oil samples are kept under the ships control (regulation 18 of Annex VI) or other relevant documentation.

(AA) 4.2.2.3 Systems containing ozone-depleting substances, if fitted:

(AA) 4.2.2.3.1 confirm that no new installation or equipment containing ozone depleting substances except those covered by (AA) 4.2.2.3.2 have been fitted to the ship after 19 May 2005 (regulation 12.3.1 of Annex VI);

(AA) 4.2.2.3.2 confirm that no installations containing hydro-chlorofluocarbons have been fitted after 1 January 2020 (regulation 12.3.2);

(AA) 4.2.2.3.3 examine externally any installation or equipment as far as practicable to ensure satisfactory maintenance and that there are no emissions of ozone-depleting substances;

(AA) 4.2.2.3.4 confirm through documentary evidence that there has been no deliberate emission of ozone-depleting substance.

(AA) 4.2.2.4 Nitrogen oxide emissions from each diesel marine diesel engine:

(AA) 4.2.2.4.1 confirm that each marine diesel engine has been operated as required in accordance with its applicable NO_x emission limit(s);

(AA) 4.2.2.4.2 confirm that no marine diesel engine been subject to major conversion in the intervening period;

(AA) 4.2.2.4.3 if engine parameter check method is used:

(AA) 4.2.2.4.3.1 review engine documentation contained in the Technical File and the record book of engine parameters to check, as far as practicable, engine rating, duty and limitation/restrictions as given in the Technical File;

(AA) 4.2.2.4.3.2 confirm that the engine has not undergone any modifications or adjustments outside the options and ranges permitted in the Technical File since the last survey;

(AA) 4.2.2.4.3.3 conduct survey as detailed in the Technical File;

(AA) 4.2.2.4.4 if the simplified method is used:

(AA) 4.2.2.4.4.1 review engine documentation contained in the Technical File;

(AA) 4.2.2.4.4.2 confirm that the test procedure is acceptable to the Administration;

(AA) 4.2.2.4.4.3 confirm that the analysers, engine performance sensors, ambient condition measurement equipment, span check gases and other test equipment are the correct type and have been calibrated in accordance with the NO_x Technical Code;

(AA) 4.2.2.4.4.4 confirm that the correct test cycle, as defined in the engine's Technical File, is used for this onboard confirmation test measurements;

(AA) 4.2.2.4.4.5 ensure that a fuel sample is taken during the test and submitted for analysis;

(AA) 4.2.2.4.4.6 witness the test and confirm that a copy of the test report has been submitted for approval on completion of the test;

(AA) 4.2.2.4.5 if the direct measurement and monitoring method is used:

(AA) 4.2.2.4.5.1 review the Technical File and the onboard monitoring manual that the arrangements are as approved;

(AA) 4.2.2.4.5.2 the procedures to be checked in the direct monitoring and measure method and the data obtained as given in the approved onboard monitoring manual should be followed (NO_x Technical Code 6.4.16.1);

(AA) 4.2.2.4.6 for a marine diesel engine with an output of more than 5,000 kW and a per cylinder displacement at or above 90 litres/cylinder installed on ships constructed between 1 January 1990 and 31 December 1999, check whether:

.1 an approved method exists;
.2 an approved method is not commercially available; or
.3 that an approved method is installed and where this is the case, that there is an approved method file,

and apply the verification procedures as given in the approved method file.

(AA) 4.2.2.5 Sulphur Oxides and Particulate Matter:

confirming, if appropriate, that:

.1 satisfactory arrangements are in place for using compliant fuel as required; or

.2 satisfactory installation and operation of the fuel switching arrangements are in place when tanks are provided for different grades of fuel, including records of the changeover to and from low sulphur fuel during transit through an emission control area established for SO_x and particulate matter control; or

.3 satisfactory installation and operation of the exhaust gas cleaning system or other technological methods are examined, (regulation 4 of Annex VI).

(AA) 4.2.2.6 Volatile Organic Compounds (VOCs):

(AA) 4.2.2.6.1 confirm that the vapour collect system, if required, is maintained in accordance with its approved arrangement;

(AA) 4.2.2.6.2 for ships carrying crude oil, confirm the VOC management plan has been implemented as appropriate.

(AA) 4.2.2.7 Incineration:

(AA) 4.2.2.7.1 confirm that prohibited materials have not been incinerated;

(AA) 4.2.2.7.2 confirm that shipboard incineration of sewage sludge or sludge oil in boilers or marine power plants is not undertaken while the ship is inside ports, harbours or estuaries.

(AA) 4.2.2.8 Incinerators (installed on or after 1 January 2000):

(AA) 4.2.2.8.1 confirm that operators have been trained as required;

(AA) 4.2.2.8.2 confirm from an external examination that each incinerator is in a generally satisfactory condition and free from leaks of gas or smoke;

(AA) 4.2.2.8.3 confirm that combustion chamber outlet temperatures have been maintained as required;

(AA) 4.2.2.8.4 confirm that each incinerator is maintained according to its approved arrangement.

(AA) 4.2.3 Fuel Oil Quality:

(AA) 4.2.3.1 confirm that Bunker Delivery Notes as required conform to the requirements of MARPOL Annex VI, Appendix V;

(AA) 4.2.3.2 confirm that MARPOL samples as required are retained on board and labels duly completed or otherwise retained under the ship's control;

(AA) 4.2.3.3 confirm that documentation in lieu of that required by 4.2.3.1 or 4.2.3.2 is available on board.

(AA) 4.2.4 For air pollution prevention the completion of the annual survey should consist of:

(AA) 4.2.4.1 after a satisfactory survey, endorsing the International Air Pollution Prevention certificate;

(AA) 4.2.4.2 if a survey shows that the condition of the ship or its equipment is unsatisfactory – see "General", section 4.8.

(AIn) **4.3** **Intermediate surveys** – see "General", section 4.3

(AIn) 4.3.1 For air pollution prevention the examination of current certificates and other records should consist of:

(AIn) 4.3.1.1 the provisions of (AA) 4.2.1.

(AIn) 4.3.2 For air pollution prevention the intermediate survey should consist of:

(AIn) 4.3.2.1 the provisions of (AA) 4.2.2.

(AIn) 4.3.3 For air pollution prevention the completion of the intermediate survey should consist of:

(AIn) 4.3.3.1 after a satisfactory survey, endorsing the International Air Pollution Prevention Certificate;

(AIn) 4.3.3.2 if a survey shows that the condition of the ship or its equipment is unsatisfactory see "General", section 4.8.

(AR) **4.4** **Renewal surveys** – see "General", section 4.5

(AR**)** 4.4.1 For air pollution prevention the examination of current certificates and other records should consist of:

(AR) 4.4.1.1 the provisions of (AA) 4.2.1 except the validity of the International Air Pollution Prevention Certificate.

(AR) 4.4.2 For air pollution prevention the renewal survey should consist of:

(AR) 4.4.2.1 the provisions of (AA) 4.2.2;

(AR) 4.4.2.2 for each incinerator the renewal survey should consist of;

(AR) 4.4.2.2.1 confirming, if necessary by simulated test or equivalent, the satisfactory operation of the following alarms and safety devices.

(AR) 4.4.3 For air pollution prevention the completion of the renewal survey should consist of:

(AR) 4.4.3.1 after satisfactory survey the International Air Pollution prevention Certificate should be issued.

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ANNEX 6

RESOLUTION MEPC.181(59)
Adopted on 17 July 2009

2009 GUIDELINES FOR PORT STATE CONTROL UNDER THE REVISED MARPOL ANNEX VI

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by the international conventions for the prevention and control of marine pollution,

RECALLING ALSO that MARPOL Annex VI entered into force on 19 May 2005,

RECALLING FURTHER resolution MEPC.129(53) by which the Committee adopted the Guidelines for port State control for MARPOL Annex VI,

NOTING that the revised MARPOL Annex VI was adopted by resolution MEPC.176(58) which is expected to enter into force on 1 July 2010,

NOTING ALSO that articles 5 and 6 of the MARPOL Convention and regulations 10 and 11 of MARPOL Annex VI provide control procedures to be followed by a Party to the 1997 Protocol with regard to foreign ships visiting its ports,

RECOGNIZING the need to revise the Guidelines for port State control for MARPOL Annex VI, in accordance with provisions of the revised MARPOL Annex VI,

HAVING CONSIDERED the 2009 Guidelines for port State control under the revised MARPOL Annex VI prepared by the Sub-Committee on Bulk Liquids and Gases at its thirteenth session and reviewed by the Sub-Committee on Flag State Implementation at its seventeenth session,

1. ADOPTS the 2009 Guidelines for port State control under the revised MARPOL Annex VI, as set out in the Annex to the present resolution;

2. INVITES Governments, when exercising port State control for the revised MARPOL Annex VI, to apply the revised Guidelines from 1 July 2010; and

3. AGREES that, at a later stage, the 2009 Guidelines be adopted as amendments to resolution A.787(19) on Procedures for port State control, as amended by resolution A.882(21).

ANNEX

2009 GUIDELINES FOR PORT STATE CONTROL UNDER THE REVISED MARPOL ANNEX VI

Chapter 1 GENERAL

1.1 This document is intended to provide basic guidance on the conduct of port State control inspections for compliance with MARPOL Annex VI (hereinafter referred to as "the Annex") and afford consistency in the conduct of these inspections, the recognition of deficiencies and the application of control procedures.

1.2 The regulations of MARPOL Annex VI contain the following compliance provisions:

.1 an IAPP Certificate is required for all ships of 400 GT or above engaged in international voyages. Administrations may establish alternative appropriate measures to demonstrate the necessary compliance in respect of ships under 400 GT engaged in international voyages;

.2 new installations which contain ozone depleting substances, other than hydro-chlorofluorocarbons, are prohibited on or after 19 May 2005. Each ship which has rechargeable systems that contain ozone depleting substances is required to maintain an Ozone Depleting Substances Record Book;

.3 in the case of the NO_x controls, Tier I emission limits are applied to all applicable marine diesel engines over 130 kW installed on ships constructed on or after 1 January 2000 and prior to 1 January 2011.

Emission limits equivalent to Tier I may apply to marine diesel engines with a power output of more than 5,000 kW and a per cylinder displacement at or above 90 litres installed on a ship constructed on or after 1 January 1990 but prior to 1 January 2000 according to regulation VI/13.7.

Tier II emission limits are applied to all applicable marine diesel engines over 130 kW installed on ships constructed on or after 1 January 2011 and prior to 1 January 2016.

Subject to the review set forth in regulation 13.10, Tier III emission limits are applied to all applicable marine diesel engines over 130 kW installed on ships constructed on or after 1 January 2016. However, while these ships are operating outside of an Emission Control Area* established for NO_x control, Tier II limits are applied.

Marine diesel engines which are subject to major conversion are to be certified to the required Tier of control according to regulation VI/13.2;

* As of DD/MM/YYYY, there is no area designated as Emission Control Area under regulation VI/13.

.4 SO_x and particulate matter control should be achieved by either:

.1 the sulphur content of any fuel oil used on board ships, subject to the provisions of regulation VI/18.2, is required not to exceed the following limits:

.1 4.50% m/m prior to 1 January 2012;

.2 3.50% m/m on and after 1 January 2012; and

.3 0.50% m/m on and after 1 January 2020, subject to the review set forth in regulations VI/14.8, VI/14.9 and VI/14.10.

However, while ships are operating within an Emission Control Area established for SO_x and particulate matter control, the sulphur content of fuel oil used on board ships is required not to exceed the following limits:

.1 1.50% m/m prior to 1 July 2010;

.2 1.00% m/m on and after 1 July 2010; and

.3 0.10% m/m on and after 1 January 2015;

or,

.2 equivalent method as approved (regulation VI/4);

.5 only those incinerators installed on or after 1 January 2000 are required to comply with the associated requirements (appendix IV to the Annex), however, the restrictions as to which materials may be incinerated apply to all incinerators; and

.6 a tanker carrying crude oil is required to have on board and implement a VOC management plan approved by the Administration. Tanker vapour emission control systems are only required where their fitting is specified by the relevant authority.

1.3 Chapters 1 (General), 4 (Contravention and detention), 5 (Reporting requirements) and 6 (Review procedures) of the Procedures for Port State Control adopted by resolution A.787(19), as amended by resolution A.882(21), also apply to these Guidelines.

Chapter 2 INSPECTIONS OF SHIPS REQUIRED TO CARRY THE IAPP CERTIFICATE

2.1 Initial inspections

2.1.1 On boarding and introduction to the master or responsible ship's officer, the port State control officer (PSCO) should examine the following documents, where applicable:

.1 the International Air Pollution Prevention Certificate (IAPP Certificate) (regulation VI/6), including its Supplement*;

.2 the Engine International Air Pollution Prevention Certificate (EIAPP Certificate) (paragraph 2.2 of the NO_x Technical Code) including its Supplement, for each applicable marine diesel engine;

.3 the Technical File (paragraph 2.3.4 of the NO_x Technical Code) for each applicable marine diesel engine;

.4 depending on the method used for demonstrating NO_x compliance for each applicable marine diesel engine:

.1 the Record Book of Engine Parameters for each marine diesel engine (paragraph 6.2.2.7 of the NO_x Technical Code) demonstrating compliance with regulation VI/13 by means of the marine diesel engine parameter check method; or

.2 documentation relating to the simplified measurement method; or

.3 documentation related to the direct measurement and monitoring method;

.5 the Approved Method File (regulation VI/13.7);

.6 written procedures covering fuel oil change over operations where separate fuel oils are used in order to achieve compliance (regulation VI/14.6);

.7 approved documentation relating to any installed exhaust gas cleaning systems, or equivalent means, to reduce SO_x emissions (regulation VI/4);

.8 the bunker delivery notes and associated samples or records thereof (regulation VI/18);

.9 the copy of the type approval certificate of any shipboard incinerator installed on or after 1 January 2000 (for the incinerators with capacities up to 1,500 kW) (resolutions MEPC.76(40) and MEPC.93(45));

.10 the Ozone Depleting Substances Record Book (regulation VI/12.6);

.11 the VOC Management Plan (regulation VI/15.6); and

.12 any notification to the ship's flag Administration issued by the master or officer in charge of the bunker operation together with any available commercial documentation relevant to non-compliant bunker delivery.

* Under regulation 6(2) of MARPOL Annex VI, a ship constructed before the date of entry into force of MARPOL Annex VI shall be issued with an International Air Pollution Prevention Certificate no later than the first scheduled dry-docking after the date of such entry into force, but in no case later than three years after this date.

The PSCO should ascertain the date of ship construction and the date of installation of equipment on board which are subject to the provisions of the Annex, in order to confirm which regulations of the Annex are applicable.

2.1.2 As a preliminary check, the IAPP Certificate's validity should be confirmed by verifying that the Certificate is properly completed and signed and that required surveys have been performed.

2.1.3 Through examining the Supplement to the IAPP Certificate, the PSCO may establish how the ship is equipped for the prevention of air pollution.

2.1.4 If the certificates and documents are valid and appropriate, and the PSCO's general impressions and visual observations on board confirm a good standard of maintenance, the PSCO should generally confine the inspection to reported deficiencies, if any.

2.1.5 In the case where the bunker delivery note or the representative sample as required by regulation VI/18 presented to the ship are not in compliance with the relevant requirements, the master or officer in charge of the bunker operation should have documented that through a Notification to the ship's flag Administration with copies to the port Authority under whose jurisdiction the ship did not receive the required documentation pursuant to the bunkering operation and to the bunker deliverer. A copy should be retained on board the ship, together with any available commercial documentation, for the subsequent scrutiny of port State control.

2.1.6 If, however, the PSCO's general impressions or observations on board give clear grounds (see paragraph 2.1.7) for believing that the condition of the ship or its equipment do not correspond substantially with the particulars of the certificates or the documents, the PSCO should proceed to a more detailed inspection.

2.1.7 "Clear grounds" to conduct a more detailed inspection include:

.1 evidence that certificates required by the Annex are missing or clearly invalid;

.2 evidence that documents required by the Annex are missing or clearly invalid;

.3 the absence of principal equipment or arrangements specified in the certificates or documents;

.4 the presence of equipment or arrangements not specified in the certificates or documents;

.5 evidence from the PSCO's general impressions or observations that serious deficiencies exist in the equipment or arrangements specified in the certificates or documents;

.6 information or evidence that the master or crew are not familiar with essential shipboard operations relating to the prevention of air pollution, or that such operations have not been carried out;

.7 evidence that the quality of fuel oil, delivered to and used on board the ship, appears to be substandard; or

.8 receipt of a report or complaint containing information that the ship appears to be substandard.

2.2 More detailed inspections

2.2.1 The PSCO should verify that:

.1 there are effectively implemented maintenance procedures for the equipment containing ozone-depleting substances; and

.2 there are no deliberate emissions of ozone-depleting substances.

2.2.2 In order to verify that each installed marine diesel engine with a power output of more than 130 kW is approved by the Administration in accordance with the NO_x Technical Code and maintained appropriately, the PSCO should pay particular attention to the following:

.1 examine such marine diesel engines to be consistent with the EIAPP Certificate and its Supplement, Technical File and, if applicable, Record Book of Engine Parameters or Onboard Monitoring Manual and related data;

.2 examine marine diesel engines specified in the Technical Files to verify that no unapproved modifications, which may affect on NO_x emission, have been made to the marine diesel engines;

.3 examine marine diesel engines with a power output of more than 5,000 kW and a per cylinder displacement at or above 90 litres installed on a ship constructed on or after 1 January 1990 but prior to 1 January 2000 to verify that they are certified, if so required, in accordance with regulation VI/13.7;

.4 in the case of ships constructed before 1 January 2000, verify that any marine diesel engine which has been subject to a major conversion, as defined in regulation VI/13, has been approved by the Administration; and

.5 emergency marine diesel engines intended to be used solely in case of emergency are still in use for this purpose.

2.2.3 The PSCO should check whether the quality of fuel oil used on board the ship conforms to the provisions of regulations VI/14 and VI/18[*], taking into account appendix IV to the Annex. Furthermore, the PSCO should pay attention to the record required in regulation VI/14.6 in order to identify the sulphur content of fuel oil used while the ship is within an Emission Control Area under regulation VI/14.3, or that other equivalent approved means have been applied as required.

2.2.4 If the ship is a tanker, as defined in regulation VI/2.21, the PSCO should verify that the vapour collection system approved by the Administration, taking into account MSC/Circ.585, is installed, if required under regulation VI/15.

[*] It should be noted that in the case where bunker delivery note or representative sample as required by regulation VI/18 are not in compliance with the relevant requirements, the master or crew should have documented that fact. Where fuel oil supply was undertaken in a port under the jurisdiction of a Party to the 1997 Protocol, the PSCO should report that non-compliance to the appropriate authority responsible for the registration of fuel oil suppliers (regulation VI/18.10.1).

2.2.5 If the ship is a tanker carrying crude oil, the PSCO should verify that there is on board an approved VOC Management Plan.

2.2.6 The PSCO should verify that prohibited materials are not incinerated.

2.2.7 The PSCO should verify that shipboard incineration of sewage sludge or sludge oil in boilers or marine power plants is not undertaken while the ship is inside ports, harbours or estuaries (regulation VI/16.4).

2.2.8 The PSCO should verify that the shipboard incinerator, if required by regulation VI/16.6.1, is approved by the Administration. For these units, it should be verified that the incinerator is properly maintained, therefore the PSCO should examine whether:

.1 the shipboard incinerator is consistent with the certificate of shipboard incinerator;

.2 the operational manual, in order to operate the shipboard incinerator within the limits provided in appendix IV to the Annex, is provided; and

.3 the combustion chamber flue gas outlet temperature is monitored as required (regulation VI/16.9).

2.2.9 If there are clear grounds as defined in paragraph 2.1.6, the PSCO may examine operational procedures by confirming that:

.1 the master or crew are familiar with the procedures to prevent emissions of ozone-depleting substances;

.2 the master or crew are familiar with the proper operation and maintenance of marine diesel engines, in accordance with their Technical Files or Approved Method file, as applicable, and with due regard for Emission Control Areas for NO_x control;

.3 the master or crew have undertaken the necessary fuel oil changeover procedures, or equivalent, associated with demonstrating compliance within an Emission Control Area for SO_x and particulate matter control;

.4 the master or crew are familiar with the garbage screening procedure to ensure that prohibited garbage is not incinerated;

.5 the master or crew are familiar with the operation of the shipboard incinerator, as required by regulation VI/16.6, within the limits provided in appendix IV to the Annex, in accordance with its operational manual;

.6 the master or crew are familiar with the regulation of emissions of volatile organic compounds (VOCs), when the ship is in ports or terminals under the jurisdiction of a Party to the 1997 Protocol to MARPOL 73/78 in which VOCs emissions are to be regulated, and are familiar with the proper operation of a vapour collection system approved by the Administration (in case the ship is a tanker as defined in regulation VI/2.21);

.7 the master or crew are familiar with the application of the VOC Management Plan, if applicable; and

.8 the master or crew are familiar with bunker delivery procedures in respect of bunker delivery notes and retained samples as required by regulation VI/18.

2.3 Detainable deficiencies

2.3.1 In exercising his/her functions, the PSCO should use professional judgment to determine whether to detain the ship until any noted deficiencies are corrected or to allow it to sail with certain deficiencies which do not pose an unreasonable threat of harm to the marine environment. In doing this, the PSCO should be guided by the principle that the requirements contained in the Annex, with respect to the construction, equipment and operation of the ship, are essential for the protection of the marine environment and that departure from these requirements could constitute an unreasonable threat of harm to the marine environment.

2.3.2 In order to assist the PSCO in the use of these Guidelines, there follows a list of deficiencies, which are considered, taking into account the provisions of regulation VI/3, to be of such a serious nature that they may warrant the detention of the ship involved:

.1 absence of valid IAPP Certificate, EIAPP Certificates or Technical Files*;

.2 a marine diesel engine, with a power output of more than 130 kW, which is installed on board a ship constructed on or after 1 January 2000, or a marine diesel engine having undergone a major conversion on or after 1 January 2000, which does not comply with the NO_x Technical Code or that does not comply with the relevant NO_x emission limit;

.3 a marine diesel engine, with a power output of more than 5,000 kW and a per cylinder displacement at or above 90 litres, which is installed on board a ship constructed on or after 1 January 1990 but prior to 1 January 2000, and an Approved Method for that engine has been certified by an Administration and was commercially available, for which an Approved Method is not installed after the first renewal survey specified in regulation VI/13.7.2;

.4 depending on the method used for demonstrating SO_x compliance, the sulphur content of any fuel oil being used on board exceeds 4.5% m/m prior to 1 January 2012, 3.50% m/m on and after a January 2012 and 0.50% m/m on and after 1 January 2020[1], taking into account the provisions of regulation VI/18.2;

.5 non-compliance with the relevant requirements while operating within an Emission Control Area for SO_x and particulate matter control;

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* Under regulation 6.2 of MARPOL Annex VI, a ship constructed before the date of entry into force of MARPOL Annex VI shall be issued with an International Air Pollution Prevention Certificate no later than the first scheduled dry-docking after the date of such entry into force, but in no case later than three years after this date.

1 Or 2025, depending on the results of the review of regulation VI/14.1.3, as described in regulation VI/14.8.

.6 an incinerator installed on board the ship on or after 1 January 2000 does not comply with requirements contained in appendix IV to the Annex, or the standard specifications for shipboard incinerators developed by the Organization (resolutions MEPC.76(40) and MEPC.93(45));

.7 the master or crew are not familiar with essential procedures regarding the operation of air pollution prevention equipment as defined in paragraph 2.2.9 above.

Chapter 3 INSPECTIONS OF SHIPS OF NON-PARTIES TO THE ANNEX AND OTHER SHIPS NOT REQUIRED TO CARRY THE IAPP CERTIFICATE

3.1 As this category of ships is not provided with the IAPP Certificate, the PSCO should judge whether the condition of the ship and its equipment satisfies the requirements set out in the Annex. In this respect, the PSCO should take into account that, in accordance with article 5(4) of the MARPOL Convention, no more favourable treatment is to be given to ships of non-Parties.

3.2 In all other respects the PSCO should be guided by the procedures for ships referred to in chapter 2 and should be satisfied that the ship and crew do not present a danger to those on board or an unreasonable threat of harm to the marine environment.

3.3 If the ship has a form of certification other than the IAPP Certificate, the PSCO may take such documentation into account in the evaluation of the ship.

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ANNEX 7

RESOLUTION MEPC.182(59)
Adopted on 17 July 2009

2009 GUIDELINES FOR THE SAMPLING OF FUEL OIL FOR DETERMINATION OF COMPLIANCE WITH THE REVISED MARPOL ANNEX VI

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution,

RECALLING ALSO that MARPOL Annex VI entered into force on 19 May 2005,

RECALLING FURTHER resolution MEPC.96(47) by which the Committee adopted the Guidelines for the sampling of fuel oil for determination of compliance with Annex VI of MARPOL 73/78,

NOTING that the revised MARPOL Annex VI was adopted by resolution MEPC.176(58) which is expected to enter into force on 1 July 2010,

NOTING ALSO that regulation 18.8.1 on fuel oil quality within the revised MARPOL Annex VI requires that the bunker delivery note shall be accompanied by a representative sample of the fuel oil delivered taking into account guidelines to be developed by the Organization,

RECOGNIZING the need to amend the Guidelines for the sampling of fuel oil for determination of compliance with Annex VI of MARPOL 73/78, in accordance with provisions of the revised MARPOL Annex VI,

HAVING CONSIDERED the amendments to Guidelines for the sampling of fuel oil for determination of compliance with Annex VI of MARPOL 73/78 prepared by the Sub-Committee on Bulk Liquids and Gases at its thirteenth session,

1. ADOPTS the 2009 Guidelines for the sampling of fuel oil for determination of compliance with the revised MARPOL Annex VI, as set out in the Annex to this resolution;

2. INVITES Governments to apply the Guidelines, as amended, from 1 July 2010; and

3. REVOKES the Guidelines adopted by resolution MEPC.96(47), as from this date.

ANNEX

2009 GUIDELINES FOR THE SAMPLING OF FUEL OIL FOR DETERMINATION OF COMPLIANCE WITH THE REVISED MARPOL ANNEX VI

1 Preface

The primary objective of these Guidelines is to establish an agreed method to obtain a representative sample of the fuel oil for combustion purposes delivered for use on board ships.

2 Introduction

The basis for these Guidelines is regulation 18.5 of Annex VI to MARPOL 73/78, as amended by resolution MEPC.176(58), which provides that for each ship subject to regulations 5 and 6 of that Annex, details of fuel oil for combustion purposes delivered to, and used on board the ship, shall be recorded by means of a bunker delivery note which shall contain at least the information specified in appendix V to that Annex. In accordance with regulation 18.8.1 of Annex VI, the bunker delivery note shall be accompanied by a representative sample of the fuel oil delivered. This sample is to be used solely for determination of compliance with Annex VI of MARPOL 73/78.

3 Definitions

For the purpose of these Guidelines:

3.1 *Supplier's representative* is the individual from the bunker tanker who is responsible for the delivery and documentation or, in the case of deliveries direct from the shore to the ship, the person who is responsible for the delivery and documentation.

3.2 *Ship's representative* is the ship's master or officer in charge who is responsible for receiving bunkers and documentation.

3.3 *Representative sample* is a product specimen having its physical and chemical characteristics identical to the average characteristics of the total volume being sampled.

3.4 *Primary sample* is the representative sample of the fuel delivered to the ship collected throughout the bunkering period obtained by the sampling equipment positioned at the bunker manifold of the receiving ship.

3.5 *Retained sample* is the representative sample in accordance with regulation 18.8.1 of Annex VI to MARPOL 73/78, of the fuel delivered to the ship derived from the primary sample.

4 Sampling methods

4.1 The primary sample should be obtained by one of the following methods:

.1 manual valve-setting continuous-drip sampler; or

.2 time-proportional automatic sampler; or

.3 flow-proportional automatic sampler.

4.2 Sampling equipment should be used in accordance with manufacturer's instructions, or guidelines, as appropriate.

5 Sampling and sample integrity

5.1 A means should be provided to seal the sampling equipment throughout the period of supply.

5.2 Attention should be given to:

.1 the form of set up of the sampler;

.2 the form of the primary sample container;

.3 the cleanliness and dryness of the sampler and the primary sample container prior to use;

.4 the setting of the means used to control the flow to the primary sample container; and

.5 the method to be used to secure the sample from tampering or contamination during the bunker operation.

5.3 The primary sample receiving container should be attached to the sampling equipment and sealed so as to prevent tampering or contamination of the sample throughout the bunker delivery period.

6 Sampling location

For the purpose of these Guidelines a sample of the fuel delivered to the ship should be obtained at the receiving ship's inlet bunker manifold and should be drawn continuously throughout the bunker delivery period.*

7 Retained sample handling

7.1 The retained sample container should be clean and dry.

7.2 Immediately prior to filling the retained sample container, the primary sample quantity should be thoroughly agitated to ensure that it is homogeneous.

7.3 The retained sample should be of sufficient quantity to perform the tests required but should not be less than 400 ml. The container should be filled to 90% ± 5% capacity and sealed.

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* The phrase "be drawn continuously throughout the bunker delivery period" in paragraph 6 of the Guidelines should be taken to mean continuous collection of drip sample throughout the delivery of bunker fuel covering each bunker delivery note. In case of receiving an amount of bunker fuel necessitating two or more delivery notes, the sampling work may be temporarily stopped to change primary sample container and then resumed as necessary.

8 Sealing of the retained sample

8.1 Immediately following collection of the retained sample, a tamper proof security seal with a unique means of identification should be installed by the supplier's representative in the presence of the ship's representative. A label containing the following information should be secured to the retained sample container:

.1 location at which, and the method by which, the sample was drawn;

.2 date of commencement of delivery;

.3 name of bunker tanker/bunker installation;

.4 name and IMO number of the receiving ship;

.5 signatures and names of the supplier's representative and the ship's representative;

.6 details of seal identification; and

.7 bunker grade.

8.2 To facilitate cross-reference details of the seal, identification may also be recorded on the bunker delivery note.

9 Retained sample storage

9.1 The retained sample should be kept in a safe storage location, outside the ship's accommodation, where personnel would not be exposed to vapours which may be released from the sample. Care should be exercised when entering a sample storage location.

9.2 The retained sample should be stored in a sheltered location where it will not be subject to elevated temperatures, preferably at a cool/ambient temperature, and where it will not be exposed to direct sunlight.

9.3 Pursuant to regulation 18.8.1 of Annex VI of MARPOL 73/78, the retained sample should be retained under the ship's control until the fuel oil is substantially consumed, but in any case for a period of not less than 12 months from the time of delivery.

9.4 The ship's master should develop and maintain a system to keep track of the retained samples.

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ANNEX 8

RESOLUTION MEPC.183(59)
Adopted on 17 July 2009

2009 GUIDELINES FOR MONITORING THE WORLDWIDE AVERAGE SULPHUR CONTENT OF RESIDUAL FUEL OILS SUPPLIED FOR USE ON BOARD SHIPS

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the function of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution,

RECALLING ALSO that MARPOL Annex VI entered into force on 19 May 2005,

RECALLING FURTHER resolution MEPC.82(43) by which the Committee adopted the Guidelines for monitoring the worldwide average sulphur content of residual fuel oils supplied for use on board ships,

NOTING that the revised MARPOL Annex VI was adopted by resolution MEPC.176(58) which is expected to enter into force on 1 July 2010,

NOTING ALSO that regulation 14.2 of the revised MARPOL Annex VI requires monitoring of the worldwide average sulphur content of residual fuel oil supplied for use on board ships, taking into account guidelines developed by the Organization,

RECOGNIZING the need to revise the Guidelines for monitoring the worldwide average sulphur content of residual fuel oils supplied for use on board ships, in accordance with provisions of the revised MARPOL Annex VI,

HAVING CONSIDERED the 2009 Guidelines for monitoring the worldwide average sulphur content of residual fuel oil supplied for use on board ships prepared by the Sub-Committee on Bulk Liquids and Gases at its thirteenth session,

1. ADOPTS the 2009 Guidelines for monitoring the worldwide average sulphur content of residual fuel oils supplied for use on board ships, as set out in the Annex to the present resolution;

2. URGES Member Governments and interested organizations to make available the resources and expertise necessary for the implementation of the Guidelines from 1 July 2010; and

3. REVOKES the Guidelines adopted by resolution MEPC.82(43), as from this date.

ANNEX

2009 GUIDELINES FOR MONITORING THE WORLDWIDE AVERAGE SULPHUR CONTENT OF RESIDUAL FUEL OILS SUPPLIED FOR USE ON BOARD SHIPS

Preface

1 The primary objective of the Guidelines is to establish an agreed method to monitor the average sulphur content of residual fuel oils supplied for use on board ships.

Introduction

2 The basis for these Guidelines is provided in regulation 14.2 of Annex VI of MARPOL and in Conference Resolution 4 (in MP/CONF.3/35), on monitoring the worldwide average sulphur content of residual fuel oil supplied for use on board ships. Among the emissions addressed by Annex VI are emissions resulting from the combustion of fuels containing sulphur. An upper limit for the sulphur content of fuels was set and it was further decided to monitor the average sulphur content of fuel.

3 The independent testing companies analyse over 100,000 samples annually, which cover between 25% and 35% of all deliveries. From the data gathered by these testing services, the current average figures for the sulphur content of residual fuels can be derived. These figures are publicized regularly and are currently in the order of 2.4% by mass[1].

Definitions

4 For the purpose of these Guidelines the following definitions should apply:

(1) *Residual fuel*:

Fuel oil for combustion purposes delivered to and used on board ships with a kinematic viscosity at 50°C greater than or equal to 30.0 centistoke[2].

(2) *Provider of sampling and testing services*:

A company that, on a commercial basis, provides testing and sampling services of bunker fuels delivered to ships for the purpose of assessing quality parameters of these fuels, including the sulphur content.

(3) *Reference value A_w*:

The value of the worldwide average sulphur content in residual fuel oils supplied for use on board ships, based on the first three years of data collected and as determined on the basis of paragraphs 4 and 5 of these Guidelines.

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1 See document MEPC 59/4/1.

2 Reference is made to ISO Standard 8217, 2005.

Monitoring and calculation of yearly and three-year rolling average

Monitoring

5 Monitoring should be based on calculation of average sulphur content of residual fuels on the basis of sampling and testing by independent testing services. Every year the average sulphur content of residual fuels should be calculated. After three years the reference value for monitoring will be set as described in paragraph 11.

Calculation of yearly average

6 At the basis of monitoring is the calculation, on an annual basis, of the average sulphur content of residual fuel.

7 The calculation of the average sulphur content is executed as follows:

For a certain calendar year, the sulphur contents of the samples analysed (one sample for each delivery of which the sulphur content is determined by fuel oil analysis) are recorded. The sulphur contents of the samples analysed are multiplied by the corresponding mass of fuel added up and then divided by the total mass of bunker analysed. The outcome of that division is the average sulphur content of residual fuel for that year.

8 As a basis for well-informed decisions a graphical representation of the distribution of the global sulphur content in residual fuels in terms of the % sulphur in increments of 0.5% sulphur plotted against the quantity of fuel associated with each incremental sulphur content range should be made available by 31 January of each year.

9 The mathematical formula for the method of calculation described is given in the appendix to these Guidelines.

Three-year rolling average

10 A three-year rolling average should be calculated as follows:

$$A_{cr} = (A_{c1} + A_{c2} + A_{c3})/3$$

in which:

A_{cr} = rolling average S-content of all deliveries tested over a three-year period

A_{c1}, A_{c2}, A_{c3} = individual average S-contents of all deliveries tested for each year under consideration

A_{cr} is to be recalculated each year by adding the latest figure for A_c and deleting the oldest.

Setting of the reference value

11 The reference value of the world wide average sulphur content of residual fuel oils supplied for use on board ships should be A_w, where $A_w = A_{cr}$ as calculated in January of the year following the first three years in which data were collected on the basis of these Guidelines. A_w should be expressed as a percentage.

Providers of sampling and testing services

12 There are presently three providers of sampling and testing services under these Guidelines.

13 Any additional providers of sampling and testing services will be approved by MEPC in accordance with the following criteria:

.1 be subject to the approval of the Marine Environment Protection Committee, which should apply these criteria;

.2 be provided with a technical and managerial staff of qualified professionals providing adequate geographical coverage and local representation to ensure quality services in a timely manner;

.3 provide services governed by a documented Code of Ethics;

.4 be independent as regards to commercial interest in the outcome of monitoring;

.5 implement and maintain an internationally recognized quality system, certified by an independent auditing body, which ensures reproducibility and repeatability of services which are internally audited, monitored and carried out under controlled conditions;

.6 take a significant number of samples on an annual basis for the purpose of globally monitoring average sulphur content of residual fuels.

Standardized method of calculation

14 Each of the providers of sampling and testing services should provide the necessary information for the calculation of the average sulphur content of the residual fuels to the Secretariat of IMO or another agreed third party on the basis of a mutually agreed format, approved by MEPC. This party will process the information and will provide the outcome in the agreed format to MEPC. From the viewpoint of competitive positions the information involved should be considered sensitive.

APPENDIX

CALCULATION OF AVERAGE SULPHUR CONTENT BASED ON QUANTITY

Note: wherever "all deliveries" are mentioned, this is meant to refer to all deliveries sampled and tested for sulphur and being taken into account for the purpose of monitoring.

Calculation weighted for quantity

$$Acj = \frac{\sum_{i=1}^{i=N_j} a_i \cdot m_i}{\sum_{i=1}^{i=N_j} m_i}$$

in which:

A_{cj} = the average sulphur content of all deliveries sampled world wide in year j

a_i = the sulphur content of individual sample for delivery i

N_j = total number of samples taken in year j

m_i = the mass of fuel with a sulphur content of a_i

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ANNEX 9

RESOLUTION MEPC.184(59)
Adopted on 17 July 2009

2009 GUIDELINES FOR EXHAUST GAS CLEANING SYSTEMS

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution,

RECALLING ALSO that MARPOL Annex VI entered into force on 19 May 2005,

RECALLING FURTHER resolution MEPC.170(57) by which the Committee adopted the Guidelines for exhaust gas cleaning system,

NOTING that the revised MARPOL Annex VI was adopted by resolution MEPC.176(58) which is expected to enter into force on 1 July 2010,

NOTING ALSO that regulation 4 of the revised MARPOL Annex VI allows the use of an alternative compliance methods at least as effective in terms of emission reductions as that required by the revised MARPOL Annex VI, including any of the standards set forth in regulation 14, taking into account guidelines developed by the Organization,

RECOGNIZING the need to revise the Guidelines for exhaust gas cleaning systems, in accordance with provisions of the revised MARPOL Annex VI,

HAVING CONSIDERED the 2009 Guidelines for exhaust gas cleaning systems prepared by the Sub-Committee on Bulk Liquids and Gases at its thirteenth session,

1. ADOPTS the 2009 Guidelines for exhaust gas cleaning systems, as set out in the Annex to this resolution;

2. INVITES Governments to apply the 2009 Guidelines from 1 July 2010;

3. URGES Administrations to provide for collection of data under Appendix III; and

4. REVOKES the Guidelines adopted by resolution MEPC.170(57) as from 1 July 2010.

ANNEX

2009 GUIDELINES FOR EXHAUST GAS CLEANING SYSTEMS

1 INTRODUCTION

1.1 Regulation 14 of Annex VI to MARPOL 73/78 requires ships to use fuel oil with a sulphur content not exceeding that stipulated in regulation 14.1 or 14.4. Regulation 4 allows, with the approval of the Administration, the use of an alternative compliance method at least as effective in terms of emission reductions as that required by the Annex, including the standards set forth in regulation 14. The Administration of a party should take into account any relevant guidelines developed by the Organization pertaining to alternatives provided for in regulation 4.

1.2 Similar to a NO_x emission reduction system, an EGC unit may be approved subject to periodic parameter and emission checks or the system may be equipped with a continuous emission monitoring system. These Guidelines have been developed with the intention of being objective and performance oriented. Furthermore, use of the SO_2 (ppm)/CO_2 (%) ratio method will simplify the monitoring of SO_x emission and facilitate approval of an EGC unit. See Appendix II for the rationale explaining the use of SO_2 (ppm)/CO_2 (%) as the basis for system monitoring.

1.3 Compliance should be demonstrated on the basis of the SO_2(ppm)/CO_2(% v/v) ratio values.

Table 1
Fuel oil sulphur limits recorded in regulations 14.1 and 14.4 and corresponding emissions values

Fuel Oil Sulphur Content (% m/m)	Ratio Emission SO_2(ppm)/CO_2(% v/v)
4.50	195.0
3.50	151.7
1.50	65.0
1.00	43.3
0.50	21.7
0.10	4.3

Note: The use of the Ratio Emissions limits is only applicable when using petroleum based Distillate or Residual Fuel Oils. See Appendix II for application of the ratio method.

1.4 These Guidelines are recommendatory in nature; however, Administrations are invited to base their implementation on these Guidelines.

2 GENERAL

2.1 Purpose

2.1.1 The purpose of these Guidelines is to specify the requirements for the testing, survey certification and verification of exhaust gas cleaning (EGC) systems under regulation 4 to ensure that they provide effective equivalence to requirements of regulations 14.1 and 14.4 of Annex VI of MARPOL 73/78.

2.1.2 The Guidelines permit two schemes; Scheme A (Unit Certification with Parameter and Emission Checks, and Scheme B (Continuous Emission Monitoring with Parameter Checks).

2.1.3 For ships which are to use an exhaust gas cleaning system in part or in total in order to comply with regulations 14.1 and/or 14.4 of MARPOL Annex VI there should be an approved SO_x Emissions Compliance Plan (SECP).

2.2 Application

2.2.1 These Guidelines apply to any EGC unit as fitted to fuel oil combustion machinery, excluding shipboard incinerators, installed on board a ship.

2.3 Definitions and Required Documents

Fuel oil combustion unit	Any engine, boiler, gas turbine, or other fuel oil fired equipment, excluding shipboard incinerators
EGC	Exhaust gas cleaning
SO_x	Sulphur oxides
SO_2	Sulphur dioxide
CO_2	Carbon dioxide
UTC	Universal Time Co-ordinated
Certified Value	The SO_2/CO_2 ratio specified by the manufacturer that the EGC unit is certified as meeting when operating on a continuous basis on the manufacturers specified maximum fuel sulphur content
In situ	Sampling directly within an exhaust gas stream
MCR	Maximum Continuous Rating
Load Range	Maximum rated power of diesel engine or maximum steaming rate of the boiler
SECP	SO_x Emissions Compliance Plan
SECC	SO_x Emissions Compliance Certificate
ETM-A	EGC system – Technical Manual for Scheme A
ETM-B	EGC system – Technical Manual for Scheme B
OMM	Onboard Monitoring Manual
EGC Record Book	A record of the EGC unit in-service operating parameters, component adjustments, maintenance and service records as appropriate

Document	Scheme A	Scheme B
SECP	X	X
SECC	X	
ETM Scheme A	X	
ETM Scheme B		X
OMM	X	X
EGC Record Book or Electronic Logging System	X	X

3 SAFETY NOTE

3.1 Due attention is to be given to the safety implications related to the handling and proximity of exhaust gases, the measurement equipment and the storage and use of pressurized containers of pure and calibration gases. Sampling positions and permanent access platforms should be such that this monitoring may be performed safely. In locating discharge outlet of washwater used in the EGC unit, due consideration should be given to the location of the ship's seawater inlet. In all operating conditions the pH should be maintained at a level that avoids damage to the vessel's anti-fouling system, the propeller, rudder and other components that may be vulnerable to acidic discharges, potentially causing accelerated corrosion of critical metal components.

4 SCHEME A – EGC SYSTEM APPROVAL, SURVEY AND CERTIFICATION USING PARAMETER AND EMISSION CHECKS

4.1 Approval of EGC systems

4.1.1 General

Options under Scheme A of these Guidelines provide for:

a) Unit approval;
b) Serially manufactured units;
c) Production range approval.

4.1.2 Unit approval

4.1.2.1 An EGC unit should be certified as capable of meeting the limit value, (the Certified Value), specified by the manufacturer (e.g., the emission level the unit is capable of achieving on a continuous basis) with fuel oils of the manufacturer's specified maximum % m/m sulphur content and for the range of operating parameters, as listed in 4.2.2.1(b), for which they are to be approved. The Certified Value should at least be suitable for ship operations under requirements given by MARPOL Annex VI regulations 14.1 and/or 14.4.

4.1.2.2 Where testing is not to be undertaken with fuel oils of the manufacturer's specified maximum % m/m sulphur content, the use of two test fuels with a lower % m/m sulphur content is permitted. The two fuels selected should have a difference in % m/m sulphur content sufficient to demonstrate the operational behaviour of the EGC unit and to demonstrate that the Certified Value can be met if the EGC unit were to be operated with a fuel of the manufacturer's specified maximum % m/m sulphur content. In such cases a minimum of two tests, in accordance with section 4.3 as appropriate, should be performed. These need not be sequential and could be undertaken on two different, but identical, EGC units.

4.1.2.3 The maximum and, if applicable, minimum exhaust gas mass flow rate of the unit should be stated. The effect of variation of the other parameters defined in 4.2.2.1(b) should be justified by the equipment manufacturer. The effect of variations in these factors should be assessed by testing or otherwise as appropriate. No variation in these factors, or combination of variations in these factors, should be such that the emission value of the EGC unit would be in excess of the Certified Value.

4.1.2.4 Data obtained in accordance with this section should be submitted to the Administration for approval together with the ETM-A.

4.1.3 Serially manufactured units

In the case of nominally similar EGC units of the same mass flow ratings as that certified under 4.1.2, and to avoid the testing of each EGC unit, the equipment manufacturer may submit, for acceptance by the Administration, a conformity of production arrangement. The certification of each EGC unit under this arrangement should be subject to such surveys that the Administration may consider necessary as to assure that each EGC unit has an emission value of not more than the Certified Value when operated in accordance with the parameters defined in 4.2.2.1(b).

4.1.4 Product range approval

4.1.4.1 In the case of an EGC unit of the same design, but of different maximum exhaust gas mass flow capacities, the Administration may accept, in lieu of tests on an EGC unit of all capacities in accordance with section 4.1.2, tests of EGC systems of three different capacities provided that the three tests are performed at intervals including the highest, lowest and one intermediate capacity rating within the range.

4.1.4.2 Where there are significant differences in the design of EGC units of different capacities, this procedure should not be applied unless it can be shown, to the satisfaction of the Administration, that in practice those differences do not materially alter the performance between the various EGC unit types.

4.1.4.3 For EGC units of different capacities, the sensitivity to variations in the type of combustion machinery to which they are fitted should be detailed together with sensitivity to the variations in the parameters listed in 4.2.2.1(b). This should be on the basis of testing, or other data as appropriate.

4.1.4.4 The effect of changes of EGC unit capacity on washwater characteristics should be detailed.

4.1.4.5 All supporting data obtained in accordance with this section, together with the ETM-A for each capacity unit, should be submitted to the Administration for approval.

4.2 Survey and certification

4.2.1 Procedures for the certification of an EGC unit

4.2.1.1 In order to meet the requirements of 4.1 either prior to, or after installation on board, each EGC unit should be certified as meeting the Certified Value specified by the manufacturer (e.g., the emission level the unit is capable of achieving on a continuous basis) under the operating conditions and restrictions as given by the EGC Technical Manual (ETM-A) as approved by the Administration.

4.2.1.2 Determination of the Certified Value should be in accordance with the provisions of these Guidelines.

4.2.1.3 Each EGC unit meeting the requirements of 4.2.1.1 should be issued with a SECC by the Administration. The form of the SECC is given in Appendix I.

4.2.1.4 Application for an SECC should be made by the EGC system manufacturer, shipowner or other party.

4.2.1.5 Any subsequent EGC units of the same design and rating as that certified under 4.2.1.1 may be issued with an SECC by the Administration without the need for testing in accordance with 4.2.1.1 subject to section 4.1.3 of these Guidelines.

4.2.1.6 EGC units of the same design, but with ratings different from that certified under 4.2.1.1 may be accepted by the Administration subject to section 4.1.4 of these Guidelines.

4.2.1.7 EGC units which treat only part of the exhaust gas flow of the uptake in which they are fitted should be subject to special consideration by the Administration to ensure that under all defined operating conditions that the overall emission value of the exhaust gas down stream of the system is no more than the Certified Value.

4.2.2 EGC System Technical Manual "Scheme A" (ETM-A).

4.2.2.1 Each EGC unit should be supplied with an ETM-A provided by the manufacturer. This ETM-A should, as a minimum, contain the following information:

(a) the identification of the unit (manufacturer, model/type, serial number and other details as necessary) including a description of the unit and any required ancillary systems;

(b) the operating limits, or range of operating values, for which the unit is certified. These should, as a minimum, include:

(i) maximum and, if applicable, minimum mass flow rate of exhaust gas;

(ii) the power, type and other relevant parameters of the fuel oil combustion unit for which the EGC unit is to be fitted. In the cases of boilers, the maximum air/fuel ratio at 100% load should also be given. In the cases of diesel engines whether the engine is of 2 or 4-stroke cycle;

(iii) maximum and minimum washwater flow rate, inlet pressures and minimum inlet water alkalinity (ISO 9963-1-2);

(iv) exhaust gas inlet temperature ranges and maximum and minimum exhaust gas outlet temperature with the EGC unit in operation;

(v) exhaust gas differential pressure range and the maximum exhaust gas inlet pressure with the fuel oil combustion unit operating at MCR or 80% of power rating whichever is appropriate;

(vi) salinity levels or fresh water elements necessary to provide adequate neutralizing agents; and

(vii) other factors concerning the design and operation of the EGC unit relevant to achieving a maximum emission value no higher than the Certified Value;

(c) any requirements or restrictions applicable to the EGC unit or associated equipment necessary to enable the unit to achieve a maximum emission value no higher than the Certified Value;

(d) maintenance, service or adjustment requirements in order that the EGC unit can continue to achieve a maximum emission value no higher than the Certified Value. The maintenance, servicing and adjustments should be recorded in the EGC Record Book;

(e) corrective actions in case of exceedances of the applicable maximum allowable SO_2/CO_2 ratio, or wash water discharge criteria;

(f) a verification procedure to be used at surveys to ensure that its performance is maintained and that the unit is used as required (see section 4.4);

(g) through range performance variation in washwater characteristics;

(h) design requirements of the washwater system; and

(i) the SECC.

4.2.2.2 The ETM-A should be approved by the Administration.

4.2.2.3 The ETM-A should be retained on board the ship onto which the EGC unit is fitted. The ETM-A should be available for surveys as required.

4.2.2.4 Amendments to the ETM-A which reflect EGC unit changes that affect performance with respect to emissions to air and/or water should be approved by the Administration. Where additions, deletions or amendments to the ETM-A are separate to the ETM-A as initially approved, they should be retained with the ETM-A and should be considered as part of the ETM-A.

4.2.3 In service surveys

4.2.3.1 The EGC unit should be subject to survey on installation and at Initial, Annual/Intermediate and Renewals Surveys by the Administration.

4.2.3.2 In accordance with MARPOL Annex VI regulation 10, EGC units may also be subject to inspection by port State control.

4.2.3.3 Prior to use each EGC unit should be issued with an SECC by the Administration.

4.2.3.4 Following the installation survey as required by 4.2.3.1, section 2.6 of the Supplement to the ship's International Air Pollution Certificate should be duly completed.

4.3 Emission limits

4.3.1 Each EGC unit should be capable of reducing emissions to equal to or less than the Certified Value at any load point when operated in accordance with the criteria as given within 4.2.2.1(b), as specified in paragraphs 4.3.2 to 4.3.5 of these Guidelines, and as excepted in paragraph 4.3.7.

4.3.2 EGC units fitted to main propulsion diesel engines should meet the requirements of 4.3.1 at all loads between 25-100% of the load range of the engines to which they are fitted.

4.3.3 EGC units fitted to auxiliary diesel engines should meet the requirements of 4.3.1 at all loads between 10-100% of the load range of the engines to which they are fitted.

4.3.4 EGC units fitted to diesel engines which supply power for both main propulsion and auxiliary purposes should meet the requirements of 4.3.3.

4.3.5 EGC units fitted to boilers should meet the requirements of 4.3.1 at all loads between 10-100% of the load range (steaming rates) or, if the turn down ratio is smaller, over the actual load range of the boilers to which they are fitted.

4.3.6 In order to demonstrate performance, emission measurements should be undertaken, with the agreement of the Administration, at a minimum of four load points. One load point should be at 95-100% of the maximum exhaust gas mass flow rate for which the unit is to be certified. One load point should be within ± 5% of the minimum exhaust gas mass flow rate for which the unit is to be certified. The other two load points should be equally spaced between the maximum and minimum exhaust gas mass flow rates. Where there are discontinuities in the operation of the system the number of load points should be increased, with the agreement of the Administration, so that it is demonstrated that the required performance over the stated exhaust gas mass flow rate range is retained. Additional intermediate load points should be tested if there is evidence of an emission peak below the maximum exhaust gas mass flow rate and above, if applicable, the minimum exhaust gas flow rate. These additional tests should be sufficient number as to establish the emission peak value.

4.3.7 For loads below those specified in 4.3.2 to 4.3.5, the EGC unit should continue in operation. In those cases where the fuel oil combustion equipment may be required to operate under idling conditions, the SO_2 emission concentration (ppm) at standardized O_2 concentration (15.0% diesel engines, 3.0% boilers) should not exceed 50 ppm.

4.4 Onboard procedures for demonstrating compliance

4.4.1 For each EGC unit, the ETM-A should contain a verification procedure for use at surveys as required. This procedure should not require specialized equipment or an in-depth knowledge of the system. Where particular devices are required they should be provided and maintained as part of the system. The EGC unit should be designed in such a way as to facilitate inspection as required. The basis of this verification procedure is that if all relevant components and operating values or settings are within those as approved, then the performance of the EGC system is within that required without the need for actual exhaust emission measurements. It is also necessary to ensure that the EGC unit is fitted to a fuel oil combustion unit for which it is rated – this forms part of the SECP. A Technical File related to an EIAPP certificate, if available, or an Exhaust Gas Declaration issued by the engine maker or designer or another competent party or a Flue Gas Declaration issued by the boiler maker or designer or another competent party serves this purpose to the satisfaction of the Administration.

4.4.2 Included in the verification procedure should be all components and operating values or settings which may affect the operation of the EGC unit and its ability to meet the Certified Value.

4.4.3 The verification procedure should be submitted by the EGC system manufacturer and approved by the Administration.

4.4.4 The verification procedure should cover both a documentation check and a physical check of the EGC unit.

4.4.5 The Surveyor should verify that each EGC unit is installed in accordance with the ETM-A and has an SECC as required.

4.4.6 At the discretion of the Administration, the Surveyor should have the option of checking one or all of the identified components, operating values or settings. Where there is more than one EGC unit, the Administration may, at its discretion, abbreviate or reduce the extent of the survey on board, however, the entire survey should be completed for at least one of each type of EGC unit on board provided that it is expected that the other EGC units perform in the same manner.

4.4.7 The EGC unit should include means to automatically record when the system is in use. This should automatically record, at least at the frequency specified in paragraph 5.4.2, as a minimum, washwater pressure and flow rate at the EGC unit's inlet connection, exhaust gas pressure before and pressure drop across the EGC unit, fuel oil combustion equipment load, and exhaust gas temperature before and after the EGC unit. The data recording system should comply with the requirements of sections 7 and 8. In case of a unit consuming chemicals at a known rate as documented in ETM-A, records of such consumption in the EGC Record Book also serves this purpose.

4.4.8 Under Scheme A, if a continuous exhaust gas monitoring system is not fitted, it is recommended that a daily spot check of the exhaust gas quality in terms of SO_2 (ppm)/CO_2 (%) ratio, is used to verify compliance in conjunction with parameter checks stipulated in 4.4.7. If a continuous exhaust gas monitoring system is fitted, only daily spot checks of the parameters listed in paragraph 4.4.7 would be needed to verify proper operation of the EGC unit.

4.4.9 If the EGC system manufacturer is unable to provide assurance that the EGC unit will meet the Certified Value or below between surveys, by means of the verification procedure stipulated in 4.4.1, or if this requires specialist equipment or in-depth knowledge, it is recommended that continuous exhaust gas monitoring of each EGC unit be used, Scheme B, to assure compliance with regulations 14.1 and/or 14.4.

4.4.10 An EGC Record Book should be maintained by the shipowner recording maintenance and service of the unit including like-for-like replacement. The form of this record should be submitted by the EGC system manufacturer and approved by the Administration. This EGC Record Book should be available at surveys as required and may be read in conjunction with engine-room log-books and other data as necessary to confirm the correction operation of the EGC unit. Alternatively, this information should be recorded in the vessel's planned maintenance record system as approved by the Administration.

5 SCHEME B – EGC SYSTEM APPROVAL, SURVEY AND CERTIFICATION USING CONTINUOUS MONITORING OF SO_x EMISSIONS

5.1 General

This Scheme should be used to demonstrate that the emissions from a fuel oil combustion unit fitted with an EGC will, with that system in operation, result in the required emission value (e.g., as stated in the SECP) or below at any load point, including during transient operation and thus compliance with the requirements of regulations 14.1 and/or 14.4 of MARPOL Annex VI.

5.2 Approval

Compliance demonstrated in service by continuous exhaust gas monitoring. Monitoring system should be approved by the Administration and the results of that monitoring available to the Administration as necessary to demonstrate compliance as required.

5.3 Survey and certification

5.3.1 The monitoring system of the EGC system should be subject to survey on installation and at Initial, Annual/Intermediate and Renewals Surveys by the Administration.

5.3.2 In accordance with regulation 10 of MARPOL Annex VI monitoring systems of EGC units may also be subject to inspection by port State control.

5.3.3 In those instances where an EGC system is installed, section 2.6 of the Supplement to the ship's International Air Pollution Prevention Certificate should be duly completed.

5.4 Calculation of emission rate

5.4.1 Exhaust gas composition in terms of SO_2 (ppm)/CO_2 (%) should be measured at an appropriate position after the EGC unit and that measurement should be in accordance with the requirements of section 6 as applicable.

5.4.2 SO_2 (ppm) and CO_2 (%) to be continuously monitored and recorded onto a data recording and processing device at a rate which should not be less than 0.0035 Hz.

5.4.3 If more than one analyser is to be used to determine the SO_2/CO_2 ratio, these should be tuned to have similar sampling and measurement times and the data outputs aligned so that the SO_2/CO_2 ratio is fully representative of the exhaust gas composition.

5.5 Onboard procedures for demonstrating compliance with emission limit

5.5.1 The data recording system should comply with the requirements of sections 7 and 8.

5.5.2 Daily spot checks of the parameters listed in paragraph 4.4.7 are needed to verify proper operation of the EGC unit and should be recorded in the EGC Record Book or in the engine-room logger system.

5.6 EGC System Technical Manual "Scheme B" (ETM-B)

5.6.1 Each EGC unit should be supplied with an ETM-B provided by the Manufacturer. This ETM-B should, as a minimum, contain the following information:

(a) the identification of the unit (manufacturer, model/type, serial number and other details as necessary) including a description of the unit and any required ancillary systems;

(b) the operating limits, or range of operating values, for which the unit is certified. These should, as a minimum, include:

(i) maximum and, if applicable, minimum mass flow rate of exhaust gas;

(ii) the power, type and other relevant parameters of the fuel oil combustion unit for which the EGC unit is to be fitted. In the cases of boilers, the maximum air/fuel ratio at 100% load should also be given. In the cases of diesel engines whether the engine is of 2 or 4-stroke cycle;

(iii) maximum and minimum washwater flow rate, inlet pressures and minimum inlet water alkalinity (ISO 9963-1-2);

(iv) exhaust gas inlet temperature ranges and maximum and minimum exhaust gas outlet temperature with the EGC unit in operation;

(v) exhaust gas differential pressure range and the maximum exhaust gas inlet pressure with the fuel oil combustion unit operating at MCR or 80% of power rating whichever is appropriate;

(vi) salinity levels or fresh water elements necessary to provide adequate neutralizing agents; and

(vii) other parameters as necessary concerning the operation of the EGC unit;

(c) any requirements or restrictions applicable to the EGC unit or associated equipment;

(d) corrective actions in case of exceedances of the applicable maximum allowable SO_2/CO_2 ratio, or washwater discharge criteria;

(e) through range performance variation in washwater characteristics;

(f) design requirements of the washwater system.

5.6.2 The ETM-B should be approved by the Administration.

5.6.3 The ETM-B should be retained on board the ship onto which the EGC unit is fitted. The ETM-B should be available for surveys as required.

5.6.4 Amendments to the ETM-B which reflect EGC unit changes that affect performance with respect to emissions to air and/or water should be approved by the Administration. Where additions, deletions or amendments to the ETM-B are separate to the ETM-B as initially approved, they should be retained with the ETM-B and should be considered as part of the ETM-B.

6 EMISSION TESTING

6.1 Emission testing should follow the requirements of the NO_x Technical Code 2008, chapter 5, and associated Appendices, except as provided for in these Guidelines.

6.2 CO_2 should be measured on a dry basis using an analyser operating on non-dispersive infra-red (NDIR) principle. SO_2 should be measured on a dry or wet basis using analysers operating on non-dispersive infra-red (NDIR) or non-dispersive ultra-violet (NDUV) principles and with additional equipment such as dryers as necessary. Other systems or analyser principles may be accepted, subject to the approval of the Administration, provided they yield equivalent or better results to those of the equipment referenced above.

6.3 Analyser performance should be in accordance with the requirements of Appendix III sections 1.6 to 1.10 of the NO_x Technical Code 2008.

6.4 An exhaust gas sample for SO_2 should be obtained from a representative sampling point downstream of the EGC unit.

6.5 SO_2 and CO_2 should be monitored using either *in situ* or extractive sample systems.

6.6 Extractive exhaust gas samples for SO_2 determination should be maintained at a sufficient temperature to avoid condensed water in the sampling system and hence loss of SO_2.

6.7 If an extractive exhaust gas sample for determination needs to be dried prior to analysis it should be done in a manner that does not result in loss of SO_2 in the sample as analysed.

6.8 Where SO_2 is measured by an *in situ* system, the water content in the exhaust gas stream at that point is also to be determined in order to correct the reading to a dry basis value.

6.9 In justified cases where the CO_2 concentration is reduced by the EGC unit, the CO_2 concentration can be measured at the EGC unit inlet, provided that the correctness of such a methodology can be clearly demonstrated.

7 DATA RECORDING AND PROCESSING DEVICE

7.1 The recording and processing device should be of robust, tamper-proof design with read-only capability.

7.2 The recording and processing device should record the data required by sections 4.4.7, 5.4.2, and 10.3 against UTC and ships position by a Global Navigational Satellite System (GNSS).

7.3 The recording and processing device should be capable of preparing reports over specified time periods.

7.4 Data should be retained for a period of not less than 18 months from the date of recording. If the unit is changed over that period, the shipowner should ensure that the required data is retained on board and available as required.

7.5 The device should be capable of downloading a copy of the recorded data and reports in a readily useable format. Such copy of the data and reports should be available to the Administration or port State authority as requested.

8 ONBOARD MONITORING MANUAL (OMM)

8.1 An OMM should be prepared to cover each EGC unit installed in conjunction with fuel oil combustion equipment, which should be identified, for which compliance is to be demonstrated.

8.2 The OMM should, as a minimum, include:

(a) the sensors to be used in evaluating EGC system performance and washwater monitoring, their service, maintenance and calibration requirements;

(b) the positions from which exhaust emission measurements and washwater monitoring are to be taken together with details of any necessary ancillary services such as sample transfer lines and sample treatment units and any related service or maintenance requirements;

(c) the analysers to be used, their service, maintenance, and calibration requirements;

(d) analyser zero and span check procedures; and

(e) other information or data relevant to the correct functioning of the monitoring systems or its use in demonstrating compliance.

8.3 The OMM should specify how the monitoring is to be surveyed.

8.4 The OMM should be approved by the Administration.

9 SHIP COMPLIANCE

9.1 SO_x Emissions Compliance Plan (SECP)

9.1.1 For all ships which are to use an EGC unit, in part or in total, in order to comply with the requirements of regulations 14.1 and 14.4 of MARPOL Annex VI there should be an SECP for the ship, approved by the Administration.

9.1.2 The SECP should list each item of fuel oil combustion equipment which is to meet the requirements for operating in accordance with the requirements of regulations 14.1 and/or 14.4.

9.1.3 Under Scheme A, the SECP should present how continuous monitoring data will demonstrate that the parameters in paragraph 4.4.7 are maintained within the manufacturer's recommended specifications. Under Scheme B, this would be demonstrated using daily recordings of key parameters.

9.1.4 Under Scheme B, the SECP should present how continuous exhaust gas emissions monitoring will demonstrate that the ship total SO_2 (ppm)/CO_2 (%) ratio is comparable to the requirements of regulation 14.1 and/or 14.4 or below as prescribed in paragraph 1.3. Under Scheme A, this would be demonstrated using daily exhaust gas emission recordings.

9.1.5 There may be some equipment such as small engines and boilers to which the fitting of EGC units would not be practical, particularly where such equipment is located in a position remote from the main machinery spaces. All such fuel oil combustion units should be listed in the SECP. For these fuel oil combustion units which are not to be fitted with EGC units, compliance may be achieved by means of regulations 14.1 and/or 14.4 of MARPOL Annex VI.

9.2 Demonstration of Compliance

9.2.1 Scheme A

9.2.1.1 The SECP should refer to, not reproduce, the ETM-A, EGC Record Book or Engine-Room logger system and OMM as specified under Scheme A. It should be noted that as an alternative, the maintenance records may be recorded in the ship's Planned Maintenance Record System, as allowed by the Administration.

9.2.1.2 For all fuel oil combustion equipment listed under 9.1.2, details should be provided demonstrating that the rating and restrictions for the EGC unit as approved, 4.2.2.1(b), are complied with.

9.2.1.3 Required parameters should be monitored and recorded as required under 4.4.7 when the EGC is in operation in order to demonstrate compliance.

9.2.2 Scheme B

9.2.2.1 The SECP should refer to, not reproduce, the ETM-B, EGC Record Book or Engine-Room logger system and OMM as specified under Scheme B.

10 WASHWATER

10.1 Washwater discharge criteria[1]

10.1.1 When the EGC system is operated in ports, harbours, or estuaries, the washwater monitoring and recording should be continuous. The values monitored and recorded should include pH, PAH, turbidity and temperature. In other areas the continuous monitoring and recording equipment should also be in operation, whenever the EGC system is in operation, except for short periods of maintenance and cleaning of the equipment. The discharge water should comply with the following limits:

10.1.2 pH criteria

10.1.2.1 The washwater pH should comply with one of the following requirements which should be recorded in the ETM-A or ETM-B as applicable:

(i) The discharge washwater should have a pH of no less than 6.5 measured at the ship's overboard discharge with the exception that during manoeuvring and transit, the maximum difference between inlet and outlet of 2 pH units is allowed measured at the ship's inlet and overboard discharge.

(ii) During commissioning of the unit(s) after installation, the discharged washwater plume should be measured externally from the ship (at rest in harbour) and the discharge pH at the ship's overboard pH monitoring point will be recorded when the plume at 4 metres from the discharge point equals or is above pH 6.5. The discharged pH to achieve a minimum pH units of 6.5 will become the overboard pH discharge limit recorded in the ETM-A or ETM-B.

10.1.3 PAHs (Polycyclic Aromatic Hydrocarbons)

10.1.3.1 The washwater PAH should comply with the following requirements. The appropriate limit should be specified in the ETM-A or ETM-B.

[1] The washwater discharge criteria should be revised in the future as more data becomes available on the contents of the discharge and its effects, taking into account any advice given by GESAMP.

10.1.3.2 The maximum continuous PAH concentration in the washwater should not be greater than 50 µg/L PAH_{phe} (phenanthrene equivalence) above the inlet water PAH concentration. For the purposes of this criteria, the PAH concentration in the washwater should be measured downstream of the water treatment equipment, but upstream of any washwater dilution or other reactant dosing unit, if used, prior to discharge.

10.1.3.3 The 50 µg/L limit described above is normalized for a washwater flow rate through the EGC unit of 45 t/MWh where the MW refers to the MCR or 80% of the power rating of the fuel oil combustion unit. This limit would have to be adjusted upward for lower washwater flow rates per MWh, and vice-versa, according to the table below.

Flow Rate (t/MWh)	**Discharge Concentration Limit (µg/L PAH_{phe} equivalents)**	**Measurement Technology**
0 - 1	2250	Ultraviolet Light
2.5	900	– ” –
5	450	Fluorescence*
11.25	200	– ” –
22.5	100	– ” –
45	50	– ” –
90	25	– ” –

10.1.3.4 For a 15-minute period in any 12-hour period, the continuous PAH_{phe} concentration limit may exceed the limit described above by up to 100%. This would allow for an abnormal start up of the EGC unit.

10.1.4 Turbidity/Suspended Particle Matter

10.1.4.1 The washwater turbidity should comply with the following requirements. The limit should be recorded in the ETM-A or ETM-B.

10.1.4.2 The washwater treatment system should be designed to minimize suspended particulate matter, including heavy metals and ash.

10.1.4.3 The maximum continuous turbidity in washwater should not be greater than 25 FNU (formazin nephlometric units) or 25 NTU (nephlometric turbidity units) or equivalent units, above the inlet water turbidity. However, during periods of high inlet turbidity, the precision of the measurement device and the time lapse between inlet measurement and outlet measurement are such that the use of a difference limit is unreliable. Therefore all turbidity difference readings should be a rolling average over a 15-minute period to a maximum of 25 FNU. For the purposes of this criteria the turbidity in the washwater should be measured downstream of the water treatment equipment but upstream of washwater dilution (or other reactant dosing) prior to discharge.

10.1.4.4 For a 15-minute period in any 12-hour period, the continuous turbidity discharge limit may be exceeded by 20%.

* For any Flow Rate > 2.5 t/MWh Fluorescence technology should be used.

10.1.5 Nitrates

10.1.5.1 The washwater treatment system should prevent the discharge of nitrates beyond that associated with a 12% removal of NO_x from the exhaust, or beyond 60 mg/l normalized for washwater discharge rate of 45 tons/MWh whichever is greater.

10.1.5.2 At each renewal survey nitrate discharge data is to be available in respect of sample overboard discharge drawn from each EGC system with the previous three months prior to the survey. However, the Administration may require an additional sample to be drawn and analysed at their discretion. The nitrate discharge data and analysis certificate is to be retained on board the ship as part of the EGC Record Book and be available for inspection as required by Port State Control or other parties. Requirements in respect of sampling, storage, handling and analysis should be detailed in the ETM-A or ETM-B as applicable. To assure comparable nitrate discharge rate assessment, the sampling procedures should take into account paragraph 10.1.5.1, which specifies the need for washwater flow normalization. The test method for the analysis of nitrates should be according to standard seawater analysis as described in Grasshoff *et al*.

10.1.5.3 All systems should be tested for nitrates in the discharge water. If typical nitrate amounts are above 80% of the upper limit, it should be recorded in the ETM-A or ETM-B.

10.1.6 Washwater additives and other substances

10.1.6.1 An assessment of the washwater is required for those EGC technologies which make use of chemicals, additives, preparations or create relevant chemicals *in situ*. The assessment could take into account relevant guidelines such as resolution MEPC.126(53), procedure for approval of ballast water management systems that make use of active substances (G9) and if necessary additional washwater discharge criteria should be established.

10.2 Washwater monitoring

10.2.1 pH, oil content (as measured by PAH levels), and turbidity should be continuously monitored and recorded as recommended in section 7 of these Guidelines. The monitoring equipment should also meet the performance criteria described below:

pH

10.2.2 The pH electrode and pH meter should have a resolution of 0.1 pH units and temperature compensation. The electrode should comply with the requirements defined in BS 2586 or of equivalent or better performance and the meter should meet or exceed BS EN ISO 60746-2:2003.

PAH

10.2.3 The PAH monitoring equipment should be capable to monitor PAH in water in a range to at least twice the discharge concentration limit given in the table above. The equipment should be demonstrated to operate correctly and not deviate more than 5% in washwater with turbidity within the working range of the application.

10.2.4 For those applications discharging at lower flow rates and higher PAH concentrations, ultraviolet light monitoring technology or equivalent, should be used due to its reliable operating range.

Turbidity

10.2.5 The turbidity monitoring equipment should meet requirements defined in ISO 7027:1999 or USEPA 180.1.

Temperature recording

10.3 Washwater monitoring data recording

10.3.1 The data recording system should comply with the requirements of sections 7 and 8 and should continuously record pH, PAH and Turbidity as specified in the washwater criteria.

10.4 Washwater residue

10.4.1 Residues generated by the EGC unit should be delivered ashore to adequate reception facilities. Such residues should not be discharged to the sea or incinerated on board.

10.4.2 Each ship fitted with an EGC unit should record the storage and disposal of washwater residues in an EGC log, including the date, time and location of such storage and disposal. The EGC log may form a part of an existing log-book or electronic recording system as approved by the Administration.

APPENDIX I

FORM OF SO_x EMISSION COMPLIANCE CERTIFICATE

Badge or Cipher

NAME OF ADMINISTRATION

SO_x EMISSION COMPLIANCE CERTIFICATE

CERTIFICATE OF UNIT APPROVAL FOR EXHAUST GAS CLEANING SYSTEMS

Issued under the provisions of the Protocol of 1997, as amended by resolution MEPC.176(58) in 2008, to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 related thereto under the authority of the Government of:

.....
(full designation of the country)

by.....
(full designation of the competent person or organization authorized under the provisions of the Convention)

This is to certify that the exhaust gas cleaning (EGC) unit listed below has been surveyed in accordance with the requirements of the specifications contained under Scheme A in the Guidelines for exhaust gas cleaning systems – adopted by resolution MEPC.***(**).

This Certificate is valid only for the EGC unit referred to below:

Unit manufacturer	Model/ type	Serial number	EGC System Unit and Technical Manual approval number

A copy of this Certificate, together with the EGC System Technical Manual, shall be carried on board the ship fitted with this EGC System unit at all times.

This Certificate is valid for the life of the EGC System unit subject to surveys in accordance with section 4.2 of the Guidelines and regulation 5 of the revised MARPOL Annex VI, installed in ships under the authority of this Government.

Issued at .....
(place of issue of certificate)

dd/mm/yyyy

....
(date of issue) (*signature of duly authorized official issuing the certificate)*

(Seal or Stamp of the authority, as appropriate)

APPENDIX II

PROOF OF THE SO_2/CO_2 RATIO METHOD

1 The SO_2/CO_2 ratio method enables direct monitoring of exhaust gas emissions to verify compliance with emissions limits set out in Table 1 in section 1.3 of these Guidelines. In the case of EGC systems that absorb CO_2 during the exhaust gas cleaning process it is necessary to measure the CO_2 prior to the cleaning process and use the CO_2 concentration before cleaning with the SO_2 concentration after cleaning. For conventional low alkali cleaning systems virtually no CO_2 is absorbed during exhaust gas cleaning and therefore monitoring of both gases can be undertaken after the cleaning process.

2 Correspondence between the SO_2/CO_2 ratio can be determined by simple inspection of the respective carbon contents per unit mass of distillate and residual fuel. For this group of hydrocarbon fuels the carbon content as a percentage of mass remains closely similar, whereas the hydrogen content differs. Thus it can be concluded that for a given carbon consumption by combustion there will be a consumption of sulphur in proportion to the sulphur content of the fuel, or in other words a constant ratio between carbon and sulphur adjusted for the molecular weight of oxygen from combustion.

3 The first development of the SO_2/CO_2 ratio considered its use to verify compliance with emissions from 1.5% S fuel. The limit of 65 ([1]ppm/%) SO_2/CO_2 for 1.5% sulphur in fuel can be demonstrated by first calculating the mass ratio of fuel sulphur to fuel carbon, which is tabulated in Table 1 in this appendix for various fuels and fuel sulphur contents; including 1.5% sulphur for both distillate and residual fuels. These ratios were used to solve for the corresponding SO_2 and CO_2 concentrations in exhaust, which are tabulated in Table 2 of this Appendix. Molecular weights (MW) were taken into account to convert mass fractions to mole fractions. For the 1.5% sulphur fuels in Table 2, the amount of CO_2 is set first at 8% and then changed to 0.5% to show that there is no effect due to changes in excess air. As expected, the absolute SO_2 concentration changes, but the SO_2/CO_2 ratio does not. This indicates that the SO_2/CO_2 ratio is independent of fuel-to-air ratios. Therefore, SO_2/CO_2 ratio can be used robustly at any point of operation, including operation where no brake power is produced.

Note that the SO_2/CO_2 ratio varies slightly from distillate to residual fuel. This occurs because of the very different atomic hydrogen-to-carbon ratios (H:C) of the two fuels. Figure 1 illustrates the extent of the SO_2/CO_2 ratios' sensitivity to H:C over a broad range of H:C and fuel sulphur concentrations. From Figure 1, it can be concluded that for fuel sulphur levels less than 3.00% S, the difference in S/C ratios for distillate and residual fuel is less than 5.0%.

In the case of using non-petroleum fuel oils, the appropriate SO_2/CO_2 ratio applicable to the values given in regulations 14.1 and/or 14.4 will be subject to approval by the Administration.

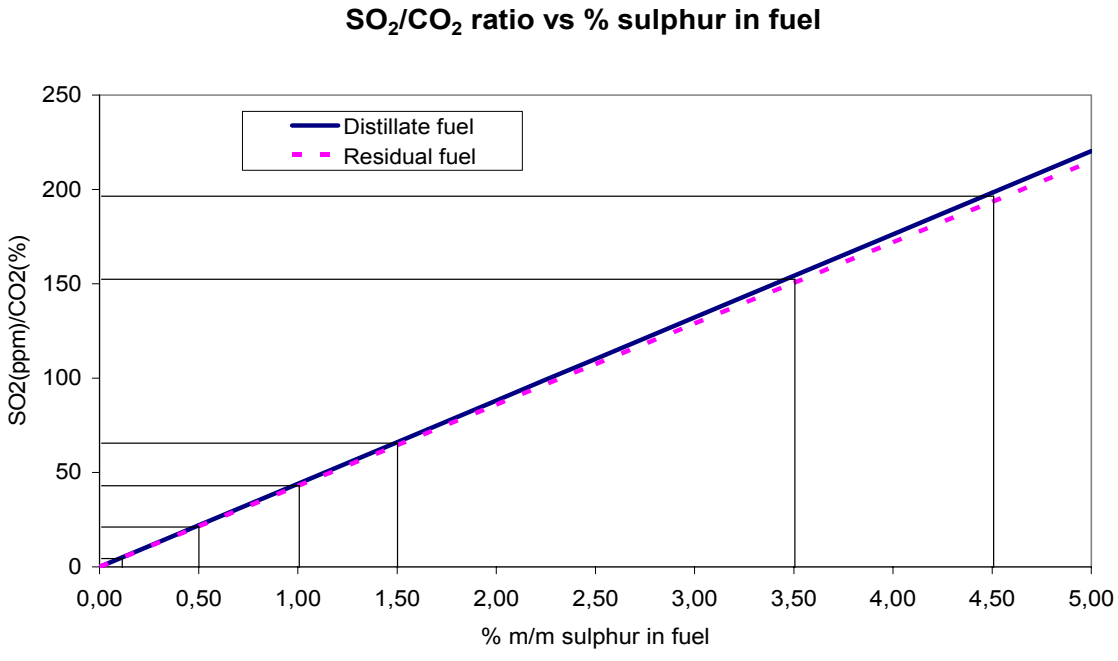
Table 1: Fuel properties for marine distillate and residual fuel*

	Carbon	Hydrogen	Sulphur	Other	C	H	S	Fuel S/C	Exh SO_2/CO_2
Fuel Type	%(m/m)	%(m/m)	%(m/m)	%(m/m)	mol/kg	mol/kg	mol/kg	mol/mol	ppm/%(v/v)
Distillate	86.20	13.60	0.17	0.03	71.8333	136	0.0531	0.00074	7.39559
Residual	86.10	10.90	2.70	0.30	71.7500	109	0.8438	0.01176	117.5958
Distillate	85.05	13.42	1.50	0.03	70.8750	134.2	0.4688	0.006614	66.1376
Residual	87.17	11.03	1.50	0.30	72.6417	110.3	0.4688	0.006453	64.5291

* Based on properties in the IMO NO_x Monitoring Guidelines, resolution MEPC.103(49).

Table 2: Emissions calculations corresponding to 1.5 % fuel sulphur

	CO_2	SO_2	Exh SO_2/CO_2	Exh S/C
	%	[1]ppm	[1]ppm/%	m/m
Distillate 0.17% S	8	59.1	7.4	0.00197
Residual 2.70% S	8	939.7	117.5	0.03136
Distillate 1.5% S	8	528.5	**66.1**	**0.01764**
Residual 1.5% S	8	515.7	**64.5**	**0.01721**
Distillate 1.5% S	0.5	33.0	**66.1**	**0.01764**
Residual 1.5% S	0.5	32.2	**64.5**	**0.01721**



4 Correspondence between 65 ([1]ppm/%) SO_2/CO_2 and 6.0 g/kWh is demonstrated by showing that their S/C ratios are similar. This requires the additional assumption of a brake-specified fuel consumption value of 200 g/kWh. This is an appropriate average for marine diesel engines. The calculation is as follows:

Note 1: The S/C mass ratios calculated above, based on 6.0 g/kWh and 200 g/kWh BSFC, are both within 0.10% of the S/C mass ratios in the emissions table (Table 2). Therefore, 65[1] (ppm/%) SO_2/CO_2 corresponds well to 6.0 g/kWh.

Note 2: The value of 6.0 g/kWh, hence the 200g/kWh brake-specified fuel consumption is taken from MARPOL Annex VI as adopted by the 1997 MARPOL Conference.

$$S/C_{fuel} = \frac{\text{brake-specific } SO_2 * \left(MW_S / MW_{SO2}\right)}{BSFC * \left(\%\text{ carbon in fuel} / 100\right)}$$

brake-specific $SO_2 = 6.0$ g/kW-hr

$MW_S = 32.065$ g/mol

$MW_{SO2} = 64.064$ g/mol

BSFC = 200 g/kW-hr

% carbon in 1.5% S fuel (from Table 1) = 85.05% (distillate) & 87.17% residual

$$S/C_{residual\ fuel} = \frac{6.0 * \left(32.065 / 64.064\right)}{200 * \left(87.17\% / 100\right)}$$

$$S/C_{residual\ fuel} = 0.01723$$

$$S/C_{distillate\ fuel} = \frac{6.0 * \left(32.065 / 64.064\right)}{200 * \left(85.05\% / 100\right)}$$

$$S/C_{distillate\ fuel} = 0.01765$$

5 Thus, the working formulas are as follows:

For complete combustion = $\dfrac{SO_2\ (ppm^*)}{CO_2\ (\%^*)} \leq 65$

For incomplete combustion = $\dfrac{SO_2\ (ppm^*)}{CO_2(\%^*) + (CO\ (ppm^*)/10000) + (THC\ (ppm^*)/10000)} \leq 65$

* Note: gas concentrations must be sampled or converted to the same residual water content (e.g., fully wet, fully dry).

6 The following is the basis of using the ([2]ppm/%) SO_2/CO_2 as the limit for determining compliance with regulation 14.1 or 14.4:

(a) This limit can be used to determine compliance from fuel oil burners that do not produce mechanical power.

(b) This limit can be used to determine compliance at any power output, including idle.

(c) This limit only requires two gas concentration measurements at one sampling location.

(d) There is no need to measure any engine parameters such as engine speed, engine torque, engine exhaust flow, or engine fuel flow.

(e) If both gas concentration measurements are made at the same residual water content in the sample (e.g., fully wet, fully dry), no dry-to-wet conversion factors are required in the calculation.

(f) This limit completely decouples the thermal efficiency of the fuel oil combustion unit from the EGC unit.

(g) No fuel properties need to be known.

(h) Because only two measurements are made at a single location, transient engine or EGCS unit effects can be minimized by aligning signals from just these two analysers. (Note that the most appropriate points to align are the points where each analyser responds to a step change in emissions at the sample probe by 50% of the steady-state value.)

(i) This limit is independent of the amount of exhaust gas dilution. Dilution may occur due to evaporation of water in an EGC unit, and as part of an exhaust sampler's preconditioning system.

[2] ppm means "parts per million". It is assumed that ppm is measured by gas analysers on a molar basis, assuming ideal gas behaviour. The technically correct units are actually micro-moles of substance per mole of total amount (μmol/mol), but ppm is used in order to be consistent with units in the NO_x Technical Code.

APPENDIX III

WASHWATER DATA COLLECTION

Background

The washwater discharge criteria are intended to act as initial guidance for implementing EGC system designs. The criteria should be revised in the future as more data becomes available on the contents of the discharge and its effects, taking into account any advice given by GESAMP.

Administrations should therefore provide for collection of relevant data. To this end, shipowners in conjunction with the EGC manufacturer are requested to sample and analyse samples of:

- inlet water (for background);
- water after the scrubber (but before any treatment system); and
- discharge water.

This sampling could be made during approval testing or shortly after commissioning and at about twelve-month intervals for a period of two years of operation (minimum of three samples). Sampling guidance and analysis should be undertaken by laboratories using EPA or ISO test procedures for the following parameters:

- pH
- PAH and oil (detailed GC-MS analysis)
- Nitrate
- Nitrite
- Cd
- Cu
- Ni
- Pb
- Zn
- As
- Cr
- V

The extent of laboratory testing may be varied or enhanced in the light of developing knowledge.

When submitting sample data to the Administration, information should also be included on washwater discharge flow rates, dilution of discharge, if applicable, and engine power should be included as well as specifications of the fuel used from the bunker delivery note as a minimum.

It is recommended that the ship that has provided this information to the satisfaction of the Administration should be granted a waiver for compliance of the existing installation(s) to possible future stricter washwater discharge standards. The Administration should forward information submitted on this issue to the Organization for dissemination by the appropriate mechanisms.

***

ANNEX 10

RESOLUTION MEPC.185(59)
Adopted on 17 July 2009

GUIDELINES FOR THE DEVELOPMENT OF A VOC MANAGEMENT PLAN

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution,

NOTING that the revised MARPOL Annex VI was adopted by resolution MEPC.176(58) which is expected to enter into force on 1 July 2010,

NOTING ALSO that regulation 15.6 of the revised Annex VI requires a tanker carrying crude oil to have onboard and implement a VOC management plan approved by the Administration, and that such a plan shall be prepared taking into account the guidelines developed by the Organization,

HAVING CONSIDERED the draft Guidelines for the development of a VOC management plan prepared by the Sub-Committee on Bulk Liquids and Gases at its thirteenth session,

1. ADOPTS the Guidelines for the development of a VOC management plan, as set out in the Annex to this resolution; and

2. INVITES Governments to apply the Guidelines from 1 July 2010.

ANNEX

GUIDELINES FOR THE DEVELOPMENT OF A VOC MANAGEMENT PLAN

1 Objectives

.1 The purpose of the VOC management plan is to ensure that the operation of a tanker, to which regulation 15 of MARPOL Annex VI applies, prevents or minimizes VOC emissions to the extent possible.

.2 Emissions of VOCs can be prevented or minimized by:

.1 optimizing operational procedures to minimize the release of VOC emissions; and/or

.2 using devices, equipment, or design changes to prevent or minimize VOC emissions.

.3 To comply with this plan, the loading and carriage of cargoes which generate VOC emissions should be evaluated and procedures written to ensure that the operations of a ship follow best management practices for preventing or minimizing VOC emissions to the extent possible. If devices, equipment, or design changes are implemented to prevent or minimize VOC emissions, they shall also be incorporated and described in the VOC management plan as appropriate.

.4 While maintaining the safety of the ship, the VOC management plan should encourage and, as appropriate, set forth the following best management practices:

.1 the loading procedures should take into account potential gas releases due to low pressure and, where possible, the routing of oil from crude oil manifolds into the tanks should be done so as to avoid or minimize excessive throttling and high flow velocity in pipes;

.2 the ship should define a target operating pressure for the cargo tanks. This pressure should be as high as safely possible and the ship should aim to maintain tanks at this level during the loading and carriage of relevant cargo;

.3 when venting to reduce tank pressure is required, the decrease in the pressure in the tanks should be as small as possible to maintain the tank pressure as high as possible;

.4 the amount of inert gas added should be minimized. Increasing tank pressure by adding inert gas does not prevent VOC release but it may increase venting and therefore increased VOC emissions; and

.5 when crude oil washing is considered, its effect on VOC emissions should be taken into account. VOC emissions can be reduced by shortening the duration of the washing or by using a closed cycle crude oil washing programme.

2 Additional considerations

.1 A person in charge of carrying out the plan

.1 A person shall be designated in the VOC management plan to be responsible for implementing the plan and that person may assign appropriate personnel to carry out the relevant tasks;

.2 Procedures for preventing or minimizing VOC emissions

.1 Ship-specific procedures should be written or modified to address relevant VOC emissions, such as the following operations:

.1 Loading;

.2 Carriage of relevant cargo; and

.3 Crude oil washing;

.2 If the ship is equipped with VOC reduction devices or equipment, the use of these devices or equipment should be incorporated into the above procedures as appropriate.

.3 Training

.1 The plan should describe the training programmes to facilitate best management practices for the ship to prevent or minimize VOC emissions.

***

ANNEX 11

DRAFT AMENDMENTS TO REGULATIONS 13 AND 14 OF THE REVISED MARPOL ANNEX VI

Regulation 13 – *Nitrogen Oxides*

1 Paragraph 6 is amended as follows:

"6 For the purposes of this regulation, emission control areas shall be:

.1 The North American emission control areas, which means:

[a. the waters extending to an outer boundary of 200 nautical miles from the territorial sea baseline off the Pacific coast of the United States (except Alaska) and Canada;

b. the waters extending to an outer boundary of 200 nautical miles from the territorial sea baseline off southeastern Alaska, United States, and located east of a rhumb line drawn between 58° 51′04″ N, 153° 15′03″ W and 56° 34′12″ N, 142° 49′00″ W;

c. the waters extending to an outer boundary of 200 nautical miles from the territorial sea baseline off the Gulf of Mexico coast of the United States;

d. the waters extending to an outer boundary of 200 nautical miles from the territorial sea baseline off the coasts of the following Hawaiian Islands: Hawaii, Maui, Oahu, Molokai, Niihau, Kauai, Lanai, and Kahoolawe; and

e. the waters extending to an outer boundary of 200 nautical miles from the territorial sea baseline off the Atlantic coast of the United States and Canada, south of a line drawn between 60° 00′00″ N, 64° 09′36″ W and 60° 00′00″ N, 56° 37′02″ W,

provided that this emission control area excludes those marine areas subject to the sovereignty, sovereign rights, or jurisdiction of any State other than the United States or Canada consistent with international law and that it is without prejudice to any un-delimited maritime boundaries][1]; and

.2 any other sea area, including any port area, designated by the Organization in accordance with the criteria and procedures set forth in appendix III to this Annex."

[1] In accordance with the Technical Group's request this description will be replaced by full coordinates.

Regulation 14 – *Sulphur Oxides (SO_x) and Particulate Matter*

2 Paragraph 3 is replaced by the following:

"3 For the purpose of this regulation, emission control areas shall include:

.1 the Baltic Sea area as defined in regulation 1.11.2 of Annex I, the North Sea as defined in regulation 5(1)(f) of Annex V, the North American area as defined in regulation 13.6.1 of this Annex; and

.2 any other sea area, including any port area, designated by the Organization in accordance with the criteria and procedures set forth in appendix III to this Annex."

***

ANNEX 12

STATEMENT BY MR. YVO DE BOER, EXECUTIVE SECRETARY OF THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (Delivered by video link)

"Ladies and gentlemen,

Copenhagen is the moment when humanity has the opportunity to rise to the challenge and decisively deal with climate change. Science tells us industrialised nations must cut emissions in the order of 25 to 40 per cent over 1990 levels by 2020, if we are to avoid the worst climate impacts. And even this assumes further action by major developing economies to limit the growth of their emissions.

I believe it is most important that the IMO chose climate change as the theme for this year's World Maritime Day showing its determination to fulfil its role in confronting climate change.

It is estimated that international shipping emits 2.7 per cent of global greenhouse gas emissions generated by human activity. It is forecast that growth in global trade will mean emissions from shipping may grow up to 250 per cent by 2050, if left unregulated. Shipping is a clear cause of concern … but it is also a clear area of opportunity for both developed and developing countries to reduce emissions.

Governments in the climate change talks are now in full negotiating mode. At the latest June session, in Bonn, Parties reviewed in detail and revised the negotiating text by adding proposals and modifications. Among this there are a number of proposals to include emissions from international aviation and shipping in a Copenhagen outcome. Any response to climate change will be incomplete, if a solution to international bunker fuels is not found.

Parties to the UN Convention on Climate Change delegated the limitation or reduction of these emissions to the IMO twelve years ago. Some progress has been made on technical and operational measures to limit or reduce emissions but emissions still grow. We have to ask ourselves whether this is enough and what needs to be done to contribute to a meaningful Copenhagen deal.

At the last session, Parties proposals on international shipping included setting a global reduction target and allowing use of existing and new market mechanisms to achieve that target. They requested that Parties work through IMO to enable an international agreement to be approved by 2011.

There was discussion on a range of variations of Article 2.2 of the Kyoto Protocol and setting a target for international shipping. There was also discussion on commencing negotiations on a sectoral agreement to address emissions that would be concluded at COP-17 and would take into account work already done by IMO.

Proposals also included raising funds from levies or instruments linked to international aviation and maritime emissions to support adaptation and mitigation in developing countries. Governments will continue work on the revised negotiating text at the next session, in Bonn, in mid-August.

One political difficulty is that the Convention is based on the principle of common but differentiated responsibilities. Industrialised countries must lead in reducing emissions, while developing countries need support to engage in mitigation actions.

The IMO, on the other hand, is based on equal treatment for all ships. Innovative thinking is needed to reconcile these principles and it can be done.

For example, raising funds for adaptation and mitigation in developed and developing countries through a global cap on bunker fuels and deploying revenues from auctioning emission rights mainly in developing countries have both been mentioned as ways to reconcile the principles of the UNFCCC and the IMO.

A global cap on bunker fuels would be in line with the "equal treatment" principle of the IMO. Using the obtained revenues to assist developing countries in addressing climate change would be in line with the provisions of the climate change Convention.

The amounts that could be generated by maritime transport in reducing its carbon footprint are substantial with estimates over four billion US dollars per year.

I hope that this MEPC meeting can succeed in recommending a package of measures for international shipping that fits in with the proposals of governments in the negotiations.

I hope that at the end of your meeting, you can agree a package of technical and operational measures to adopt that will result in a significant reduction of emissions with an implementation deadline.

I hope you can also finalize work on developing a market-based mechanism for international shipping. Informing COP 15 on practical actions for regulating international bunker fuels would thus make a significant contribution to an effective agreed outcome in Copenhagen.

Parties to the UNFCCC are looking forward to receiving input from the work of IMO.

This week, there is no question that you can make a major step towards that.

Thank you."

***

ANNEX 13

STATEMENT BY THE DELEGATION OF CHINA ON GHG ISSUES

The delegation of China thanks those countries who have submitted documents under this agenda item facilitating our discussion, although China cannot endorse the content of all the relevant documents. Because the submissions touch upon many areas, in summary, the Chinese delegation would like to make 5 points as follows:

1: The origin of IMO's mandate in addressing GHG issues

Article 2.2 of the Kyoto Protocol requires developed countries to limit GHG emission from marine bunker fuels, working through IMO. This is the only mandate IMO has received so far, and it is also a clear and specific mission for IMO. MEPC should accomplish this mission first and report to the Copenhagen Conference to be held at the end of this year.

2: The future mandate for IMO

UNFCCC is currently discussing the emission reduction targets of the second commitment period for Annex I countries after 2012, as well as the medium and long-term targets and co-operation framework of the Convention. All countries have demonstrated their strong political willingness to shoulder responsibilities in response to climate change. The current intense political atmosphere is a favourable condition for successful international negotiations under the UNFCCC. In the opinion of this delegation, discussions on this issue in any other forum should contribute to the process of the international negotiation under the UNFCCC, rather than being counter-productive, still less hindering or complicating this process.

3: The principles that IMO should follow

IMO should follow the principles of the UNFCCC when discussing and developing any technical specifications, taking measures and implementing strategic plans for GHG emission reduction. One of the important principles is the common but differentiated responsibilities. This principle should not only be reflected in the establishment of emission reduction targets for each country, but also in funding mechanisms and technical specifications. In implementing new technical specifications, developed countries should provide assistance to developing countries in the areas of technology, funding and capacity-building.

4: On technical specifications

In developing technical specifications, IMO has tapped into its expertise and made certain progresses. China appreciates this effort of IMO and will work together with other countries to further improve all the formulas. At present, these formulas are not mature yet and in need of further

discussions and modifications. Before such numerous technical difficulties are dealt with, the committee should encourage all countries to try these formulas on a voluntary basis and to provide more accurate and well-based data, thus providing a solid scientific foundation for further improvements and final application of the formulas.

5: On market-based measures

The market-based measures are very complicated. They touch upon not only the international negotiation process under the UNFCCC and its CBDR (common but differentiated responsibilities) principle, but also the political willingness of different countries, legal systems and plans for sustainable development. In addition, the characteristics such as movability of ships engaged in international trade have caused many uncertainties for establishing and implementing market-based measures. Therefore, this delegation holds the view that the Committee might give preliminary consideration to this matter, but make no conclusions at this session. Furthermore, discussions on this matter should take into full consideration the political arrangement and outcome of the Copenhagen Conference. The relevant arrangements and implementation mechanism will be a package, and no IMO mechanism in this field can come into being, exist and operate in isolation.

All in all, this delegation still support IMO playing its role as a specialised agency in respect of technology related to reduction of GHG emission from ships, and the political, legal and economic matters should be decided by UNFCCC.

***

ANNEX 14

Second IMO GHG study 2009

Executive summary

9 April 2009

Prepared for the International Maritime Organization (IMO) by:

- MARINTEK, Norway
- CE Delft, The Netherlands
- Dalian Maritime University, China
- Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany
- DNV, Norway
- Energy and Environmental Research Associates (EERA), USA
- Lloyd's Register – Fairplay Research, Sweden
- Manchester Metropolitan University, UK
- Mokpo National Maritime University (MNMU), Korea
- National Maritime Research Institute (NMRI), Japan
- Ocean Policy Research Foundation (OPRF), Japan

Preface

This study of greenhouse gas emissions from ships was commissioned as an update of International Maritime Organization's (IMO) *Study of Greenhouse Gas Emissions from Ships* which was delivered in 2000. The updated study been prepared on behalf of the IMO by an international consortium led by MARINTEK. The study was carried out in partnership with the following institutions:

CE Delft, Dalian Maritime University, Deutsches Zentrum für Luft- und Raumfahrt e.V., DNV, Energy and Environmental Research Associates (EERA), Lloyd's Register – Fairplay, Manchester Metropolitan University, Mokpo National Maritime University (MNMU), National Maritime Research Institute (Japan), Ocean Policy Research Foundation (OPRF).

The following individuals were the main contributors to the report:

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In the course of their efforts, the research team has gratefully received input and comments from the International Energy Agency (IEA), the Baltic and International Maritime Council (BIMCO), the International Association of Independent Tanker Owners (INTERTANKO), the Government of Australia, the Government of Greece and the IMO Secretariat.

The main objectives of the study were to assess: (i) present and future emissions from international shipping; (ii) the potential for reduction of these emissions through technology and policy; and (iii) impacts on climate from these emissions.

The work has been conducted in two phases. Results from the first phase, covering only part of the scope, is presented in MEPC 58/INF.6. This report covers the full scope of work, hence updates and supersedes the report on the first phase.

The views and conclusions drawn in this work are those of the scientists writing the report.

Recommended citation: Buhaug, Ø.; Corbett, J.J.; Endresen, Ø.; Eyring, V.; Faber, J.; Hanayama, S.; Lee, D.S.; Lee, D.; Lindstad, H.; Markowska, A.Z.; Mjelde, A.; Nelissen, D.; Nilsen, J.; Pålsson, C.; Winebrake, J.J.; Wu, W.–Q.; Yoshida, K. *Second IMO GHG study 2009*; International Maritime Organization (IMO) London, UK, March 2009.

List of abbreviations

AIS	Automatic identification system
AFFF	Aqueous film-forming foams
AMVER	Automated Mutual-assistance Vessel Rescue system
BC	Black carbon
CBA	Cost–benefit analysis
CDM	Clean development mechanism
CFC	Chlorofluorocarbons
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
COADS	Comprehensive Ocean–Atmosphere Data Set
CORINAIR	Core Inventory of Air Emissions – Programme to establish an inventory of emissions of air pollutants in Europe
ECA	Emission Control Area
EEDI	Energy Efficiency Design Index
EEOI	Energy Efficiency Operational Indicator
EJ	Exajoule (10^{19} joules)
EIA	United States Energy Information Administration
EGR	Exhaust gas recirculation (NO_x reduction technology)
EU ETS	European Union Emissions Trading Scheme
FAME	Fatty Acid Methyl Ester (a type of bio-diesel)
FTD	Fischer–Tropsch Diesel (a type of synthetic diesel)
GCM	Global climate model
GDP	Gross domestic product
GHG	Greenhouse gas
GT	Gross tonnage
GTP	Global temperature change potential
GWP	Global warming potential
HCFC	Hydrochlorofluorocarbons
HFC	Hydrofluorocarbons
HFO	Heavy fuel oil
HVAC	Heat, Ventilation and Air Conditioning
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
LNG	Liquefied natural gas
LRFPR	Lloyd's Register – Fairplay Research
MARPOL	International Convention for the Prevention of Pollution from Ships
MCR	Maximum continuous rating
MDO	Marine diesel oil (distillate marine fuel with possible residual fuel traces)
MEPC	Marine Environment Protection Committee
MGO	Marine gas oil (distillate marine fuel)
NO_x	Nitrogen oxides
NMVOC	Non-methane volatile organic compounds
NSV	Net standard volume
O_3	Ozone
OECD	Organisation for Economic Co-operation and Development
OPRF	Ocean Policy Research Foundation
PAC	Polycyclic aromatic hydrocarbons
PFOS	Perfluorooctane sulphonates
PM	Particulate matter/material

PM_{10}	Particulate matter/material with aerodynamic diameter 10 micrometres or less
POM	Particulate organic matter/material
RF	Radiative forcing
RTOC	Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee
SCR	Selective catalytic reduction
SECA	SO_x Emission Control Area
SF_6	Sulphur hexafluoride
SO_x	Sulphur oxides
SRES	Special Report on Emissions Scenarios (IPCC)
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VOC	Volatile organic compounds

Definitions

International shipping	Shipping between ports of different countries, as opposed to *domestic shipping*. International shipping excludes military and fishing vessels. By this definition, the same ship may frequently be engaged in both international and domestic shipping operations. This is consistent with IPCC 2006 Guidelines.
Domestic shipping	Shipping between ports of the same country, as opposed to *international shipping*. Domestic shipping excludes military and fishing vessels. By this definition, the same ship may frequently be engaged in both international and domestic shipping operations. This definition is consistent with IPCC 2006 Guidelines.
Coastwise shipping	Coastwise shipping is freight movements and other shipping activities that are predominantly along coastlines or regionally bound (e.g., passenger vessels, ferries, offshore vessels) as opposed to ocean-going shipping. The distinction is made for the purpose of scenario modelling and is based on ship types, i.e. a ship is either a coastwise or an ocean-going ship.
Ocean-going shipping	This is a term used for scenario modelling. It refers to large cargo-carrying ships engaged in ocean-crossing trade.
Total shipping	This is defined in this report as international and domestic shipping plus fishing. It excludes military vessels.

Chapter 1

Executive summary

Conclusions

- Shipping is estimated to have emitted 1046 million tonnes of CO_2 in 2007, which corresponds to 3.3% of the global emissions during 2007. International shipping is estimated to have emitted 870 million tonnes, or about 2.7% of the global emissions of CO_2 in 2007.

- Exhaust gases are the primary source of emissions from ships. Carbon dioxide is the most important GHG emitted by ships. Both in terms of quantity and of global warming potential, other GHG emissions from ships are less important.

- Mid-range emissions scenarios show that, by 2050, in the absence of policies, ship emissions may grow by 150% to 250% (compared to the emissions in 2007) as a result of the growth in shipping.

- A significant potential for reduction of GHG through technical and operational measures has been identified. Together, if implemented, these measures could increase efficiency and reduce the emissions rate by 25% to 75% below the current levels. Many of these measures appear to be cost-effective, although non-financial barriers may discourage their implementation, as discussed in chapter 5.

- A number of policies to reduce GHG emissions from ships are conceivable. This report analyses options that are relevant to the current IMO debate. The report finds that market-based instruments are cost-effective policy instruments with a high environmental effectiveness. These instruments capture the largest amount of emissions under the scope, allow both technical and operational measures in the shipping sector to be used, and can offset emissions in other sectors. A mandatory limit on the Energy Efficiency Design Index for new ships is a cost-effective solution that can provide an incentive to improve the design efficiency of new ships. However, its environmental effect is limited because it only applies to new ships and because it only incentivizes design improvements and not improvements in operations.

- Shipping has been shown, in general, to be an energy-efficient means of transportation compared to other modes. However, not all forms of shipping are more efficient than all other forms of transport.

- The emissions of CO_2 from shipping lead to positive "radiative forcing" (a metric of climate change) and to long-lasting global warming. In the shorter term, the global mean radiative forcing from shipping is negative and implies cooling; however, regional temperature responses and other manifestations of climate change may nevertheless occur. In the longer term, emissions from shipping will result in a warming response as the long-lasting effect of CO_2 will overwhelm any shorter-term cooling effects.

- If a climate is to be stabilized at no more than 2°C warming over pre-industrial levels by 2100 and emissions from shipping continue as projected in the scenarios that are given in this report, then they would constitute between 12% and 18% of the global total CO_2 emissions in 2050 that would be required to achieve stabilization (by 2100) with a 50% probability of success.

Background

1.1 The 1997 MARPOL Conference (September 1997) convened by the IMO adopted resolution 8 on "CO_2 emissions from ships". This resolution invited, *inter alia*, the IMO to undertake a study of emissions of GHG from ships for the purpose of establishing the amount and relative percentage of GHG emissions from ships as part of the global inventory of GHG emissions. As a follow-up to the above resolution, the IMO Study of Greenhouse Gas Emissions from Ships was completed and presented to the forty-fifth session of the MEPC (MEPC 45) in June 2000, as document MEPC 45/8.

1.2 MEPC 55 (October 2006) agreed to update the "IMO Study of Greenhouse Gas Emissions from Ships" from 2000 to provide a better foundation for future decisions and to assist in the follow-up to resolution A.963(23). MEPC 56 (July 2007) adopted the Terms of Reference for the updating of the study, which has been given the title "Second IMO GHG Study 2009". This report has been prepared by an international consortium, as set out in the preface to this report.

Scope and structure

1.3 As set out in the terms of reference, this study provides estimates of present and future emissions from international shipping. "International shipping" has been defined in accordance with guidelines developed by The Intergovernmental Panel on Climate Change (IPCC). These Guidelines divide emissions from water-borne navigation into two primary categories: domestic and international, where "international waterborne navigation" is defined as navigation between ports of different countries. Total estimates that include emissions from domestic shipping and emissions from fishing are also included in this report.

1.4 The study addresses greenhouse gases (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6) and other relevant substances (NO_x, NMVOC, CO, PM, SO_x) that are defined in the terms of reference for this study.

1.5 The report has been organized into the following main parts:

.1 Annual inventories of emissions of greenhouse gases and other relevant emissions from shipping from 1990 to 2007 (chapter 3);

.2 Analysis of the progress in reducing emissions from shipping through implementation of MARPOL Annex VI (chapter 4);

.3 Analysis of technical and operational measures to reduce emissions (chapter 5);

.4 Analysis of policy options to reduce emissions (chapter 6);

.5 Scenarios for future emissions from international shipping (chapter 7);

.6 Analysis of the effect of emissions from shipping on the global climate (chapter 8); and

.7 A comparison of the energy efficiency and CO_2 efficiency of shipping compared to other modes of transport (chapter 9).

Emissions 1990-2007

1.6 The analysis in this report shows that exhaust gas is the dominating source of emissions from shipping. Additionally, emissions originating from leaks of refrigerant and release of volatile organic compounds in conjunction with the transport of crude oil are quantified in this study. Other emissions include diverse sources, such as emissions from testing and maintenance of fire-fighting equipment. These are not considered significant and are not quantified in this report.

1.7 Emissions of exhaust gases from international shipping are estimated in this study, based on a methodology where the total fuel consumption of international shipping is first determined. Emissions are subsequently calculated by multiplying fuel consumption with an emission factor for the pollutant in question.

1.8 Fuel consumption for the year 2007 was estimated by an activity-based methodology. This is a change in methodology compared to the first IMO study on greenhouse gas emissions from ships, published in 2000, which relied on fuel statistics. The investigations that are presented in this study suggest that international fuel statistics would under-report fuel consumption. The difference between the fuel statistics and the activity-based estimate is about 30%.

1.9 Guidebook emission factors from CORINAIR and IPCC were used for all emissions except for NO_x, where adjustments were made to accommodate the effect of the NO_x regulations in MARPOL Annex VI. Estimates of emissions of refrigerants were retrieved from the 2006 United Nations Environmental Programme (UNEP) assessment of refrigerant emissions from transport. The emissions of VOC from crude oil were assessed on the basis of several data sources.

1.10 An estimate of the share of the total emissions of exhaust gases from ships that can be attributed to international shipping was made on the basis of the estimate for total fuel consumption by shipping and statistics for fuel consumption by domestic shipping in 2007. An emissions series from 1990 to 2007 was generated by assuming that ship activity was proportional to data on seaborne transport published by Fearnresearch. The estimate of GHG emissions for 2007 is presented in table 1-1. Emissions of SF_6 and PFC are considered negligible and are not quantified. Emissions of CO_2 from shipping are compared with global total emissions in figure 1-1.

Table 1-1 Summary of GHG emissions from shipping* during 2007

	International shipping	Total shipping	
	million tonnes	million tonnes	CO_2 equivalent
CO_2	870	1046	1046
CH_4	Not determined*	0.24	6
N_2O	0.02	0.03	9
HFC	Not determined*	0.0004	≤ 6

* A split into domestic and international emissions is not possible.

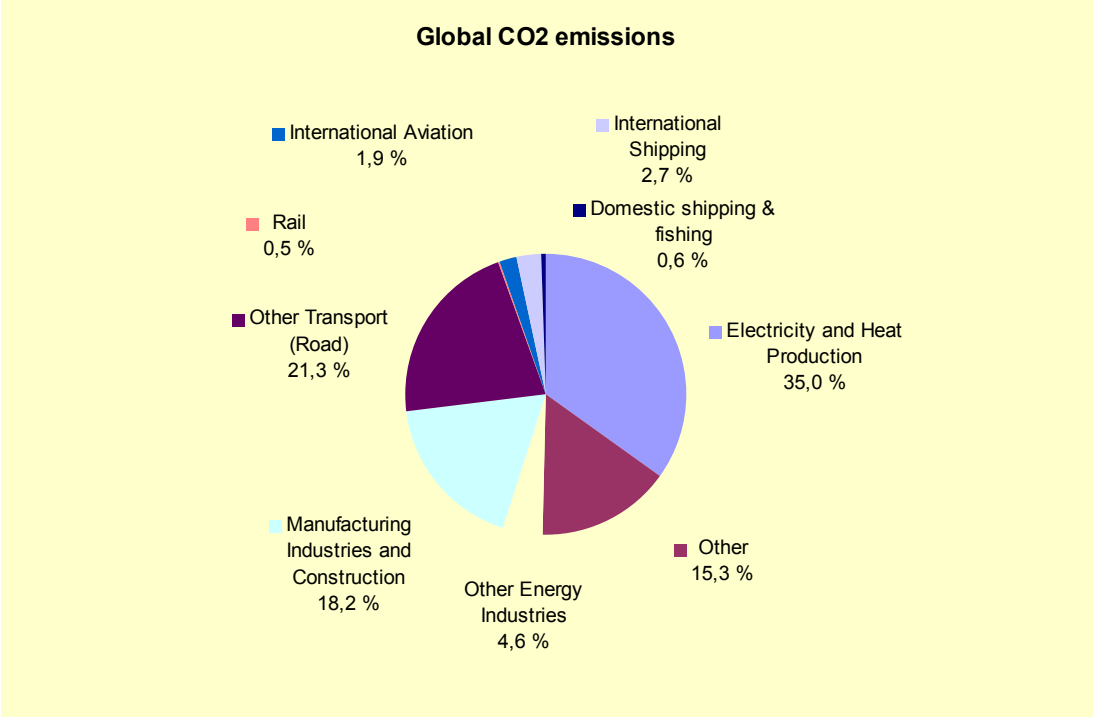

Figure 1-1 – Emissions of CO_2 from shipping compared with global total emissions

Emission reductions achieved by implementation of MARPOL Annex VI

1.11 Progress to date in reducing emissions was assessed by analysing the reductions in the emissions that are regulated in MARPOL Annex VI.

1.12 Reductions in emissions of ozone-depleting substances (ODSs) from ships have been achieved as a result of several international agreements, including the Montreal Protocol and MARPOL Annex VI. Reductions in these emissions have been estimated on the basis of figures in the 1998 and 2006 reports published by the UNEP Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee (RTOC). The base year for the 2006 RTOC report is 2003; however, a base year is not available in the 1998 report. Nevertheless, these data indicate the following:

.1 CFC – 735 tonnes reduction (98%);

.2 HCFC – 10 900 tonnes reduction (78%); and

.3 HFC – 415 tonnes increase (315%).

1.13 Emissions of HFC have increased, because HFC are used as a substitute for CFC and HCFC.

1.14 Where emissions of NO_x are concerned, a reduction in emissions of about 12-14% per tonne of fuel consumed has been identified for regulated (Tier I) engines as compared to pre-regulation (Tier 0) engines. In 2007, about 40% of the installed engine power of the world fleet had been built since 1 January 2000 and was thus assumed to be Tier I-compliant. The net reduction in international emissions of NO_x from shipping in 2007 was thus about 6% compared

to a no-regulation baseline. However, NO_x emissions from international shipping are estimated to have increased from 16 million tonnes in 2000 to 20 million tonnes in 2007.

1.15 Reductions in SO_x emissions have been estimated for 2008, since this is the first year in which both of the sulphur emission control areas (SECAs) have been fully in force. Based on a set of assumptions, including an average content of sulphur in the fuel that is used in SECAs, in the hypothetical unregulated scenario it is estimated that emissions of sulphur oxides from shipping in the SECA areas had been reduced by about 42%.

1.16 A reduction in emissions of VOC has not been quantified. The most tangible result of implementing regulation 15 in MARPOL Annex VI is the introduction of standardized VOC return pipes, through which tankers can discharge VOC to shore during loading. Most tankers now have this capability, although the frequency of their use is variable.

Technological and operational options for reduction of emissions

1.17 A wide range of options for increasing the energy efficiency and reducing emissions by changing ship design and ship operation has been identified. An overall assessment of the potential of these options to achieve a reduction of CO_2 emissions is shown in table 1-2. Since the primary gateway to reduction of CO_2 emissions is increased energy efficiency, these reduction potentials generally apply to all emissions of exhaust gases from ships.

Table 1-2 Assessment of potential reductions of CO_2 emissions from shipping by using known technology and practices

<table>
<tr><th>DESIGN (New ships)</th><th>Saving of CO_2/tonne-mile</th><th>Combined</th><th>Combined</th></tr>
<tr><td>Concept, speed & capability</td><td>2% to 50%+</td><td rowspan="7">10% to 50%+</td><td rowspan="11">25% to 75%+</td></tr>
<tr><td>Hull and superstructure</td><td>2% to 20%</td></tr>
<tr><td>Power and propulsion systems</td><td>5% to 15%</td></tr>
<tr><td>Low-carbon fuels</td><td>5% to 15%*</td></tr>
<tr><td>Renewable energy</td><td>1% to 10%</td></tr>
<tr><td>Exhaust gas CO_2 reduction</td><td>0%</td></tr>
<tr><td>OPERATION (All ships)</td><td></td><td></td></tr>
<tr><td>Fleet management, logistics & incentives</td><td>5% to 50%+</td><td rowspan="3">10% to 50%+</td></tr>
<tr><td>Voyage optimization</td><td>1% to 10%</td></tr>
<tr><td>Energy management</td><td>1% to 10%</td></tr>
</table>

+ Reductions at this level would require reductions of operational speed.

* CO_2 equivalent, based on the use of LNG.

1.18 A considerable proportion of the potential abatement appears to be cost-effective at present. However, non-financial barriers may currently limit the adoption of certain measures, as discussed in chapter 5.

1.19 Renewable energy, in the form of electric power generated by solar cells and thrust generated by wind, is technically feasible only as a partial source of replacement power, due to the variable intensity and the peak power of wind and sunlight.

1.20 Carbon dioxide is the most important GHG emission from shipping, and the potential benefits from reducing emissions of the other GHG are small in comparison.

1.21 Fuels with lower life-cycle CO_2 emissions include biofuels and liquefied natural gas (LNG). The use of biofuels on board ships is technically possible; however, use of first-generation biofuels poses some technical challenges and could also increase the risk of losing power (e.g., due to plugging of filters). These challenges are, nevertheless, overshadowed by limited availability and unattractive prices that make this option appear unlikely to be implemented on a large scale in the near future. However, it is believed that LNG will become economically attractive, principally for ships in regional trades within ECAs where LNG is available.

1.22 Emissions of other relevant substances (NO_x, SO_x, PM, CO and NMVOC) as exhaust gas pollutants will be reduced as the energy efficiency of shipping is improved. Long-term reductions in emissions that are mandated or expected from implementation of the revised Annex VI are shown in table 1-3. Significant reductions in emissions can be achieved by increasing numbers or extending the coverage of Emission Control Areas.

Table 1-3 Long-term reductions in emissions in the revised MARPOL Annex VI

	Global	**ECA**
NO_x (g/kW·h)	15–20%	80%
SO_x* (g/kW·h)	80%	96%
PM (mass)† (g/kW·h)	73%	83%

* Reduction relative to fuel that contains 2.7% sulphur.
† Expected PM reduction arising from change of composition of fuel.

1.23 Future (sulphur) emission control areas ((S)ECAs) will limit the maximum sulphur content of the fuels that are used within these areas to 0.1%. This is a radical improvement from the present-day average of 2.7% of sulphur in residual fuel, although it will still be 100-times higher than the levels of sulphur in automotive diesel fuels (10 ppm, 0.001%). Reductions in emission levels that are significantly beyond the ECA levels indicated in table 1-3 would create a need for stricter fuel-quality requirements.

Policy options for reduction of emissions

1.24 Many technical and operational measures that may be used to reduce GHG emissions from ships have been identified; however, these measures may not be implemented unless policies are established to support their implementation. A number of policies to reduce GHG emissions from ships are conceivable. This report sets out to identify a comprehensive overview of options. The options that are relevant to the current IMO debate are analysed in detail. These options are:

.1 A mandatory limit on the Energy Efficiency Design Index (EEDI) for new ships;

.2 Mandatory or voluntary reporting of the EEDI for new ships;

.3 Mandatory or voluntary reporting of the Energy Efficiency Operational Indicator (EEOI);

.4 Mandatory or voluntary use of a Ship Efficiency Management Plan (SEMP);

.5 Mandatory limit on the EEOI value, combined with a penalty for non-compliance;

.6 A Maritime Emissions Trading Scheme (METS); and

.7 A so-called International Compensation Fund (ICF), to be financed by a levy on marine bunkers.

1.25 The analysis of the options is based on the criteria for a coherent and comprehensive future IMO regulatory framework on GHG emissions from ships, developed by MEPC 57. Based on these criteria, the following qualitative conclusions can be drawn with respect to options being discussed within IMO at present:

.1 A mandatory limit on Energy Efficiency Design Index (EEDI) for new ships appears to be a cost-effective solution that can provide a strong incentive to improve the design efficiency of new ships. The main limitation of the EEDI is that it only addresses ship design; operational measures are not considered. This limits the environmental effectiveness. The effect is also limited, in the sense that it applies only to new ships;

.2 Mandatory and/or voluntary reporting of either the EEDI or the EEOI would have no environmental effect in itself. Rather, environmental effectiveness and cost-effectiveness would depend on incentive schemes being set up to make use of the information. The assessment of the large number of conceivable incentive schemes was beyond the scope of this report;

.3 The Ship Efficiency Management Plan (SEMP) appears to be a feasible approach to increase awareness of cost-effective measures to reduce emissions. However, since this instrument does not require a reduction of emissions, its effectiveness will depend on the availability of cost-effective measures to reduce emissions (i.e. measures for which the fuel savings exceed the capital and operational expenditures). Likewise, it will not incentivize innovation and R & D beyond the situation of "business as usual";

.4 A mandatory limit on EEOI appears to be a cost-effective solution that can provide a strong incentive to reduce emissions from all ships that are engaged in transport work. It incentivizes both technical and operational measures. However, this option is technically very challenging, due to the difficulties in establishing and updating baselines for operational efficiency and in setting targets;

.5 Both the Maritime Emission Trading Scheme (METS) and the International Compensation Fund for GHG Emissions from Ships (ICF) are cost-effective policy instruments with high environmental effectiveness. They have the largest amount of emissions within their scope, allow all measures in the shipping sector to be used and can offset emissions in other sectors. These instruments provide strong incentives to technological change, both in operational technologies and in ship design; and

.6 The environmental effect of the METS is an integral part of its design and will therefore be met. In contrast, part of the environmental effect of the ICF depends on decisions about the share of funds that will be spent on buying emission allowances from other sectors. With regard to cost-effectiveness, incentives to technological change and feasibility of implementation, both policy instruments seem to be quite similar.

Scenarios for future emissions from international shipping

1.26 Future emissions of CO_2 from international shipping were estimated on the basis of a relatively simple model, which was developed in accordance with well-established scenario practice and methodology. The model incorporates a limited number of key driving parameters, as shown in table 1-4.

Table 1-4 Driving variables used for scenario analysis

Category	Variable	Related elements
Economy	Shipping transport demand (tonne-miles/year)	Population, global and regional economic growth, modal shifts, shifts in sectoral demand
Transport efficiency	Transport efficiency (MJ/tonne-mile) – depends on fleet composition, ship technology and operation	Ship design, advances in propulsion, vessel speed, regulations aimed at achieving other objectives but that have consequences for emissions of GHG
Energy	Carbon fraction of the fuel that is used by shipping (g of C/MJ of fuel energy)	Cost and availability of fuels (e.g., use of residual fuel, distillates, biofuels, or other fuels)

1.27 In this study, carbon emissions are explicitly modelled as a parameter of the scenario. Other levels of pollutant emissions are calculated on the basis of energy consumption and MARPOL regulations. Scenarios are based on the framework for global development and storylines that have been developed by the Intergovernmental Panel on Climate Change (IPCC) in the Special Report on Emission Scenarios (SRES).

1.28 A hybrid approach, considering both historic correlations between economic growth and trade as well as analysis considering regional shifts in trade, increased recycling, and new transport corridors, has been employed, *inter alia*, to derive the projections of future demand for transport.

1.29 No regulations regarding CO_2 or fuel efficiency have been assumed, and the improvement in efficiency over time reflects improvements that would be cost-effective in the various scenarios rather than the ultimate technological potential.

1.30 Assumptions about future use of fuel reflect that the availability of energy in the SRES scenarios would permit the continued use of oil-based fuels until 2050 for shipping. Therefore, in these scenarios, in which there is non-regulation of GHG emissions, the move from oil-derived fuels would have to be motivated by economic factors. The effect of MARPOL Annex VI on the fuel that is used is considered.

1.31 Scenarios are modelled from 2007 to 2050. The main scenarios are named A1FI, A1B, A1T, A2, B1 and B2, according to terminology from the IPCC Special Report on Emission Scenarios (SRES). These scenarios are characterized by global differences in population, economy, land-use and agriculture which are evaluated against two major tendencies: (1) globalization versus regionalization and (2) environmental values versus economic values. The background for these scenarios is discussed in chapter 7 of this report.

1.32 Annual increases of CO_2 emissions, in the range of 1.9–2.7%, are found in base scenarios, with extreme scenarios indicating increases of 5.2% and −0.8%, respectively. The increase in emissions is driven by the expected growth in seaborne transport. The scenarios with the lowest emissions show reductions in CO_2 emissions in 2050 compared to emissions during 2007. Results from the scenarios are shown in figure 1-2.

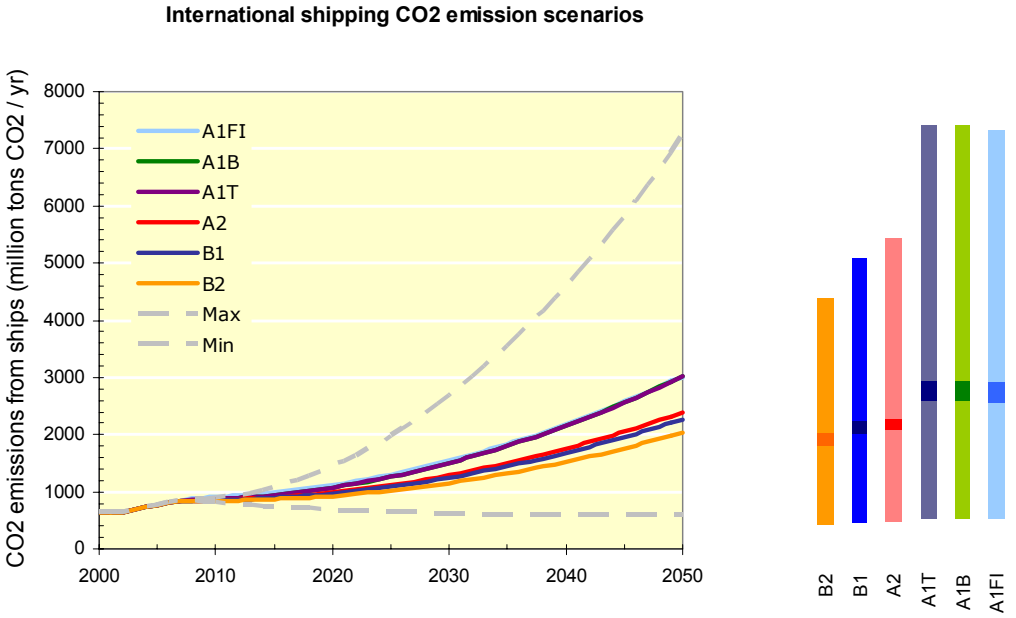

Figure 1-2 – Trajectories of the emissions from international shipping. Columns on the right-hand side indicate the range of results for the scenarios within individual families of scenario

Climate impact

1.33 A detailed analysis of the climate impacts of emissions from ships was performed, using state-of-the-art modelling and references to and comparison with other relevant research. Emissions from international shipping produce significant impacts on atmospheric composition, human health and climate; these are summarized below:

.1 Increases in well-mixed GHGs, such as CO_2, lead to positive "radiative forcing[7]" (RF) and to long-lasting global warming;

[7] A common metric to quantify impacts on climate from different sources is "radiative forcing' (RF), in units of W/m^2, since there is an approximately linear relationship between global mean radiative forcing and change in global mean surface temperature. RF refers to the change in the Earth–atmosphere energy balance since the pre-industrial period. If the atmosphere is subject to a positive RF from, for example, the addition of a greenhouse gas such as CO_2, the atmosphere attempts to re-establish a radiative equilibrium, resulting in a warming of the atmosphere.

.2 For 2007, the RF from CO_2 from shipping was calculated to be 49 mW m^{-2}, contributing approximately 2.8% of total RF from anthropogenic CO_2 in 2005;

.3 For a range of 2050 scenarios, the RF of CO_2 from shipping was calculated to be between 99 and 122 mW m^{-2}, bounded by a minimum/maximum uncertainty range (from the scenarios) of 68 mW m^{-2} and 152 mW m^{-2};

.4 The total RF for 2007 from shipping was estimated to be −110 mW m^{-2}, dominated by a rather uncertain estimate of the indirect effect (−116 mW m^{-2}) and not including the possible positive RF from the interaction of black carbon with snow, which has not yet been calculated for ship emissions. We also emphasize that CO_2 remains in the atmosphere for a long time and will continue to have a warming effect long after it was emitted. This has been demonstrated here by showing how the residual effects of emissions from shipping prior to 2007 turn from a negative effect on temperature to a positive effect. By contrast, sulphate has a residence time in the atmosphere of approximately 10 days, and the duration of response of the climate to sulphate is of the order of decades, whilst that of CO_2 is of the order of centuries to millennia;

.5 Simple calculations of global means have been presented here for RF and temperature response, and are in agreement with other studies in the literature. As highlighted by others, global mean temperature response is only a first-order indicator of climate change. Calculations presented here show that the radiative forcing from shipping has a complex spatial structure, and there is evidence from other, more general, studies of indirect cloud-forcing effects that significant changes in precipitation patterns may result from localized negative RFs, even if the localized temperature response is not so variable. Such alterations in precipitation, even from negative forcing, constitute climate change. This is a complex subject, and more work on this aspect is needed;

.6 While the control of emissions of NO_x, SO_2 and particles from ships will have beneficial impacts on air quality, acidification and eutrophication, reductions of emissions of CO_2 from all sources (including ships and other freight modes) will be required to reduce global warming. Moreover, a shift to cleaner combustion and cleaner fuels may be enhanced by a shift to technologies that lower the emissions of CO_2; and

.7 Climate stabilization will require significant reductions in future global emissions of CO_2. The projected emissions from shipping for 2050 that have been developed for this work – which are based on SRES non-climate intervention policy assumptions – constitute 12% to 18% of the WRE450 stabilization scenario, which corresponds to the total permissible global emissions of CO_2 in 2050 if the increase in global average temperature is to be limited to 2°C with a probability greater than 50%.

Comparison of emissions of CO_2 from ships with emissions from other modes of transport

1.34 The ranges of CO_2 efficiency of various forms of transport were estimated, using actual operating data, transport statistics and other information. The efficiency of ships is compared with that of other modes of transport in figure 1-3. Efficiency is expressed as mass of CO_2 per tonne-kilometre, where the mass of CO_2 expresses the total emissions from the activity and "tonne-kilometre" expresses the total transport work that is done. The ranges that have been plotted in the figure show the typical average range for each of them. The figure does not indicate the maximum (or minimum) efficiency that may be observed.

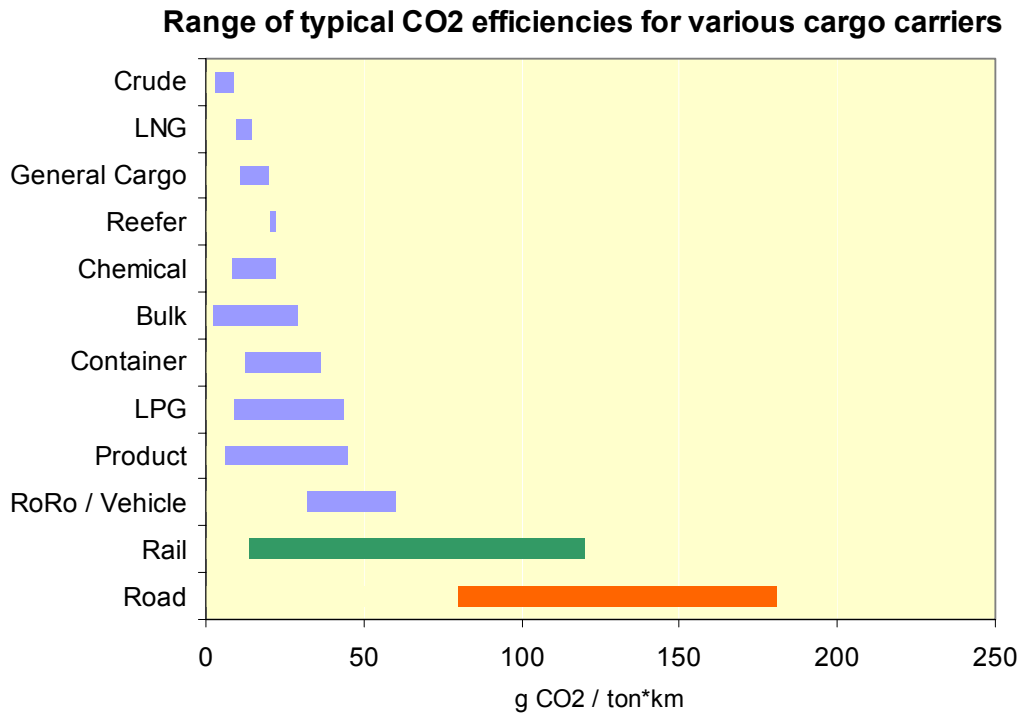

Figure 1-3 – Typical ranges of CO_2 efficiencies of ships compared with rail and road transport

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ANNEX 15

STATEMENT BY THE DELEGATION OF AUSTRALIA ON THE OUTCOME OF THE RECENT UNFCCC MEETINGS

Mr. Chair,

This is a general statement to be included under the agenda item reporting on the outcome of the recent UNFCCC meetings.

Mr. Chair, all of our countries are committed to forging a comprehensive global agreement on climate change at the Copenhagen Climate Conference in December. The climate challenge is both grave and urgent, and every sector must play its full part in meeting this challenge, including the maritime sector.

The progress that we have achieved to date in the IMO on matters such as the energy efficiency design index, the operational indicator and the ship efficiency management plan can help make a solid contribution to action. But these measured alone are not enough.

The second IMO GHG study indicates that the maritime sector can achieve low or no cost emission reductions of up to 20 percent. The sector can also do much more to work with other sectors to address climate change, particularly through market based approaches. In this regard the development of the work plan to consider market based measures in IMO is a useful starting point. In this regard, we are encouraged by the development of the work plan to consider market based measures in the IMO.

It is important that we give a clear message about the seriousness with which we are addressing the issue of climate change in the maritime industry.

Mr. Chair,

Australia strongly supports the negotiation of a global agreement on maritime emissions as soon as possible. Such an agreement should be comprehensive in its coverage of all operators and supportive of the efforts of the most vulnerable developing countries to adapt to the impacts of climate change. This must be done in a way that is environmentally effective, economically efficient, and fair. Our goal should be to finalize an agreement by no later than 2011.

In the absence of a clear IMO mandate to negotiate such an agreement, Australia has supported the negotiation of a sector specific agreement under the auspices of the UN Climate Change Framework.

But the key point is less the location than the need for urgent action. Australia is committed to working assiduously with our international partners – both in the IMO and the UN Climate Convention – to help achieve this outcome.

Mr. Chair,

Australia has always been a strong advocate of the IMO, and we will continue to be so. This Organization provides a strong institutional framework for progressing action on climate change as it does for other environmental matters. We still see a window of opportunity for the IMO to take the lead on this important issue of emission reductions.

We hope, and anticipate, that the Copenhagen outcome will provide a strong spur to our efforts to further address maritime emissions, including in the IMO.

Thank you.

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ANNEX 16

WORK PLAN FOR FURTHER CONSIDERATION OF MARKET-BASED MEASURES

The Committee, having made significant progress in relation to technical and operational measures, had an in depth discussion on market-based measures, and in its willingness to further consider that issue and fulfil the requests of the Assembly in resolution A.963(23), agreed on a work plan to build on discussions and submissions from MEPC 59, as outlined below.

The Committee, also recognizing that its consideration of the issue in the next biennium will take into account the relevant outcomes of COP 15, agreed that the work plan agreed will not start before MEPC 60.

In order to carry out the work plan efficiently and effectively, the Committee agreed further that future sessions of the Committee may need to develop appropriate inclusive working arrangements.

The Committee will use the following work plan to guide its future discussions on market-based measures with a view to reporting to the twenty-seventh regular session of the Assembly the progress achieved:

1. Member States, Associate Members and observer organizations should endeavour to submit further detailed outlines of possible market-based measures to MEPC 60;

2. MEPC 60 would further consider the methodology and criteria for feasibility studies and impact assessments in relation to international shipping, giving priority to the overall impact on the maritime sectors of developing countries.

3. Taking into account the outcomes and conclusions of the studies mentioned in paragraph 2 above and any other contribution made, the Committee would be able, preferably by MEPC 61, to clearly indicate which market-based measure it wishes to evaluate further and identify the elements that could be included in such a measure; and

4. Based on the outcome mentioned in paragraph 3, MEPC 62 could be in a position to report progress on the issue to the twenty-seventh regular session of the Assembly, to identify possible future steps.

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ANNEX 17

INTERIM GUIDELINES ON THE METHOD OF CALCULATION OF THE ENERGY EFFICIENCY DESIGN INDEX FOR NEW SHIPS

1 Definitions

For the purpose of these Guidelines , the following definitions should apply:

.1	Passenger ship	a ship which carries more than 12 passengers as defined in SOLAS chapter 1, regulation 2
.2	Dry cargo carrier	a ship which is constructed generaly with single deck, top-side tanks and hopper tanks in cargo spaces, and it is intended primarily to carry dry cargo in bulk, and includes such types as ore carriers and combination carriers, as defined in SOLAS chapter IX, regulation 1
.3	Gas tanker	a gas carrier as defined in SOLAS chapter II-1, regulation 3
.4	Tanker	an oil tanker as defined in MARPOL Annex 1, regulation 1 or chemical tanker and a NLS tanker as defined in MARPOL Annex II, regulation 1
.5	Containership	a ship designed exclusively for the carriage of containers in holds and on deck
.6	Ro-ro cargo ship: Vehicle carrier	A multi deck ro-ro cargo ship designed for the carriage of empty cars and trucks
.7	Ro-ro cargo ship: Volume carrier	A ro-ro cargo ship, with a deadweight per lanemetre less than 4* tons/m, designed for the carriage of cargo transportation units
.8	Ro-ro cargo ship: Weight carrier	A ro-ro cargo ship, with a deadweight per lanemetre of 4* tons/m or above, designed for the carriage of cargo transportation units
.9	General cargo ship	A ship with a multi-deck or single deck hull designed primarily for the carriage of general cargo
.10	Ro-ro passenger ship	A passenger ship as defined in SOLAS chapter II-1, Part A, regulation 2.23

* The value should be further investigated during the period of voluntary use of the EEDI.

Ships falling within more than one of the ship types should be considered as being the ship type with the lower baseline.

2 Energy Efficiency Design Index (EEDI)

The attained new ship Energy Efficiency Design Index (EEDI) is a measure of ships CO_2 efficiency and calculated by the following formula:

$$\frac{\left(\prod_{j=1}^{M} f_j\right)\left(\sum_{i=1}^{nME} P_{ME(i)} C_{FME(i)} \cdot SFC_{ME(i)}\right) + \left(P_{AE} \cdot C_{FAE} \cdot SFC_{AE}*\right) + \left(\left(\prod_{j=1}^{M} f_j \cdot \sum_{i=1}^{nPTI} P_{PTI(i)} - \sum_{i=1}^{neff} f_{eff(i)} \cdot P_{AEeff(i)}\right) C_{FAE} \cdot SFC_{AE}\right) - \left(\sum_{i=1}^{neff} f_{eff(i)} \cdot P_{eff(i)} \cdot C_{FME} \cdot SFC_{ME}\right)}{f_i \cdot Capacity \cdot V_{ref} \cdot f_w}$$

* If part of the Normal Maximum Sea Load is provided by shaft generators, SFC_{ME} may – for that part of the power – be used instead of SFC_{AE}

Note: This formula may not be able to apply to diesel-electric propulsion, turbine propulsion or hybrid propulsion system.

Where:

.1 C_F is a non-dimensional conversion factor between fuel consumption measured in g and CO_2 emission also measured in g based on carbon content. The subscripts $_{MEi}$ and $_{AEi}$ refer to the main and auxiliary engine(s) respectively. C_F corresponds to the fuel used when determining *SFC* listed in the applicable EIAPP Certificate. The value C_F of is as follows:

Type of fuel	Reference	Carbon content	C_F (t-CO_2/t-Fuel)
1. Diesel/Gas Oil	ISO 8217 Grades DMX through DMC	0.875	3.206000
2. Light Fuel Oil (LFO)	ISO 8217 Grades RMA through RMD	0.86	3.151040
3. Heavy Fuel Oil (HFO)	ISO 8217 Grades RME through RMK	0.85	3.114400
4. Liquified Petroleum Gas (LPG)	Propane Butane	0.819 0.827	3.000000 3.030000
5. Liquified Natural Gas (LNG)		0.75	2.750000

.2 V_{ref} is the ship speed, measured in nautical miles per hour (knot), on deep water in the maximum design load condition (*Capacity*) as defined in paragraph 3 at the shaft power of the engine(s) as defined in paragraph 5 and assuming the weather is calm with no wind and no waves. The maximum design load condition shall be defined by the deepest draught with its associated trim, at which the ship is allowed to operate. This condition is obtained from the stability booklet approved by the Administration.

.3 *Capacity* is defined as follows:

.3.1 For dry cargo carriers, tankers, gas tankers, containerships, ro-ro cargo and general cargo ships, deadweight should be used as *Capacity*.

.3.2 For passenger ships and ro-ro passenger ships, gross tonnage in accordance with the International Convention of Tonnage Measurement of Ships 1969, Annex I, regulation 3 should be used *Capacity*.

.3.3 For containerships, the capacity parameter should be established at 65% of the deadweight.

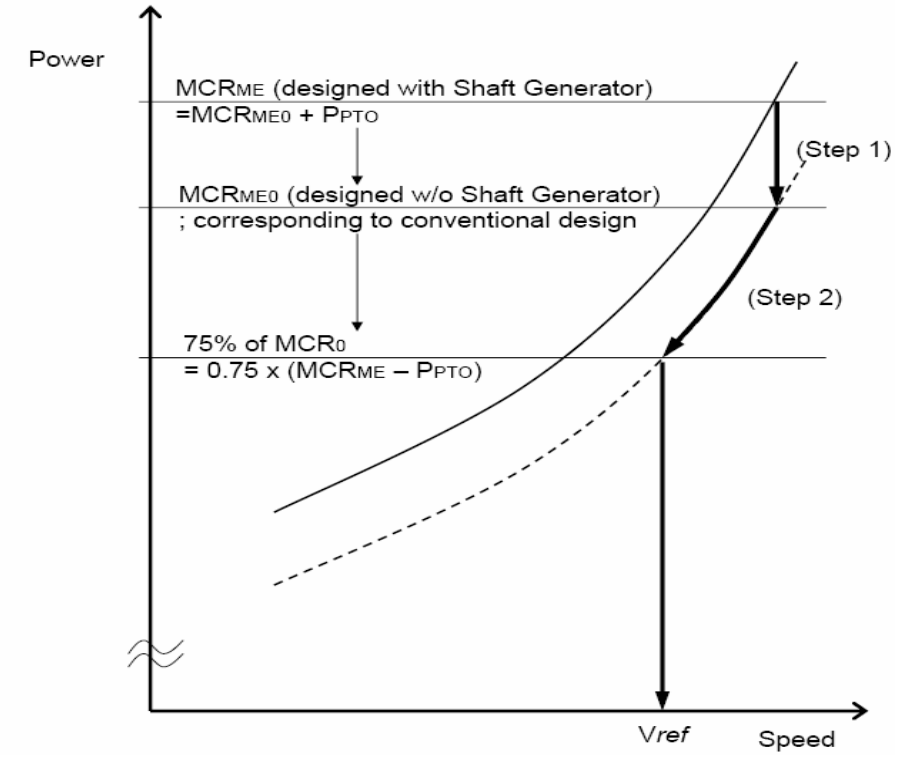
.4 *Deadweight* means the difference in tones between the displacement of a ship in water of relative density of 1,025 kg/m3 at the deepest operational draught and the lightweight of the ship.

.5 P is the power of the main and auxiliary engines, measured in kW. The subscripts $_{ME}$ and $_{AE}$ refer to the main and auxiliary engine(s), respectively. The summation on i is for all engines with the number of engines (^{nME}). (See the diagram in Appendix.)

.5.1 $P_{ME(i)}$ is 75% of the rated installed power (MCR) for each main engine (i) deducted any installed shaft generator(s):

$$P_{ME(i)} = 0.75 \times \left(MCR_{MEi} - P_{PTOi}\right)$$

The following figure gives guidance for determination of $P_{ME(i)}$:



.5.2 $P_{PTO(i)}$ is 75% output of each shaft generator installed divided by the relevant efficiency of that shaft generator.

.5.3 $P_{PTI(i)}$ is 75% of the rated power consumption of each shaft motor divided by the weighted averaged efficiency of the generator(s).

In case of combined PTI/PTO the normal operational mode at sea will determine which of these to be used in the calculation.

Note: The shaft motor's chain efficiency may be taken into consideration to account for the energy losses in the equipment from the switchboard to the shaft motor, if the chain efficiency of the shaft motor is given in a verified document.

.5.4 $P_{eff(i)}$ is 75% of the main engine power reduction due to innovative mechanical energy efficient technology.

Mechanical recovered waste energy directly coupled to shafts need not be measured.

.5.5 $P_{AEeff\ (i)}$ is the auxiliary power reduction due to innovative electrical energy efficient technology measured at $P_{ME(i).}$

.5.6 P_{AE} is the required auxiliary engine power to supply normal maximum sea load including necessary power for propulsion machinery/systems and accommodation, e.g., main engine pumps, navigational systems and equipment and living on board, but excluding the power not for propulsion machinery/systems, e.g., thrusters, cargo pumps, cargo gear, ballast pumps, maintaining cargo, e.g., reefers and cargo hold fans, in the condition where the ship engaged in voyage at the speed (*Vref*) under the design loading condition of *Capacity.*

.1 For cargo ships with a main engine power of 10000 kW or above, P_{AE} is defined as:

$$P_{AE(MCRME>10000KW)} = \left(0.025 \times \sum_{i=1}^{nME} MCR_{MEi}\right) + 250$$

.2 For cargo ships with a main engine power below 10000 kW, P_{AE} is defined as:

$$P_{AE(MCRME<10000KW)} = 0.05 \times \sum_{i=1}^{nME} MCR_{MEi}$$

.3 For ship types where the P_{AE} value calculated by .1 or .2 above is significantly different from the total power used at normal seagoing, e.g., in cases of passenger ships, the P_{AE} value should be estimated by the consumed electric power (excluding propulsion) in conditions when the ship is engaged in a voyage at reference speed (V_{ref}) as given in the electric power table[1], divided by the weighted average efficiency of the generator(s).

.6 V_{ref}, *Capacity* and *P* should be consistent with each other.

.7 *SFC* is the certified specific fuel consumption, measured in g/kWh, of the engines. The subscripts $_{ME(i)}$ and $_{AE(i)}$ refer to the main and auxiliary engine(s), respectively. For engines certified to the E2 or E3 duty cycles of the NO_x Technical Code 2008 the engine Specific Fuel Consumption ($SFC_{ME(i)}$) is that recorded on the EIAPP Certificate(s) at the engine(s) 75% of MCR power or torque rating. For engines certified to the D2 or C1 duty cycles of the NO_x Technical Code 2008 the engine Specific Fuel Consumption ($SFC_{AE(i)}$) is that recorded on the EIAPP Certificate(s) at the engine(s) 50% of MCR power or torque rating.

For ships where the P_{AE} value calculated by 2.5.6.1 and 2.5.6.2 is significantly different from the total power used at normal seagoing, e.g., conventional passenger ships, the Specific Fuel Consumption (SFC_{AE}) of the auxiliary generators is that recorded in the EIAPP Certificate(s) for the engine(s) at 75% of P_{AE} MCR power of its torque rating.

SFC_{AE} is the weighted average among $SFC_{AE(i)}$ of the respective engines *i*.

For those engines which do not have an EIAPP Certificate because its power is below 130 kW, the *SFC* specified by the manufacturer and endorsed by a competent authority should be used.

.8 f_j is a correction factor to account for ship specific design elements.

The f_j for ice-classed ships is determined by the standard f_j in Table-1.

[1] **Note:** The electric power table is often verified and approved by the Administration/Recognized Organization as documentation relating to SOLAS Chapter II-1 Part D Regulation 40.1.1. The electric power table shows a generator load summary in kW and lists generators in service at different conditions of ship operation, e.g., "normal sea going at full passenger load", where the ambient conditions are as follows: outside temperature is 35°C, the relative humidity is 85% and the sea water temperature is 32°C.

Table-1

Correction factor for power f_j for ice-classed ships

For further information on approximate correspondence between ice classes, see HELCOM Recommendation 25/7*

Ship type	f_j	Limits depending on the ice class			
		IC	IB	IA	IA Super
Tanker	$\frac{0.516 L_{PP}^{1.87}}{\sum_{i=1}^{nME} P_{iME}}$	$\begin{cases} max\ 1.0 \\ min\ 0.72 L_{PP}^{0.06} \end{cases}$	$\begin{cases} max\ 1.0 \\ min\ 0.61 L_{PP}^{0.08} \end{cases}$	$\begin{cases} max\ 1.0 \\ min\ 0.50 L_{PP}^{0.10} \end{cases}$	$\begin{cases} max\ 1.0 \\ min\ 0.40 L_{PP}^{0.12} \end{cases}$
Dry cargo carrier	$\frac{2.150 L_{PP}^{1.58}}{\sum_{i=1}^{nME} P_{iME}}$	$\begin{cases} max\ 1.0 \\ min\ 0.89 L_{PP}^{0.02} \end{cases}$	$\begin{cases} max\ 1.0 \\ min\ 0.78 L_{PP}^{0.04} \end{cases}$	$\begin{cases} max\ 1.0 \\ min\ 0.68 L_{PP}^{0.06} \end{cases}$	$\begin{cases} max\ 1.0 \\ min\ 0.58 L_{PP}^{0.08} \end{cases}$
General cargo ship	$\frac{0.0450 \cdot L_{PP}^{2.37}}{\sum_{i=1}^{nME} P_{iME}}$	$\begin{cases} max\ 1.0 \\ min\ 0.85 L_{PP}^{0.03} \end{cases}$	$\begin{cases} max\ 1.0 \\ min\ 0.70 L_{PP}^{0.06} \end{cases}$	$\begin{cases} max\ 1.0 \\ min\ 0.54 L_{PP}^{0.10} \end{cases}$	$\begin{cases} max\ 1.0 \\ min\ 0.39 L_{PP}^{0.15} \end{cases}$

For other ship types, f_j should be taken as 1.0.

* HELCOM Recommendation 25/7 may be found at http://www.helcom.fi

.9 f_W is an non-dimensional coefficient indicating the decrease of speed in representative sea conditions of wave height, wave frequency and wind speed (e.g., Beaufort Scale 6), and should be determined as follows:

.9.1 It can be determined by conducting the ship-specific simulation of its performance at representative sea conditions. The simulation methodology should be prescribed in the Guidelines developed by the Organization and the method and outcome for an individual ship shall be verified by the Administration or an organization recognized by the Administration.

.9.2 In case that the simulation is not conducted, f_W value should be taken from the "Standard f_W" table/curve. A "Standard f_W" table/curve, which is to be contained in the Guidelines, is given by ship type (the same ship as the "baseline" below), and expressed in a function of the parameter of *Capacity* (e.g., DWT). The "Standard f_W" table/curve is to be determined by conservative approach, i.e. based on data of actual speed reduction of as many existing ships as possible under representative sea conditions.

.9.3 f_W should be taken as one (1.0) until the Guidelines for the ship-specific simulation (paragraph .9.1) or f_W table/curve (paragraph .9.2) becomes available.

.10 $f_{eff(i)}$ is a the availability factor of each innovative energy efficiency technology. $f_{eff(i)}$ for waste energy recovery system should be one (1.0).

.11 f_i is the capacity factor for any technical/regulatory limitation on capacity, and can be assumed one (1.0) if no necessity of the factor is granted.

f_i for ice-classed ships is determined by the standard f_i in Table-2.

Table-2

Capacity correction factor f_i for ice-classed ships

For further information on approximate correspondence between ice classes, see HELCOM Recommendation 25/7*

Ship type	f_i	Limits depending on the ice class			
		IC	IB	IA	IA Super
Tanker	$\frac{0.00115 L_{PP}^{3.36}}{capacity}$	$\begin{cases} max\ 1.31 L_{PP}^{-0.05} \\ min\ 1.0 \end{cases}$	$\begin{cases} max\ 1.54 L_{PP}^{-0.07} \\ min\ 1.0 \end{cases}$	$\begin{cases} max\ 1.80 L_{PP}^{-0.09} \\ min\ 1.0 \end{cases}$	$\begin{cases} max\ 2.10 L_{PP}^{-0.11} \\ min\ 1.0 \end{cases}$
Dry cargo carrier	$\frac{0{,}000665 \cdot L_{PP}^{3.44}}{capacity}$	$\begin{cases} max\ 1.31 L_{PP}^{-0.05} \\ min\ 1.0 \end{cases}$	$\begin{cases} max\ 1.54 L_{PP}^{-0.07} \\ min\ 1.0 \end{cases}$	$\begin{cases} max\ 1.80 L_{PP}^{-0.09} \\ min\ 1.0 \end{cases}$	$\begin{cases} max\ 2.10 L_{PP}^{-0.11} \\ min\ 1.0 \end{cases}$
General cargo ship	$\frac{0{,}000676 \cdot L_{PP}^{3.44}}{capacity}$	1.0	$\begin{cases} max\ 1.08 \\ min\ 1.0 \end{cases}$	$\begin{cases} max\ 1.12 \\ min\ 1.0 \end{cases}$	$\begin{cases} max\ 1.25 \\ min\ 1.0 \end{cases}$
Container ship	$\frac{0.1749 \cdot L_{PP}^{2.29}}{capacity}$	1.0	$\begin{cases} max\ 1.25 L_{PP}^{-0.04} \\ min\ 1.0 \end{cases}$	$\begin{cases} max\ 1.60 L_{PP}^{-0.08} \\ min\ 1.0 \end{cases}$	$\begin{cases} max\ 2.10 L_{PP}^{-0.12} \\ min\ 1.0 \end{cases}$
Gas tanker	$\frac{0.1749 \cdot L_{PP}^{2.33}}{capacity}$	$\begin{cases} max\ 1.25 L_{PP}^{-0.04} \\ min\ 1.0 \end{cases}$	$\begin{cases} max\ 1.60 L_{PP}^{-0.08} \\ min\ 1.0 \end{cases}$	$\begin{cases} max\ 2.10 L_{PP}^{-0.12} \\ min\ 1.0 \end{cases}$	1.0

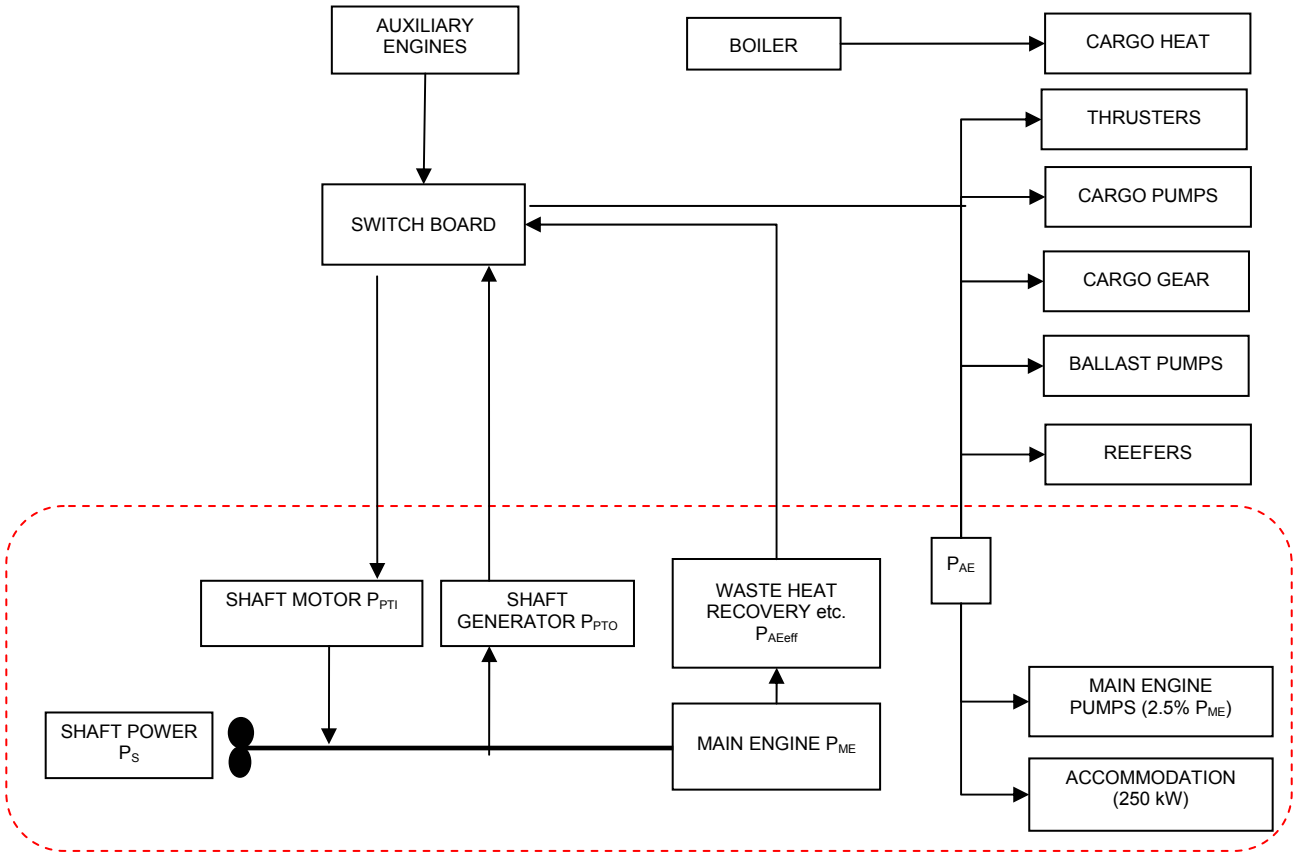
For other ship types, f_i should be taken as 1.0.

* HELCOM Recommendation 25/7 may be found at http://www.helcom.fi

.12 *Length between perpendiculars, Lpp*, means 96 per cent of the total length on a waterline at 85 per cent of the least moulded depth measured from the top of the keel, or the length from the foreside of the stem to the axis of the rudder stock on that waterline, if that be greater. In ships designed with a rake of keel the waterline on which this length is measured shall be parallel to the designed waterline. The length between perpendiculars (L_{pp}) shall be measured in metres.

APPENDIX

A GENERIC AND SIMPLIFIED MARINE POWER PLANT



Note 1: Mechanical recovered waste energy directly coupled to shafts need not be measured.

Note 2: In case of combined PTI/PTO the normal operational mode at sea will determine which of these to be used in the calculation.

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ANNEX 18

INTERIM GUIDELINES FOR VOLUNTARY VERIFICATION OF THE ENERGY EFFICIENCY DESIGN INDEX

1 GENERAL

The purpose of these Guidelines is to assist verifiers of Energy Efficiency Design Index (EEDI) of ships in conducting the verification, on a voluntary basis, of the EEDI which should be calculated in accordance with the Interim Guidelines on the Method of Calculation of the EEDI for New Ships ("EEDI Guidelines", hereafter), and assist shipowners, shipbuilders and manufacturers being related to the energy efficiency of a ship and other interested parties in understanding the procedures of the voluntary EEDI verification.

2 DEFINITIONS[1]

2.1 *Verifier* means an organization which conducts the voluntary EEDI verification in accordance with these Guidelines , including Administrations, classification societies and other organizations which possess technical expertise necessary for conducting the EEDI verification.

2.2 *Ship of the same type* means a ship of which hull form (expressed in the lines such as sheer plan and body plan) excluding additional hull features such as fins and of which principal particulars are identical to that of the base ship.

2.3 *Ship of a similar type* means a ship of which hull form (expressed in the lines such as sheer plan and body plan) excluding additional hull features such as fins and of which principal particulars are largely identical to that of the base ship.

2.4 *Tank test* means model towing tests, model self propulsion tests and model propeller open water tests. Numerical tests may be accepted as equivalent to model tests if they are performed under documented conditions agreed by the shipbuilder and shipowner.

3 APPLICATION

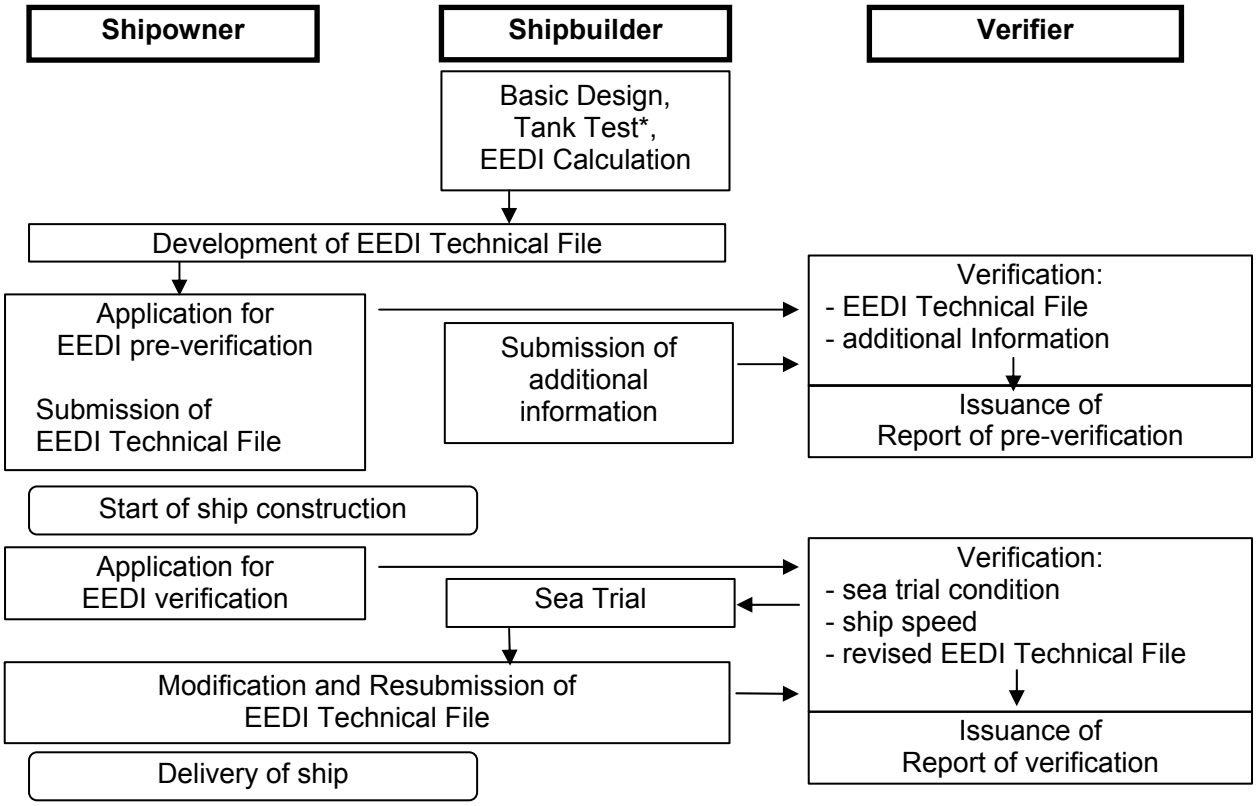
These Guidelines should be applied on a voluntary basis to new ships for which an application for an EEDI verification has been submitted to a verifier.

4 PROCEDURES FOR VERIFICATION

4.1 General

Attained EEDI should be calculated in accordance with the EEDI Guidelines. Voluntary EEDI verification should be conducted on two stages: preliminary verification at the design stage, and final verification at the sea trial. The basic flow of the verification process is presented in the Figure 1.

[1] Other terms used in these Guidelines have the same meaning as those defined in the EEDI Guidelines.



* to be conducted by a test organization or a shipbuilder itself.

Figure 1 – Basic Flow of Verification Process

4.2 Preliminary verification at the design stage

4.2.1 For the preliminary verification at the design stage, a shipowner should submit to a verifier an application for the verification and an EEDI Technical File containing the necessary information for the verification and other relevant background documents.

4.2.2 EEDI Technical File, which is to be developed by either a shipowner or a shipbuilder, should include at least but not limited to:

.1 deadweight (DWT) or gross tonnage (GT) for passenger and ro-ro passenger ships, the shaft power of the main and auxiliary engines, the ship speed on deep water in the maximum design loaded conditions at the 75% of the maximum continuous rate (MCR) for the main engine, the specific fuel consumption (SFC) of the main engine at the 75% of MCR power, the SFC of the auxiliary engines at the 50% MCR power, and the electric power table for certain ship types as necessary, as defined in the EEDI Guidelines;

.2 power curves (kW – knot) estimated at design stage under fully loaded condition and sea trial condition;

.3 principal particulars and the overview of propulsion system and electricity supply system on board;

.4 estimation process and methodology of the power curves at design stage;

.5 description of energy saving equipment; and

.6 calculated value of the Attained EEDI.

4.2.3 Sea trial conditions should be set in fully loaded condition, if possible, e.g., in the case of tankers.

4.2.4 The SFC of the main and auxiliary engines should be quoted from the approved NO_x Technical File. For the confirmation of the SFC, a copy of the approved NO_x Technical File should be submitted to the verifier. In case the NO_x Technical File has not been approved at the time of the application for preliminary verification, the test reports provided by manufacturers should be used. In this case, at the time of the sea trial verification, a copy of the approved NO_x Technical File should be submitted to the verifier.

Note: SFC in the NO_x Technical File are the values of a parent engine, and the use of such value of SFC for the EEDI calculation for member engines may have the following technical problems for further consideration:

- The definition of "member engines" given in NO_x Technical Files is broad and specification of engines belonging to the same family group may vary; and

- The rate of NO_x emission of the parent engine is the highest in the group/family, i.e. CO_2 emission, which is in the trade-off relationship with NO_x emission, can be lower than the other engines in the group/family.

Thus, for member engines of which specifications are different from the parent engine, how to determine SFC should be considered further. For instance, measured values of SFC at test bed of manufacturers could be used.

4.2.5 The power curves used for the preliminary verification at the design stage should be based on reliable results of tank test. A tank test for an individual ship may be omitted based on technical justifications such as availability of the results of tank tests for ships of the same/similar type.

4.2.6 The verifier may request the shipbuilder for additional information on top of those contained in Technical File, as necessary, to examine the calculation process of the Attained EEDI. The estimation of the ship speed at the design stage much depends on each shipbuilder's experiences, and it may not be practicable for any person/organization other than the shipbuilder to fully examine the technical aspects of experience-based parameters such as the roughness coefficient and wake coefficient. Therefore, the preliminary verification should focus on the calculation process of the Attained EEDI that should follow the EEDI Guidelines.

Note: A possible way forward for more robust verification is to establish a standard methodology of deriving the ship speed from the outcomes of tank test, by setting standard values for experience-based correction factors such as roughness coefficient and wake coefficient. In this way, ship-by-ship performance comparison could be made more objectively by excluding the possibility of arbitrary setting of experience-based parameters. If such standardization is sought, this would have an implication on how the ship speed adjustment based on sea trial results should be conducted in accordance with paragraph 4.3.8 of these Guidelines.

Note: For ensuring the quality of tank tests, it would be desirable in the future that an organization conducting a tank test be authorized by the Administration or an organization recognized by it in accordance with the guidelines developed by the Organization.

4.2.7 Additional information that the verifier should request the shipbuilder to provide directly to it (i.e. not to be contained in Technical File) includes but not limited to:

.1 descriptions of a tank test facility; this should include the name of the facility, the particulars of tanks and towing equipment, and the records of calibration of each monitoring equipment;

.2 lines of a model ship and an actual ship for the verification of the appropriateness of the tank test; the lines (sheer plan, body plan and half-breadth plan) should be detailed enough to demonstrate the similarity between the model ship and the actual ship;

.3 lightweight of the ship and displacement table for the verification of the deadweight;

.4 detailed report on the method and results of the tank test; this should include at least the tank test results at sea trial condition and at fully loaded condition;

.5 detailed calculation process of the ship speed, which should include the estimation basis of experience-based parameters such as roughness coefficient, wake coefficient; and

.6 reasons for exempting a tank test, if applicable; this should include lines and tank test results of the ships of same/similar type, and the comparison of the principal particulars of such ships and the ship in question. Appropriate technical justification should be provided for regarding the tank test unnecessary.

4.2.8 Such additional information may contain shipbuilders' confidential information. Therefore, after the verification, the verifier should return all or part of such information to the shipbuilder at its request.

4.3 Final verification of the Attained EEDI at sea trial

4.3.1 Prior to the sea trial, a shipowner should submit the application for the verification of EEDI together with the final displacement table and the measured lightweight, or a copy of the survey report of deadweight, as well as a copy of NO_x Technical File as necessary.

4.3.2 The verifier should attend the sea trial and confirm:

.1 propulsion and power supply system, particulars of the engines, and other relevant items described in the EEDI Technical File;

.2 draft and trim;

.3 sea conditions;

.4 ship speed; and

.5 shaft power of the main engine.

4.3.3 Draft and trim should be confirmed by the draft measurements taken prior to the sea trial. The draft and trim should be as close as practical to those at the assumed conditions used for estimating the power curves.

4.3.4 Sea conditions should be measured in accordance with ISO15016:2002 or the equivalent.

4.3.5 Ship speed should be measured in accordance with ISO15016:2002 or the equivalent and at more than two points of which range includes the 75% of MCR power.

4.3.6 The shaft power of the main engine should be measured by shaft power meter or estimated by fuel rack. Otherwise, it should be measured by a method which the engine manufacturer recommends and the verifier approves.

4.3.7 The shipbuilder should develop power curves based on the measured ship speed and the measured shaft power of the main engine at sea trial. For the development of the power curves, the shipbuilder should calibrate the measured ship speed, if necessary, by taking into account the effects of wind, tide and waves in accordance with ISO15016:2002 or the equivalent.

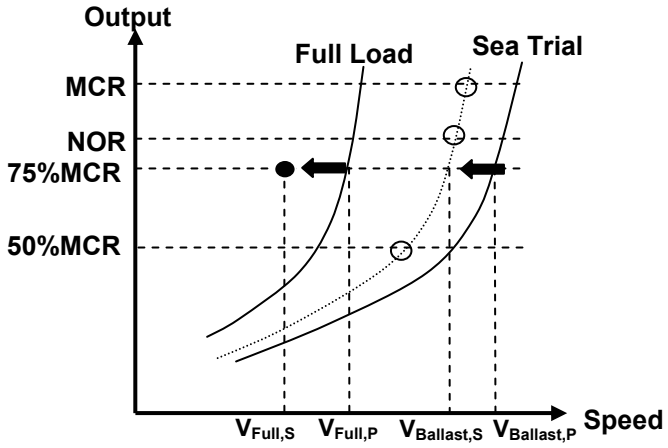
4.3.8 The shipbuilder should compare the power curves obtained as a result of the sea trial and the estimated power curves at the design stage. In case differences are observed, the Attained EEDI should be recalculated, as necessary, in accordance with the following:

.1 for ships for which sea trial is conducted in fully loaded condition (e.g., tankers): the Attained EEDI should be recalculated using the measured ship speed at sea trial at 75% of MCR power; and

.2 for ships for which sea trial cannot be conducted in fully loaded condition (e.g., dry bulkers): if the measured ship speed at 75% of MCR power of the main engine at the sea trial conditions is different from the expected ship speed on the power curve at the corresponding condition, the shipbuilder should recalculate the Attained EEDI by adjusting ship speed in fully loaded condition by an appropriate correction method that is agreed by the verifier.

An example of possible methods of the speed adjustment is given in Figure 2:

Note: Further consideration would be necessary for speed adjustment methodology in 4.3.8.2. One of concerns relates to a possible situation where the power curve for sea trial condition is estimated in excessively conservative manner (i.e. power curve is shifted in a leftward direction) with the intention to get an upward adjustment of the ship speed by making the measured ship speed at sea trial easily exceed the lower-estimated speed for sea trial condition at design stage.



$V_{Full,S} = V_{Full,P} \times (V_{Ballast,S} / V_{Ballast,P})$

$V_{Ballast,P}$:estimated ship speed at sea trial conditions on the power curve estimated at design stage
$V_{Ballast,S}$:ship speed obtained as a result of the sea trial
$F_{Full,S}$: adjusted ship speed by the results of sea trial, in fully loaded condition
$F_{Full,P}$:estimated ship speed in fully loaded condition at design stage.

Figure 2 – An Example of Possible Ship Speed Adjustment

4.3.9 In case where the Attained EEDI is calculated at the preliminary verification by using SFC based on the manufacturer's test report due to the non-availability at that time of the approved NO_x Technical File, the shipowner or the shipbuilder should recalculate the Attained EEDI by using SFC in the approved NO_x Technical File.

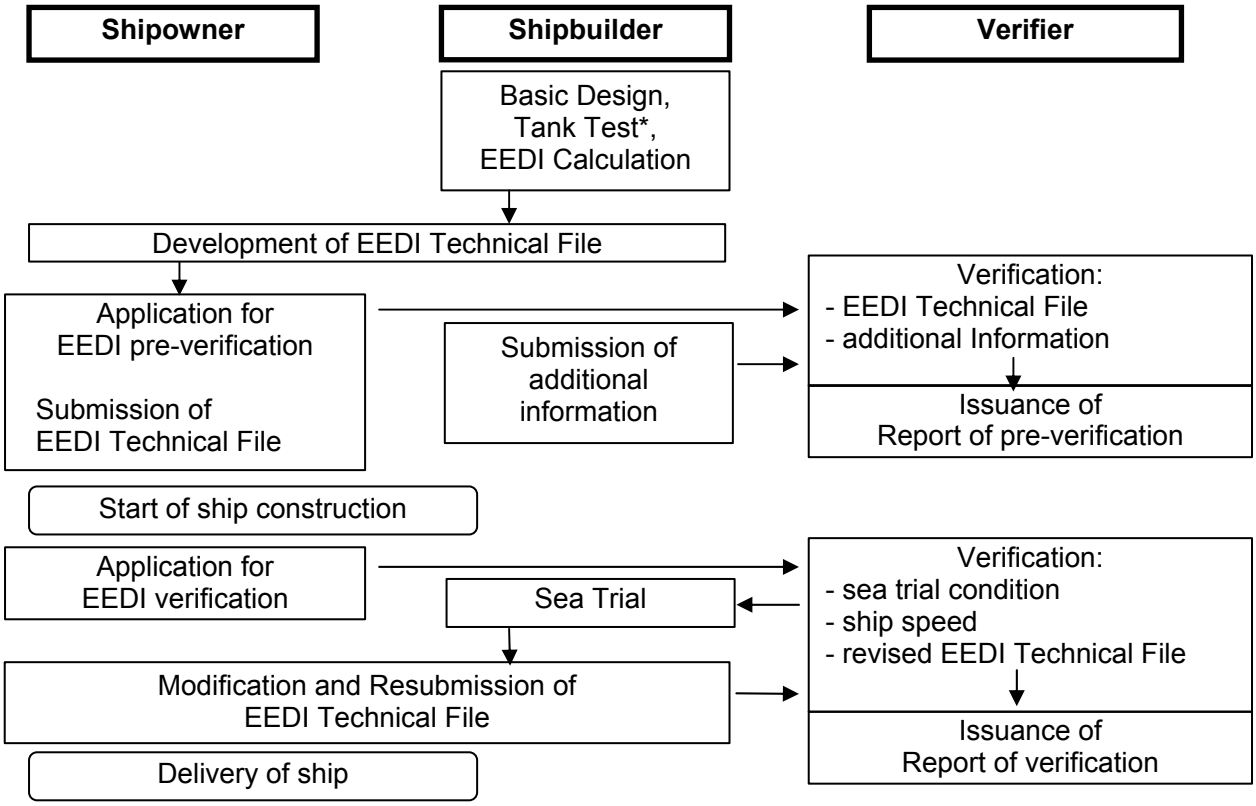
4.3.10 The shipowner or the shipbuilder should revise an EEDI Technical File, as necessary, by taking into account the results of sea trial. Such revision should include, as applicable, the adjusted power curve based on the results of sea trial (namely, modified ship speed at 75% of MCR power of the main engine at fully loaded condition) and SFC described in the approved NO_x Technical File, and the recalculated Attained EEDI based on these modifications.

4.3.11 The EEDI Technical File, if revised, should be submitted to the verifier for the confirmation that the (revised) Attained EEDI is calculated in accordance with the EEDI Guidelines.

5 ISSUANCE OF THE EEDI VERIFICATION REPORT

5.1 The verifier should issue the Report on the Preliminary Verification of EEDI after it verified the Attained EEDI at design stage in accordance with sections 4.1 and 4.2 of these Guidelines.

5.2 The verifier should issue the report on the Verification of EEDI after it verified the Attained EEDI after the sea trial in accordance with sections 4.1 and 4.3 of these Guidelines.



* to be conducted by a test organization or a shipbuilder itself.

Figure 1 – Basic Flow of Verification Process

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ANNEX 19

GUIDANCE FOR THE DEVELOPMENT OF A SHIP ENERGY EFFICIENCY MANAGEMENT PLAN (SEEMP)

1 INTRODUCTION

1.1 There are around 70,000 ships engaged in international trade and this unique industry carries 90% of world trade. Sea transport has a justifiable image of conducting its operations in a manner that creates remarkably little impact on the global environment. Compliance with the MARPOL Convention and other IMO instruments and the actions that many companies take beyond the mandatory requirements serve to further limit the impact. It is nevertheless the case that enhancement of efficiencies can reduce fuel consumption, save money, and decrease environmental impacts for individual ships. While the yield of individual measures may be small, the collective effect across the entire fleet will be significant.

1.2 In global terms it should be recognized that operational efficiencies delivered by a large number of ship operators will make an invaluable contribution to reducing global carbon emissions.

1.3 A Ship Energy Efficiency Management Plan provides a possible approach for monitoring ship and fleet efficiency performance over time and some options to be considered when seeking to optimize the performance of the ship.

2 GENERAL

2.1 The purpose of a Ship Energy Efficiency Management Plan (SEEMP) is to establish a mechanism for a company and/or a ship to improve the energy efficiency of a ship's operation. Preferably, the ship-specific SEEMP is linked to a broader corporate energy management policy for the company that owns, operates or controls the ship, recognizing that no two shipping companies or shipowners are the same, and that ships operate under a wide range of different conditions.

2.2 Many companies will already have an environmental management system (EMS) in place under ISO14001 which contains procedures for selecting the best measures for particular vessels and then setting objectives for the measurement of relevant parameters, along with relevant control and feedback features. Monitoring of operational environmental efficiency should therefore be treated as an integral element of broader company management systems.

2.3 This document provides guidance for the development of a SEEMP that should be adjusted to the characteristics and needs of individual companies and ships. The ship energy efficiency management plan is intended to be a management tool to assist a company in managing the ongoing environmental performance of its vessels and as such, it is recommended that a company develops procedures for implementing the plan in a manner which limits any onboard administrative burden to the minimum necessary.

2.4 The SEEMP should be developed as a ship-specific plan by the shipowner, operator or any other party concerned, e.g., charterer. The SEEMP seeks to improve a ship's energy efficiency through four steps: *planning*, *implementation*, *monitoring*, and *self-evaluation and improvement*. These components play a critical role in the continuous cycle to improve ship energy management. With each iteration of the cycle, some elements of the SEEMP will necessarily change while others may remain as before.

3 APPLICATION

Planning

3.1 Planning is the most crucial stage of the SEEMP, in that it primarily determines both the current status of ship energy usage and the expected improvement of ship energy efficiency. Therefore, it is encouraged to devote sufficient time to planning so that the most appropriate, effective and implementable plan can be developed.

Ship-specific measures

3.2 Recognizing that there are a variety of options to improve efficiency – speed optimization, weather routeing and hull maintenance, for example – and that the best package of measures for a ship to improve efficiency differs to a great extent depending upon ship type, cargoes, routes and other factors, the specific measures for the ship to improve energy efficiency should be identified in the first place. These measures should be listed as a package of measures to be implemented, thus providing the overview of the actions to be taken for that ship.

3.3 During this process, therefore, it is important to determine and understand the ship's current status of energy usage. The SEEMP then identifies energy-saving measures that have been undertaken, and determines how effective these measures are in terms of improving energy efficiency. The SEEMP also identifies what measures can be adopted to further improve the energy efficiency of the ship. It should be noted, however, that not all measures can be applied to all ships, or even to the same ship under different operating conditions and that some of them are mutually exclusive. Ideally, initial measures could yield energy (and cost) saving results that then can be reinvested into more difficult or expensive efficiency upgrades identified by the SEEMP.

3.4 Guidance on Best Practices for Fuel-Efficient Operation of Ships set out in paragraph 4 below can be used to facilitate this part of the planning phase. Also, in the planning process, particular consideration should be given to minimize any onboard administrative burden.

Company-specific measures

3.5 The improvement of energy efficiency of ship operation does not necessarily depend on single ship management only. Rather, it may depend on many stakeholders including ship repair yards, shipowners, operators, charterers, cargo owners, ports, and traffic management services. For example, "Just in time" – as explained in 4.5 – requires good early communication among operators, ports and traffic management service. The better coordination among such stakeholders is, the more improvement can be expected. In most cases, such coordination or total management is better made by a company rather than by a ship. In this sense, it is recommended that a company also establish an energy management plan to manage its fleet (should it not have one in place already) and make necessary coordination among stakeholders.

Human resource development

3.6 For effective and steady implementation of the adopted measures, raising awareness of and providing necessary training for personnel both on shore and on board are an important element. Such human resource development is encouraged and should be considered as an important component of planning as well as a critical element of implementation.

Goal setting

3.7 The last part of planning is goal setting. It should be emphasized that the goal setting is voluntary, that there is no need to announce the goal or the result to the public, and that neither a company nor a ship is subject to external inspection. The purpose of goal setting is to serve as a signal which involved people should be conscious of, to create a good incentive for proper implementation, and then to increase commitment to the improvement of energy efficiency. The goal can take any form, such as the annual fuel consumption or a specific target of Energy Efficiency Operational Indicator (EEOI). Whatever the goal is, the goal should be measurable and easy to understand.

Implementation

Establishment of implementation system

3.8 After a ship and a company identify the measures to be implemented, it is essential to establish a system for implementation of the identified and selected measures by developing the procedures for energy management, by defining tasks and by assigning them to qualified personnel. Thus, the SEEMP should describe how each measure should be implemented and who the responsible person(s) is. The development of such a system can be considered as a part of *planning*, and therefore may be completed at the planning stage.

Implementation and record-keeping

3.9 The planned measures should be carried out in accordance with the predetermined implementation system. Record-keeping for the implementation of each measure is beneficial for self-evaluation at a later stage and should be encouraged. If any identified measure cannot be implemented for any reason(s), the reason(s) should be recorded for internal use.

Monitoring

Monitoring tools

3.10 The energy efficiency of a ship should be monitored quantitatively. This should be done by an established method, preferably by an international standard. The EEOI developed by the Organization is one of the internationally established tools to obtain a quantitative indicator of energy efficiency of a ship and/or fleet in operation, and can be used for this purpose. Therefore, EEOI could be considered as the primary monitoring tool, although other quantitative measures also may be appropriate.

3.11 If used, the EEOI should be calculated in accordance with the guidelines developed by the Organization (MEPC/Circ….). If deemed appropriate, a Rolling Average Index of the EEOI values may be calculated to monitor energy efficiency of the ship over time.

3.12 In addition to the EEOI, if convenient and/or beneficial for a ship or a company, other measurement tools can be utilized. In the case where other monitoring tools are used, the concept of the tool and the method of monitoring may be determined at the planning stage.

Establishment of monitoring system

3.13 It should be noted that whatever measurement tools are used, continuous and consistent data collection is the foundation of monitoring. To allow for meaningful and consistent monitoring, the monitoring system, including the procedures for collecting data and the assignment of responsible personnel, should be developed. The development of such a system can be considered as a part of *planning*, and therefore should be completed at the planning stage.

3.14 It should be noted that, in order to avoid unnecessary administrative burdens on ships' staff, monitoring should be carried out as far as possible by shore staff, utilizing data obtained from existing required records such as the official and engineering log-books and oil record books, etc. Additional data could be obtained as appropriate.

Self-evaluation and improvement

3.15 *Self-evaluation and improvement* is the final phase of the management cycle. This phase should produce meaningful feedback for the coming first stage, i.e. planning stage, of the next improvement cycle.

3.16 The purpose of self-evaluation is to evaluate the effectiveness of the planned measures and of their implementation, to deepen the understanding on the overall characteristics of the ship's operation such as what types of measures can/cannot function effectively and how and/or why, to comprehend the trend of the efficiency improvement of that ship, and to develop the improved SEEMP for the next cycle.

3.17 For this process, procedures for self-evaluation of ship energy management should be developed. Furthermore, self-evaluation should be implemented periodically by using data collected through monitoring. In addition, it is recommended to invest time in identifying the cause and effect of the performance during the evaluated period for improving the next stage of the management plan.

Voluntary reporting/review

3.18 Some shipowners/operators may wish to make public the results of the actions they have taken in their SEEMP and how those actions have impacted the efficiency of their ship(s). These efforts should be incentivized as voluntary reporting and review, which could have a number of benefits. Some national Administrations, ports, or partnerships may wish to recognize the efforts of these leading shipowners/operators. For example, some ports now offer environmentally-differentiated harbour fees or other rewards to those ships that qualify as "green" and a growing number of consumer products companies increasingly utilize only verifiably green transportation options in moving their products to market. Such a proposed framework is complementary to and can easily co-exist with currently successful national and international energy efficiency and emissions reductions programmes outside IMO.

4 GUIDANCE ON BEST PRACTICES FOR FUEL-EFFICIENT OPERATION OF SHIPS

4.1 The search for efficiency across the entire transport chain takes responsibility beyond what can be delivered by the owner/operator alone. A list of all the possible stakeholders in the efficiency of a single voyage is long; obvious parties are designers, shipyards and engine manufacturers for the characteristics of the ship, and charterers, ports and vessel traffic management services, etc., for the specific voyage. All involved parties should consider the inclusion of efficiency measures in their operations both individually and collectively.

Fuel Efficient Operations

Improved voyage planning

4.2 The optimum route and improved efficiency can be achieved through the careful planning and execution of voyages. Thorough voyage planning needs time, but a number of different software tools are available for planning purposes.

4.3 IMO resolution A.893(21) (25 November 1999) on voyage planning provides essential guidance for the ship's crew and voyage planners.

Weather routeing

4.4 Weather routeing has a high potential for efficiency savings on specific routes. It is commercially available for all types of ship and for many trade areas. Significant savings can be achieved, but conversely weather routeing may also increase fuel consumption for a given voyage.

Just in time

4.5 Good early communication with the next port should be an aim in order to give maximum notice of berth availability and facilitate the use of optimum speed where port operational procedures support this approach.

4.6 Optimized port operation could involve a change in procedures involving different handling arrangements in ports. Port authorities should be encouraged to maximize efficiency and minimize delay.

Speed optimization

4.7 Speed optimization can produce significant savings. However, optimum speed means the speed at which the fuel used per tonne mile is at a minimum level for that voyage. It does not mean minimum speed; in fact sailing at less than optimum speed will consume more fuel rather than less. Reference should be made to the engine manufacturer's power/consumption curve and the ship's propeller curve. Possible adverse consequences of slow speed operation may include increased vibration and sooting and these should be taken into account.

4.8 As part of the speed optimization process, due account may need to be taken of the need to coordinate arrival times with the availability of loading/discharge berths, etc. The number of ships engaged in a particular trade route may need to be taken into account when considering speed optimization.

4.9 A gradual increase in speed when leaving a port or estuary whilst keeping the engine load within certain limits may help to reduce fuel consumption.

4.10 It is recognized that under many charter parties the speed of the vessel is determined by the charterer and not the operator. Efforts should be made when agreeing charter party terms to encourage the ship to operate at optimum speed in order to maximize energy efficiency.

Optimized shaft power

4.11 Operation at constant shaft RPM can be more efficient than continuously adjusting speed through engine power (see 4.7). The use of automated engine management systems to control speed rather than relying on human intervention may be beneficial.

Optimized ship handling

Optimum trim

4.12 Most ships are designed to carry a designated amount of cargo at a certain speed for a certain fuel consumption. This implies the specification of set trim conditions. Loaded or unloaded, trim has a significant influence on the resistance of the ship through the water and optimizing trim can deliver significant fuel savings. For any given draft there is a trim condition that gives minimum resistance. In some ships it is possible to assess optimum trim conditions for fuel efficiency continuously throughout the voyage. Design or safety factors may preclude full use of trim optimization.

Optimum ballast

4.13 Ballast should be adjusted taking into consideration the requirements to meet optimum trim and steering conditions and optimum ballast conditions achieved through good cargo planning.

4.14 When determining the optimum ballast conditions, the limits, conditions and ballast management arrangements set out in the ship's Ballast Water Management Plan are to be observed for that ship.

4.15 Ballast conditions have a significant impact on steering conditions and autopilot settings and it needs to be noted that less ballast water does not necessarily mean the highest efficiency.

Optimum propeller and propeller inflow considerations

4.16 Selection of the propeller is normally determined at the design and construction stage of a ship's life but new developments in propeller design have made it possible for retrofitting of later designs to deliver greater fuel economy. Whilst it is certainly for consideration, the propeller is but one part of the propulsion train and a change of propeller in isolation may have no effect on efficiency and may even increase fuel consumption.

4.17 Improvements to the water inflow to the propeller using arrangements such as fins and/or nozzles could increase propulsive efficiency power and hence reduce fuel consumption.

Optimum use of rudder and heading control systems (autopilots)

4.18 There have been large improvements in automated heading and steering control systems technology. Whilst originally developed to make the bridge team more effective, modern autopilots can achieve much more. An integrated Navigation and Command System can achieve significant fuel savings by simply reducing the distance sailed "off track". The principle is simple; better course control through less frequent and smaller corrections will minimize losses due to rudder resistance. Retrofitting of a more efficient autopilot to existing ships could be considered.

4.19 During approaches to ports and pilot stations the autopilot cannot always be used efficiently as the rudder has to respond quickly to given commands. Furthermore at certain stage of the voyage it may have to be de-activated or very carefully adjusted, i.e. heavy weather and approaches to ports.

4.20 Consideration may be given to the retrofitting of improved rudder blade design (e.g., "twist-flow" rudder).

Hull maintenance

4.21 Docking intervals should be integrated with ship operator's ongoing assessment of ship performance. Hull resistance can be optimized by new-technology coating systems, possibly in combination with cleaning intervals. Regular in-water inspection of the condition of the hull is recommended.

4.22 Propeller cleaning and polishing or even appropriate coating may significantly increase fuel efficiency. The need for ships to maintain efficiency through in-water hull cleaning should be recognized and facilitated by port States.

4.23 Consideration may be given to the possibility of timely full removal and replacement of underwater paint systems to avoid the increased hull roughness caused by repeated spot blasting and repairs over multiple dockings.

4.24 Generally, the smoother the hull, the better the fuel efficiency.

Propulsion system

4.25 Marine diesel engines have a very high thermal efficiency (~50%). This excellent performance is only exceeded by fuel cell technology with an average thermal efficiency of 60%. This is due to the systematic minimization of heat and mechanical loss. In particular, the new breed of electronic controlled engines can provide efficiency gains. However, specific training for relevant staff may need to be considered to maximize the benefits.

Propulsion system maintenance

4.26 Maintenance in accordance with manufacturers' instructions in the company's planned maintenance schedule will also maintain efficiency. The use of engine condition monitoring can be a useful tool to maintain high efficiency.

4.27 Additional means to improve engine efficiency might include:

Use of fuel additives;
Adjustment of Cylinder lubrication oil consumption;
Valve improvements;
Torque analysis; and
Automated engine monitoring systems.

Waste heat recovery

4.28 Waste heat recovery is now a commercially available technology for some ships. Waste heat recovery systems use thermal heat losses from the exhaust gas for either electricity generation or additional propulsion with a shaft motor.

4.29 It may not be possible to retrofit such systems into existing ships. However, they may be a beneficial option for new ships. Shipbuilders should be encouraged to incorporate new technology into their designs.

Improved fleet management

4.30 Better utilization of fleet capacity can often be achieved by improvements in fleet planning. For example, it may be possible to avoid or reduce long ballast voyages through improved fleet planning. There is opportunity here for charterers to promote efficiency. This can be closely related to the concept of "just in time" arrivals.

4.31 Efficiency, reliability and maintenance-oriented data sharing within a company can be used to promote best practice among ships within a company and should be actively encouraged.

Improved cargo handling

4.32 Cargo handling is in most cases under the control of the port and optimum solutions matched to ship and port requirements should be explored.

Energy management

4.33 A review of electrical services on board can reveal the potential for unexpected efficiency gains. However care should be taken to avoid the creation of new safety hazards when turning off electrical services (e.g., lighting). Thermal insulation is an obvious means of saving energy. Also see comment below on shore power.

4.34 Optimization of reefer container stowage locations may be beneficial in reducing the effect of heat transfer from compressor units. This might be combined as appropriate with cargo tank heating, ventilation, etc. The use of water-cooled reefer plant with lower energy consumption might also be considered.

Fuel Type

4.35 Use of emerging alternative fuels may be considered as a CO_2 reduction method but availability will often determine the applicability.

Other measures

4.36 Development of computer software for the calculation of fuel consumption, for the establishment of an emissions "footprint", to optimize operations, and the establishment of goals for improvement and tracking of progress may be considered.

4.37 Renewable energy sources, such as wind, solar (or Photovoltaic) cell technology, have improved enormously in the recent years and should be considered for onboard application.

4.38 In some ports shore power may be available for some ships but this is generally aimed at improving air quality in the port area. If the shore-based power source is carbon efficient, there may be a net efficiency benefit. Ships may consider using on-shore power if available.

4.39 Even wind assisted propulsion may be worthy of consideration.

4.40 Efforts could be made to source fuel of improved quality in order to minimize the amount of fuel required to provide a given power output.

Compatibility of measures

4.41 This document indicates a wide variety of possibilities for energy efficiency improvements for the existing fleet. While there are many options available, they are not cumulative, are often area and trade dependent and likely to require the agreement and support of a number of different stakeholders if they are to be utilized most effectively.

Age and operational service life of a ship

4.42 All measures identified in this paper are potentially cost effective as a result of high oil prices. Measures previously considered unaffordable or commercially unattractive may now be feasible and worthy of fresh consideration. Clearly, this equation is heavily influenced by the remaining service life of a ship and the cost of fuel.

Trade and sailing area

4.43 The feasibility of many of the measures described in this guidance will be dependant on the trade and sailing area of the vessel. Sometimes ships will change their trade areas as a result of a change in chartering requirements but this cannot be taken as a general assumption. For example wind enhanced power sources might not be feasible for short sea shipping as these ships generally sail in areas with high traffic densities or in restricted waterways. Another aspect is that the world's oceans and seas each have characteristic conditions and so ships designed for specific routes and trades may not obtain the same benefit by adopting the same measures or combination of measures as other ships. It is also likely that some measures will have a greater or lesser effect in different sailing areas.

4.44 The trade a ship is engaged in will also determine the feasibility of some of the measures. Ships that perform services at sea (pipe laying, seismic survey, OSVs, dredgers, etc.) are likely to choose different methods of carbon reductions when compared to conventional cargo carriers. The length of voyage will also be an important parameter as will safety considerations imposed upon some vessels. As a result, it is likely that the pathway to the most efficient combination of measures will be unique to each vessel within each shipping company.

A sample form of a SEEMP is presented in the appendix for illustrative purposes.

APPENDIX

SHIP EFFICIENCY ENERGY MANAGEMENT PLAN

Name of Vessel:		GT:	
Vessel Type:		Capacity:	

Date of Development:		Developed by:	
Implementation Period:	From: Until:	Implemented by:	
Planned Date of Next Evaluation:			

1 MEASURES

Energy Efficiency Measures	**Implementation** (including the starting date)	**Responsible Personnel**
Weather Routeing	<Example> Contracted with [Service providers] to use their weather routeing system and start using on trial basis as of 1 July 2012.	<Example> The master is responsible for selecting the optimum route based on the information provided by [Service providers].
Speed Optimization	While the design speed (85% MCR) is 19.0 kt, the maximum speed is set at 17.0 kt as of 1 July 2012.	The master is responsible for keeping the ship speed. The log-book entry should be checked every day.

2 MONITORING

- Description of monitoring tools

3 GOAL

- Measurable goals

4 EVALUATION

- Procedures of evaluation

***

ANNEX 20

GUIDELINES FOR VOLUNTARY USE OF THE SHIP ENERGY EFFICIENCY OPERATIONAL INDICATOR

1 The Conference of Parties to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, held from 15 to 26 September 1997 in conjunction with the Marine Environment Protection Committee's fortieth session, adopted Conference resolution 8, on CO_2 emissions from ships.

2 IMO Assembly resolution A.963(23) on IMO Policies and Practices Related to the Reduction of Greenhouse Gas Emissions from Ships urged the Marine Environment Protection Committee (MEPC) to identify and develop the mechanism or mechanisms needed to achieve the limitation or reduction of Greenhouse Gas (GHG) emissions from international shipping and, in doing so, to give priority to the establishment of a GHG baseline; and the development of a methodology to describe the GHG efficiency of a ship in terms of GHG emission indicator for that ship.

3 As urged by the Assembly, MEPC 53 approved Interim Guidelines for Voluntary Ship CO_2 Emission Index for Use in Trials.

4 These Guidelines can be used to establish a consistent approach for voluntary use of an Energy Efficiency Operational Indicator (EEOI), which will assist shipowners, ship operators and parties concerned in the evaluation of the performance of their fleet with regard to CO_2 emissions. As the amount of CO_2 emitted from a ship is directly related to the consumption of bunker fuel oil, the EEOI can also provide useful information on a ship's performance with regard to fuel efficiency.

5 These Guidelines may be updated periodically, to take account of:

- Operational experiences from use of the EEOI for different ship types, as reported to MEPC by industry organizations and Administrations; and

- Any other relevant developments.

6 Industry organizations and interested Administrations are invited to promote the use of the attached Guidelines or equivalent approaches and their incorporation in company and ship environmental management plans. In addition, they are invited to report their experience in applying the EEOI concept back to MEPC.

7 In addition to these Guidelines, due account should be taken of the pertinent clauses within the ISM Code on a voluntary basis along with reference to relevant industry guidance on the management and reduction of CO_2 emissions.

ANNEX

GUIDELINES FOR VOLUNTARY USE OF THE SHIP ENERGY EFFICIENCY OPERATIONAL INDICATOR (EEOI)

1 INTRODUCTION

In 1997 IMO adopted a resolution on CO_2 emissions from ships[1].

IMO Assembly further adopted resolution A.963(23) on IMO policies and practices related to the reduction of greenhouse gas emissions from ships, which requests the MEPC to develop a greenhouse gas emission index for ships, and guidelines for use of that index.

This document constitutes the Guidelines for the use of an Energy Efficiency Operational Indicator (EEOI) for ships. It sets out:

- what the objectives of the IMO EEOI are,
- how a ship's energy performance should be measured, and
- how the EEOI could be used to promote low-emission shipping, in order to help limit the impact of shipping on global climate change.

2 OBJECTIVES

The objective of these Guidelines is to provide the users with assistance in the process of establishing a mechanism to achieve the limitation or reduction of greenhouse gas emissions from ships in operation.

These Guidelines present the concept of an indicator for the energy efficiency of a ship in operation, as an expression of efficiency expressed in the form of CO_2 emitted per unit of transport work. The Guidelines are intended to provide an example of a calculation method which could be used as an objective, performance-based approach to monitoring the efficiency of a ship's operation.

These Guidelines are recommendatory in nature and present a possible use of an operational indicator. However, shipowners, ship operators and parties concerned are invited to implement either these Guidelines or an equivalent method in their environmental management systems and consider adoption of the principles herein when developing plans for performance monitoring.

[1] Resolution 8 of the 1997 International Conference of Parties to MARPOL 73/78.

3 DEFINITIONS

3.1 Indicator definition

In its most simple form *the Energy Efficiency Operational Indicator* is defined as the ratio of mass of CO_2 (M) emitted per unit of transport work:

Indicator = M_{CO_2} / (transport work)

For more details of indicator calculation see 3.2 to 3.4 and Appendix 1.

3.2 Fuel consumption

Fuel consumption, FC, is defined as all fuel consumed at sea and in port or for voyages or a period in question, e.g., a day, by main and auxiliary engines including boilers and incinerators.

3.3 Distance sailed

Distance sailed, means the actual distance sailed in nautical miles (deck log-book data) for the voyage or period in question.

3.4 Ship and cargo types

The Guidelines are applicable for all ships performing transport work.

.1 Ships:

- dry cargo carriers
- tankers
- gas tankers
- containerships
- ro-ro cargo ships
- general cargo ships
- passenger ships including ro-ro passenger ships

.2 Cargo:

Cargo includes but not limited to:
all gas, liquid and solid bulk cargo, general cargo, containerized cargo (including the return of empty units), break bulk, heavy lifts, frozen and chilled goods, timber and forest products, cargo carried on freight vehicles, cars and freight vehicles on ro-ro ferries, and passenger (for passenger and ro-ro passenger ships).

3.5 Cargo Mass Carried or Work Done

In general, cargo mass carries or work done is expressed as follows:

.1 for dry cargo carries, liquid tankers, gas tankers, ro-ro cargo ships and general cargo ships, metric tonnes (t) of the cargo carried should be used;

.2 for containerships carrying solely containers, number of containers (TEU) or metric tons(*t*) of the total mass of cargo and containers should be used;

.3 for ships carrying a combination of containers and other cargoes, a TEU mass of 10 t could be applied for loaded TEUs and 2 t for empty TEUs; and

.4 for passenger ships including ro-ro passenger ships, number of passengers or gross tonnes of the ship should be used;

in some particular cases, work done can be expressed as follows:

.5 for car ferries and car carriers, number of car units or occupied lane metres;

.6 for containerships, number of TEUs (empty or full); and

.7 for railway and ro-ro vessels, number of railway cars and freight vehicles, or occupied lane metres.

For vessels such as, for example, certain ro-ro vessels, which carry a mixture of passengers in cars, foot passengers and freight, operators may wish to consider some form of weighted average based on the relative significance of these trades for their particular service or the use of other parameters or indicators as appropriate.

3.6 Voyage

Voyage generally means the period between a departure from a port to the departure from the next port. Alternative definitions of a voyage could also be acceptable.

4 ESTABLISHING AN ENERGY EFFICIENCY OPERATIONAL INDICATOR (EEOI)

The EEOI should be a representative value of the energy efficiency of the ship operation over a consistent period which represents the overall trading pattern of the vessel. Guidance on a basic calculation procedure for a generic EEOI is provided in the Appendix.

In order to establish the EEOI , the following main steps will generally be needed:

.1 define the period for which the EEOI is calculated*;

.2 define data sources for data collection;

.3 collect data;

.4 convert data to appropriate format; and

.5 calculate EEOI.

* Ballast voyages, as well as voyages which are not used for transport of cargo, such as voyage for docking service, should also be included. Voyages for the purpose of securing the safety of a ship or saving life at sea should be excluded.

5 GENERAL DATA RECORDING AND DOCUMENTATION PROCEDURES

Ideally, the data recording method used should be uniform so that information can be easily collated and analysed to facilitate the extraction of the required information. The collection of data from ships should include the distance travelled, the quantity and type of fuel used, and all fuel information that may affect the amount of carbon dioxide emitted. For example, fuel information is provided on the bunker delivery notes that are required under regulation 18 of MARPOL Annex VI.

If the example formula given in the Appendix is used, then the unit used for distance travelled and quantity of fuel should be expressed in nautical miles and metric tonnes. The work done can be expressed using units appropriate for the ship type in paragraph 3.5.

It is important that sufficient information is collected on the ship with regard to fuel type and quantity, distance travelled and cargo type so that a realistic assessment can be generated.

The distance travelled should be calculated by actual distance travelled, as contained in the ship's log-book.

Amount and type of fuel used (bunker delivery notes) and distance travelled (according to the ship's log-book) could be documented by the ship based either on the example described in the Appendix or on an equivalent company procedure.

6 MONITORING AND VERIFICATION

6.1 General

Documented procedures to monitor and measure, on a regular basis, should be developed and maintained. Elements to be considered when establishing procedures for monitoring could include:

- identification of operations/activities with impact on the performance;
- identification of data sources and measurements that are necessary, and specification of the format;
- identification of frequency and personnel performing measurements; and
- maintenance of quality control procedures for verification procedures.

The results of this type of self-assessment could be reviewed and used as indicators of the System's success and reliability, as well as identifying those areas in need of corrective action or improvement.

It is important that the source of figures established are properly recorded, the basis on which figures have been calculated and any decisions on difficult or grey areas of data. This will provide assistance on areas for improvement and be helpful for any later analysis.

In order to avoid unnecessary administrative burdens on ships' staff, it is recommended that monitoring of an EEOI should be carried out by shore staff, utilizing data obtained from existing required records such as the official and engineering log-books and oil record books, etc. The necessary data could be obtained during internal audits under ISM, routine visits by superintendents, etc.

6.2 Rolling average indicator

As a ship energy efficiency management tool, the rolling average indicator, when used, should be calculated by use of a methodology whereby the minimum period of time or a number of voyages that is statistically relevant is used as appropriate. "Statistically relevant" means that the period set as standard for each individual ship should remain constant and be wide enough so the accumulated data mass reflects a reasonable mean value for operation of the ship in question over the selected period.

7 USE OF GUIDELINES

Methodology and use of EEOI, as described in this Guideline, provides an example of a transparent and recognized approach for assessment of the GHG efficiency of a ship with respect to energy efficiency. The Guidelines are considered to be suitable for implementation within a company environmental management system.

Implementation of the EEOI in an established environmental management system should be performed in line with the implementation of any other chosen indicator and follow the main elements of the recognized standards (planning, implementation and operation, checking and corrective action, management review).

When using the EEOI as a performance indicator, the indicator could provide a basis for consideration of both current performance and trends over time.

One approach could be to set internal performance criteria and targets based on the EEOI data.

APPENDIX

CALCULATION OF ENERGY EFFICIENCY OPERATIONAL INDICATOR (EEOI) BASED ON OPERATIONAL DATA

1 General

The objective of the appendix is to provide guidance on calculation of the Energy Efficiency Operational Indicator (EEOI) based on data from the operation of the ship.

2 Data sources

Primary data sources selected could be the ship log-book (bridge log-book, engine log-book, deck log-book and other official records).

3 Fuel mass to CO_2 mass conversion factors (C_F)

C_F is a non-dimensional conversion factor between fuel consumption measured in g and CO_2 emission also measured in g based on carbon content. The value C_F of is as follows:

Type of fuel	Reference	Carbon content	C_F (t-CO_2/t-Fuel)
1. Diesel/Gas Oil	ISO 8217 Grades DMX through DMC	0.875	3.206000
2. Light Fuel Oil (LFO)	ISO 8217 Grades RMA through RMD	0.86	3.151040
3. Heavy Fuel Oil (HFO)	ISO 8217 Grades RME through RMK	0.85	3.114400
4. Liquified Petroleum Gas (LPG)	Propane Butane	0.819 0.827	3.000000 3.030000
5. Liquified Natural Gas (LNG)		0.75	2.750000

4 Calculation of EEOI

The basic expression for EEOI for a voyage is defined as:

$$\text{EEOI} = \frac{\sum_j FC_j \times C_{Fj}}{m_{cargo} \times D} \qquad \text{Equation 1}$$

Where average of the indicator for a period or for a number of voyages is obtained, the Indicator is calculated as:

$$\text{Average EEOI} = \frac{\sum_i \sum_j (FC_{ij} \times C_{Fj})}{\sum_i (m_{cargo,i} \times D_i)} \qquad \text{Equation 2}$$

where:

- j is the fuel type;
- i is the voyage number;
- FC_{ij} is the mass of consumed fuel j at voyage i;
- C_{Fj} is the fuel mass to CO_2 mass conversion factor for fuel j;
- m_{cargo} is cargo carried (tonnes) or work done (number of TEU or passengers) or gross tonnes for passenger ships; and
- D is the distance in nautical miles corresponding to the cargo carries or work done.

The unit of EEOI depends on the measurement of cargo carried or work done, e.g., tonnes CO_2/(tonnes • nautical miles), tonnes CO_2/(TEU • nautical miles), tonnes CO_2/(person • nautical miles), etc.

It should be noted that Equation 2 does not give a simple average of EEOI among number of voyage i.

5 Rolling average

Rolling average, when used, can be calculated in a suitable time period, for example one year closest to the end of a voyage for that period, or number of voyages, for example six or ten voyages, which are agreed as statistically relevant to the initial averaging period. The Rolling Average EEOI is then calculated for this period or number of voyages by Equation 2 above.

6 Data

Data covering a voyage or period, e.g., a day, in question with corresponding data on fuel consumption/cargo carried and distanced sailed for each voyage in a continuous sailing pattern could be collected as shown in the reporting sheet below.

EEOI Indicator reporting sheet

NAME AND TYPE OF SHIP						
Voyage or day (i)	Fuel consumption (FC) at sea and in port in tonnes				Voyage or time period data	
	Fuel type ( )	Fuel type ( )	Fuel type ( )		Cargo (m) (tonnes or units)	Distance (D) (NM)
1						
2						
3						

NOTE: For voyages with m_{cargo} =0, it is still necessary to include the fuel used during this voyage in the summation above the line.

7 Conversion from g/tonne-mile to g/tonne-km

The EEOI may be converted from g/tonne-mile to g/tonne-km by multiplication by 0.54.

8 Example:

A simple example including one ballast voyage, for illustration purpose only, is provided below. The example illustrates the application of the formula based on the data reporting sheet.

NAME AND TYPE OF SHIP						
Voyage or day (i)	Fuel consumption (FC) at sea and in port in tonnes				Voyage or time period data	
	Fuel type (HFO)	Fuel type (LFO)	Fuel type ( )		Cargo (m) (tonnes or units)	Distance (D) (NM)
1	20	5			25,000	300
2	20	5			0	300
3	50	10			25,000	750
	10	3			15,000	150

$$EEOI = \frac{100 \times 3.114 + 23 \times 3.151}{(25{,}000 \times 300) + (0 \times 300) + (25{,}000 \times 750) + (15{,}000 \times 150)} = 13.47 \times 10^{-6}$$

unit: tonnes CO_2/(tons • nautical miles)

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ANNEX 21

STATEMENTS BY THE OBSERVERS OF IUCN AND FOEI ON GHG ISSUES

Statement by the observer of IUCN

Thank you, Mr. Chairman,

This year's theme for the IMO is "Climate change – a challenge for IMO too".

This challenge should not be narrowly seen as only reducing or limiting GHG emissions any more. The climate action required is much wider and was accepted in the Bali Action Plan of 2007. The action comprises mitigation, adaptation, technology, and financing. These are to be guided by a shared vision, taking into account the principle of common but differentiated responsibilities and respective capabilities.

The sense of urgency for action on climate change is undisputed, as we heard many times this week.

In this context, we would like to call on all delegates to be proactive before COP 15, rather than just wait for the relevant outcomes.

IUCN being an intergovernmental organization, we feel free to call upon you as fellows.

Distinguished delegates, when you come back to your capitals tell your environment department that a global market-based based scheme for shipping is feasible. Tell your foreign office that it could comply with the provisions of UNFCCC. Tell your finance ministry that it could generate financing for international action outside of the constrained national budgets. Tell your politicians that the impact on end consumers in developed countries will be minute, estimated at an extra $1 of every $1,000 of imported goods.

In developing countries, tell your politicians that it will cost you nothing. Instead it will provide additional financing for reducing deforestation, adapting to impacts of climate change and for technology transfer and transformation in the entire shipping sector.

Distinguished delegates, financing is make-or-break of COP 15. Therefore, discuss with your climate negotiators paragraph 173, option 4 of the current text for COP 15. This option proposes a financing scheme based on carbon price on emissions from international maritime transport. IMO can do it!

Mr. Chairman, if we, the delegates successfully help COP 15 to agree on such a financing scheme, IMO will have required guidance and a green light to expeditiously deliver on the proposed plan in J10. This will very likely bring enormous benefits for the environment, shipping, and the IMO – in that order.

The time for action is now.

Statement by the observer of FOEI

Mr. Chairman,

At the beginning of this session the Secretary-General asked us to rise to the challenge of climate change and develop ambitious and forward looking plans which would represent real progress and demonstrate to the UNFCCC and to the world that the IMO is the appropriate body to remain in charge of international measures to reduce GHG from shipping.

So we need to ask ourselves, Mr. Chairman, what has been achieved?

Does this Work Plan on Market Based Measures meet the Secretary-General's expectations? Will it confound the critics?
Is there any sense of urgency?
Does it meet this Committee's expectations?
In what sense is it consistent in spirit or in practice with Assembly resolution 963/23's call made nearly 6 years ago now – yes, nearly 6 years ago – that *priority* be given to the evaluation inter alia of market based mechanisms?
Will this further Work Plan provide any assurance to UNFCCC that IMO is geared up to do the job?
Will it be sufficient to stop the European Union taking the unilateral action on shipping that it has long talked about and options for which are now being developed?
Where will the IMO stand if US upstream legislation proceeds?

Above all, 12 years after Kyoto, and in the continuing absence of even one single binding measure to address GHG, will yet another multi-year work plan – which includes a hiatus of inactivity from the closure of this session until MEPC 60 – satisfy the world and, in particular, those living in less developed countries and small island states who are the most vulnerable to climate change and who so often get the short end of the stick?

We welcome agreement on the efficiency indices. Let us undertake trials and agree to discuss and decide at MEPC 60 on their mandatory application, but they will only deliver the necessary results if they are driven by strong targets and market based incentives.

We now call on a coalition of the willing to come forward and show the leadership that is your obligation. Agree to fund an immediate and in depth study of MBI options – be inclusive in its terms of reference and composition of experts in a consortium from developed and developing countries. Present the results to UNFCCC and to MEPC 60 and press for action to be accelerated in light of the necessary expert advice which will then be available.

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ANNEX 22

DRAFT RESOLUTION MEPC.186(59)
Adopted on 17 July 2009

AMENDMENTS TO THE ANNEX OF THE PROTOCOL OF 1978 RELATING TO THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973

(Addition of a new chapter 8 to MARPOL Annex I and consequential amendments to the Supplement to the IOPP Certificate, Form B)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution,

NOTING Article 16 of the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1973 Convention") and article VI of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1978 Protocol") which together specify the amendment procedure of the 1978 Protocol and confer upon the appropriate body of the Organization the function of considering and adopting amendments to the 1973 Convention, as modified by the 1978 Protocol (MARPOL 73/78),

HAVING CONSIDERED proposed amendments to Annex I of MARPOL 73/78,

1. ADOPTS, in accordance with Article 16(2)(d) of the 1973 Convention, the amendments to Annex I of MARPOL 73/78 concerning the addition of a new chapter 8 and consequential amendments to the Supplement to the IOPP Certificate, Form B, the text of which is set out in the annex to the present resolution;

2. DETERMINES, in accordance with Article 16(2)(f)(iii) of the 1973 Convention, that the amendments shall be deemed to have been accepted on 1 July 2010 unless, prior to that date, not less than one-third of the Parties or Parties the combined merchant fleets of which constitute not less than 50 per cent of the gross tonnage of the world's merchant fleet, have communicated to the Organization their objection to the amendments;

3. INVITES the Parties to note that, in accordance with Article 16(2)(g)(ii) of the 1973 Convention, the said amendments shall enter into force on 1 January 2011 upon their acceptance in accordance with paragraph 2 above;

4. REQUESTS the Secretary-General, in conformity with Article 16(2)(e) of the 1973 Convention, to transmit to all Parties to MARPOL 73/78 certified copies of the present resolution and the text of the amendments contained in the annex; and

5. REQUESTS FURTHER the Secretary-General to transmit to the Members of the Organization which are not Parties to MARPOL 73/78 copies of the present resolution and its annex.

ANNEX

(Addition of a new chapter 8 to MARPOL and Annex I and consequential amendments to the Supplement to the IOPP Certificate, Form B)

1 A new chapter 8 is added:

"**CHAPTER 8 – PREVENTION OF POLLUTION DURING TRANSFER OF OIL CARGO BETWEEN OIL TANKERS AT SEA**

Regulation 40
Scope of application

1 The regulations contained in this chapter apply to oil tankers of 150 gross tonnage and above engaged in the transfer of oil cargo between oil tankers at sea (STS operations) and their STS operations conducted on or after 1 April 2012. However, STS operations conducted before that date but after the approval of the Administration of STS operations Plan required under regulation 41.1 shall be in accordance with the STS operations Plan as far as possible.

2 The regulations contained in this chapter shall not apply to oil transfer operations associated with fixed or floating platforms including drilling rigs; floating production, storage and offloading facilities (FPSOs) used for the offshore production and storage of oil; and floating storage units (FSUs) used for the offshore storage of produced oil[1].

3 The regulations contained in this chapter shall not apply to bunkering operations.

4 The regulations contained in this chapter shall not apply to STS operations necessary for the purpose of securing the safety of a ship or saving life at sea, or for combating specific pollution incidents in order to minimize the damage from pollution.

5 The regulations contained in this chapter shall not apply to STS operations where either of the ships involved is a warship, naval auxiliary or other ship owned or operated by a State and used, for the time being, only on government non-commercial service. However, each State shall ensure, by the adoption of appropriate measures not impairing operations or operational capabilities of such ships that the STS operations are conducted in a manner consistent, so far as is reasonable and practicable, with this chapter.

[1] Revised Annex I of MARPOL, chapter 7 (resolution MEPC.117(52)) and UNCLOS article 56 are applicable and address these operations.

Regulation 41
General Rules on safety and environmental protection

1 Any oil tanker involved in STS operations shall carry on board a Plan prescribing how to conduct STS operations (STS operations Plan) not later than the date of the first annual, intermediate or renewal survey of the ship to be carried out on or after 1 January 2011. Each oil tanker's STS operations Plan shall be approved by the Administration. The STS operations Plan shall be written in the working language of the ship.

2 The STS operations Plan shall be developed taking into account the information contained in the best practice guidelines for STS operations identified by the Organization[2]. The STS operations Plan may be incorporated into an existing Safety Management System required by chapter IX of the International Convention for the Safety of Life at Sea, 1974, as amended, if that requirement is applicable to the oil tanker in question.

3 Any oil tanker subject to this chapter and engaged in STS operations shall comply with its STS operations Plan.

4 The person in overall advisory control of STS operations shall be qualified to perform all relevant duties, taking into account the qualifications contained in the best practice guidelines for STS operations identified by the Organization[3].

5 Records[4] of STS operations shall be retained on board for three years and be readily available for inspection by a Party to the present Convention.

Regulation 42
Notification

1 Each oil tanker subject to this chapter that plans STS operations within the territorial sea, or the exclusive economic zone of a Party to the present Convention shall notify that Party not less than 48 hours in advance of the scheduled STS operations. Where, in an exceptional case, all of the information specified in paragraph 2 is not available not less than 48 hours in advance, the oil tanker discharging the oil cargo shall notify the Party to the present Convention, not less than 48 hours in advance that an STS operation will occur and the information specified in paragraph 2 shall be provided to the Party at the earliest opportunity.

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2 IMO's "Manual on Oil Pollution, Section I, Prevention" as amended, and the ICS and OCIMF "Ship-to-ship Transfer Guide, Petroleum", fourth edition, 2005.

3 IMO's "Manual on Oil Pollution, Section I, Prevention" as amended, and the ICS and OCIMF "Ship-to-ship Transfer Guide, Petroleum", fourth edition, 2005.

4 Revised Annex I of MARPOL chapters 3 and 4 (resolution MEPC.117(52)); requirements for recording bunkering and oil cargo transfer operations in the Oil Record Book, and any records required by the STS operations Plan.

2 The notification specified in paragraph 1 of this regulation[5] shall include at least the following:

.1 name, flag, call sign, IMO Number and estimated time of arrival of the oil tankers involved in the STS operations;

.2 date, time and geographical location at the commencement of the planned STS operations;

.3 whether STS operations are to be conducted at anchor or underway;

.4 oil type and quantity;

.5 planned duration of the STS operations;

.6 identification of STS operations service provider or person in overall advisory control and contact information; and

.7 confirmation that the oil tanker has on board an STS operations Plan meeting the requirements of regulation 41.

3 If the estimated time of arrival of an oil tanker at the location or area for the STS operations changes by more than six hours, the master, owner or agent of that oil tanker shall provide a revised estimated time of arrival to the Party to the present Convention specified in paragraph 1 of this regulation."

2 In the Record of Construction and Equipment for Oil Tankers, Form B, new section 8A is added as follows:

"**8A Ship-to-ship oil transfer operations at sea**
(regulation 41)

8A.1 The oil tanker is provided with an STS operations Plan in compliance with regulation 41."

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[5] The national operational contact point as listed in document MSC-MEPC.6/Circ.4 of 31 December 2007 or its subsequent amendments.

ANNEX 23

DRAFT RESOLUTION MEPC.187(59)
Adopted on 17 July 2009

AMENDMENTS TO THE ANNEX OF THE PROTOCOL OF 1978 RELATING TO THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973

(Amendments to regulations 1, 12, 13, 17 and 38 of MARPOL Annex I, Supplement to the IOPP Certificate and Oil Record Book Parts I and II)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution,

NOTING Article 16 of the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1973 Convention") and article VI of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1978 Protocol") which together specify the amendment procedure of the 1978 Protocol and confer upon the appropriate body of the Organization the function of considering and adopting amendments to the 1973 Convention, as modified by the 1978 Protocol (MARPOL 73/78),

HAVING CONSIDERED proposed amendments to Annex I of MARPOL 73/78,

1. ADOPTS, in accordance with Article 16(2)(d) of the 1973 Convention, the amendments to Annex I of MARPOL 73/78 concerning regulations 1, 12, 13, 17 and 38 and the Supplement to the IOPP Certificate and Oil Record Book Parts I and II, the text of which is set out in the annex to the present resolution;

2. DETERMINES, in accordance with Article 16(2)(f)(iii) of the 1973 Convention, that the amendments shall be deemed to have been accepted on 1 July 2010 unless prior, to that date, not less than one-third of the Parties or Parties the combined merchant fleets of which constitute not less than 50 per cent of the gross tonnage of the world's merchant fleet, have communicated to the Organization their objection to the amendments;

3. INVITES the Parties to note that, in accordance with Article 16(2)(g)(ii) of the 1973 Convention, the said amendments shall enter into force on 1 January 2011 upon their acceptance in accordance with paragraph 2 above;

4. REQUESTS the Secretary-General, in conformity with Article 16(2)(e) of the 1973 Convention, to transmit to all Parties to MARPOL 73/78 certified copies of the present resolution and the text of the amendments contained in the annex; and

5. REQUESTS FURTHER the Secretary-General to transmit to the Members of the Organization which are not Parties to MARPOL 73/78 copies of the present resolution and its annex.

ANNEX

AMENDMENTS TO MARPOL ANNEX I

(Amendments to regulations 1, 12, 13, 17 and 38 of MARPOL Annex I, Supplement to the IOPP Certificate and Oil Record Book Parts I and II)

Annex 1

AMENDMENTS TO REGULATIONS 1, 12, 13, 17 AND 38 OF MARPOL ANNEX I

Regulation 1 – Definitions

1 The following new subparagraphs .31, .32, .33 and .34 are added after existing subparagraph .30:

".31 **Oil residue (sludge)** means the residual waste oil products generated during the normal operation of a ship such as those resulting from the purification of fuel or lubricating oil for main or auxiliary machinery, separated waste oil from oil filtering equipment, waste oil collected in drip trays, and waste hydraulic and lubricating oils.

.32 **Oil residue (sludge) tank means** a tank which holds oil residue (sludge) from which sludge may be disposed directly through the standard discharge connection or any other approved means of disposal.

.33 **Oily bilge water** means water which may be contaminated by oil resulting from things such as leakage or maintenance work in machinery spaces. Any liquid entering the bilge system including bilge wells, bilge piping, tank top or bilge holding tanks is considered oily bilge water.

.34 **Oily bilge water holding tank** means a tank collecting oily bilge water prior to its discharge, transfer or disposal."

Regulation 12 – Tanks for oil residues (sludge)

2 Paragraph 1 is amended to read as follows:

"1 Every ship of 400 gross tonnage and above shall be provided with a tank or tanks of adequate capacity, having regard to the type of machinery and length of voyage, to receive the oil residues (sludge) which cannot be dealt with otherwise in accordance with the requirements of this Annex."

3 The following new paragraph 2 is inserted, after the existing paragraph 1:

"2 Oil residue (sludge) may be disposed of directly from the oil residue (sludge) tank(s) through the standard discharge connection referred to in regulation 13, or any other approved means of disposal. The oil residue (sludge) tank(s):

.1 shall be provided with a designated pump for disposal that is capable of taking suction from the oil residue (sludge) tank(s); and

.2 shall have no discharge connections to the bilge system, oily bilge water holding tank(s), tank top or oily water separators except that the tank(s) may be fitted with drains, with manually operated self-closing valves and arrangements for subsequent visual monitoring of the settled water, that lead to an oily bilge water holding tank or bilge well, or an alternative arrangement, provided such arrangement does not connect directly to the bilge piping system."

4 Existing paragraphs 2 and 3 are renumbered 3 and 4, respectively.

Regulations 12, 13, 17 and 38

5 The word "sludge" in regulations 12.2, 13, 17.2.3, 38.2 and 38.7 is replaced by the words "oil residue (sludge)".

6 The words "and other oil residues" in regulation 17.2.3 are deleted.

Annex 2

AMENDMENTS TO THE SUPPLEMENT TO THE IOPP CERTIFICATE FORM A (SHIPS OTHER THAN OIL TANKERS) AND FORM B (OIL TANKERS)

1 The existing Section 3 of the Supplement to the IOPP Certificate, Form A and Form B, is replaced by the following:

"**3 Means for retention and disposal of oil residues (sludge) (regulation 12) and oily bilge water holding tank(s)**[*]

3.1 The ship is provided with oil residue (sludge) tanks for retention of oil residues (sludge) on board as follows:

Tank identification	Tank location		Volume (m^3)
	Frames (from)-(to)	Lateral position	
		Total volume: …… m^3	

3.2 Means for the disposal of oil residues (sludge) retained in oil residue (sludge) tanks:

3.2.1 Incinerator for oil residues (sludge), maximum capacity kW or kcal/h (delete as appropriate) ..... ☐

3.2.2 Auxiliary boiler suitable for burning oil residues (sludge) ..... ☐

3.2.3 Other acceptable means, state which ..... ☐

3.3 The ship is provided with holding tank(s) for the retention on board of oily bilge water as follows:

Tank identification	Tank location		Volume (m^3)
	Frames (from)-(to)	Lateral position	
		Total volume: …… m^3	

"

[*] Oily bilgewater holding tank(s) are not required by the Convention; if such tank(s) are provided they shall be listed in Table 3.3.

2 The term "(double bottom requirements)" at the end of paragraph 5.8.2 of Form B is deleted.

3 Paragraphs 5.8.5 and 5.8.7 are replaced by the following:

"5.8.5 The ship is not subject to regulation 20 (check which box(es) apply):

.1	The ship is less than 5,000 tonnes deadweight	☐
.2	The ship complies with regulation 20.1.2	☐
.3	The ship complies with regulation 20.1.3	☐"

"5.8.7 The ship is not subject to regulation 21 (check which box(es) apply):

.1	The ship is less than 600 tonnes deadweight	☐
.2	The ship complies with regulation 19 (Deadweight tonnes ≥ 5,000)	☐
.3	The ship complies with regulation 21.1.2	☐
.4	The ship complies with regulation 21.4.2 (600 ≤ Deadweight tonnes < 5,000)	☐
.5	The ship does not carry "heavy grade oil" as defined in regulation 21.2 of MARPOL Annex I	☐"

4 Delete paragraph 6.1.5.4 from the Supplement to the International Oil Pollution Prevention Certificate, Form B.

Annex 3

AMENDMENTS TO THE OIL RECORD BOOK PARTS I AND II

1 Sections (A) to (H) of the Oil Record Book Part I are replaced by the following:

"**(A) Ballasting or cleaning of oil fuel tanks**

1 Identity of tank(s) ballasted.
2 Whether cleaned since they last contained oil and, if not, type of oil previously carried.
3 Cleaning process:
 .1 position of ship and time at the start and completion of cleaning;
 .2 identify tank(s) in which one or another method has been employed (rinsing through, steaming, cleaning with chemicals; type and quantity of chemicals used, in m^3);
 .3 identity of tank(s) into which cleaning water was transferred and the quantity in m^3.
4 Ballasting:
 .1 position of ship and time at start and end of ballasting;
 .2 quantity of ballast if tanks are not cleaned, in m^3.

(B) Discharge of dirty ballast or cleaning water from oil fuel tanks referred to under Section (A)

5 Identity of tank(s).
6 Position of ship at start of discharge.
7 Position of ship on completion of discharge.
8 Ship's speed(s) during discharge.
9 Method of discharge:
 .1 through 15 ppm equipment;
 .2 to reception facilities.
10 Quantity discharged, in m^3.

(C) Collection, transfer and disposal of oil residues (sludge)

11 Collection of oil residues (sludge).
Quantities of oil residues (sludge) retained on board. The quantity should be recorded weekly[1]: (this means that the quantity must be recorded once a week even if the voyage lasts more than one week):
 .1 identity of tank(s)
 .2 capacity of tank(s) ..... m^3
 .3 total quantity of retention ..... m^3
 .4 quantity of residue collected by manual operation ..... m^3
 (Operator initiated manual collections where oil residue (sludge) is transferred into the oil residue (sludge) holding tank(s).)

[1] Only those tanks listed in item 3.1 of Forms A and B of the Supplement to the IOPP Certificate used for oil residues (sludge).

12 Methods of transfer or disposal of oil residues (sludge).
State quantity of oil residues transferred or disposed of, the tank(s) emptied and the quantity of contents retained in m^3:
.1 to reception facilities (identify port)[2];
.2 to another (other) tank(s) (indicate tank(s) and the total content of tank(s));
.3 incinerated (indicate total time of operation);
.4 other method (state which).

(D) Non-automatic starting of discharge overboard, transfer or disposal otherwise of bilge water which has accumulated in machinery spaces

13 Quantity discharged, transferred or disposed of, in m^3.[3]
14 Time of discharge, transfer or disposal (start and stop).
15 Method of discharge, transfer, or disposal:
.1 through 15 ppm equipment (state position at start and end);
.2 to reception facilities (identify port)[2];
.3 to slop tank or holding tank or other tank(s) (indicate tank(s); state quantity retained in tank(s), in m^3).

(E) Automatic starting of discharge overboard, transfer or disposal otherwise of bilge water which has accumulated in machinery spaces

16 Time and position of ship at which the system has been put into automatic mode of operation for discharge overboard, through 15 ppm equipment.
17 Time when the system has been put into automatic mode of operation for transfer of bilge water to holding tank (identify tank).
18 Time when the system has been put into manual operation.

(F) Condition of the oil filtering equipment

19 Time of system failure[4].
20 Time when system has been made operational.
21 Reasons for failure.

(G) Accidental or other exceptional discharges of oil

22 Time of occurrence.
23 Place or position of ship at time of occurrence.
24 Approximate quantity and type of oil.
25 Circumstances of discharge or escape, the reasons therefor and general remarks.

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[2] The ship's master should obtain from the operator of the reception facilities, which includes barges and tank trucks, a receipt or certificate detailing the quantity of tank washings, dirty ballast, residues or oily mixtures transferred, together with the time and date of the transfer. This receipt or certificate, if attached to the Oil Record Book Part I, may aid the master of the ship in proving that the ship was not involved in an alleged pollution incident. The receipt or certificate should be kept together with the Oil Record Book Part I.

[3] In case of discharge or disposal of bilge water from holding tank(s), state identity and capacity of holding tank(s) and quantity retained in holding tank.

[4] The condition of the oil filtering equipment covers also the alarm and automatic stopping devices, if applicable.

(H) Bunkering of fuel or bulk lubricating oil

26 Bunkering:
.1 Place of bunkering.
.2 Time of bunkering.
.3 Type and quantity of fuel oil and identity of tank(s) (state quantity added, in tonnes and total content of tank(s)).
.4 Type and quantity of lubricating oil and identity of tank(s) (state quantity added, in tonnes and total content of tank(s)).”

2 Section (J) of the Oil Record Book Part II is replaced by the following:

“**(J) Collection, transfer and disposal of residues and oily mixtures not otherwise dealt with**

55 Identity of tanks.
56 Quantity transferred or disposed of from each tank. (State the quantity retained, in m^3.)
57 Method of transfer or disposal:
.1 disposal to reception facilities (identify port and quantity involved);
.2 mixed with cargo (state quantity);
.3 transferred to or from (an)other tank(s) including transfer from machinery space oil residue (sludge) and oily bilge water tanks (identify tank(s); state quantity transferred and total quantity in tank(s), in m^3); and
.4 other method (state which); state quantity disposed of in m^3.”

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ANNEX 24

UNIFIED INTERPRETATION TO REGULATION 23.7.3.2 (ACCIDENTAL OIL OUTFLOW PERFORMANCE) OF MARPOL ANNEX I

MEPC 58 considered and approved a UI to regulation 23.7.3.2 (Accidental oil outflow performance) of MARPOL Annex I, which is set out in annex 18 to document MEPC 58/23.

MEPC 59 considered additional information and approved a revised text of the UI as follows:

"If an inert gas system is fitted, the normal overpressure, in kPa, is to be taken as 5 kPa."

This revised UI replaces that approved at MEPC 58 (MEPC 58/23, annex 18).

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ANNEX 25

WORK PROGRAMME OF THE OPRC-HNS TECHNICAL GROUP*

Priority	Title and reference to strategic directions, high-level actions and planned outputs for 2009-2010	Target completion date/number of sessions needed for completion	Reference
1	**Technical Co-operation implementation on OPRC and HNS** *Strategic direction: 7.2* *High-level Action: 7.2.3* *Planned output: 7.2.3.1*	Continuous	MEPC 59/WP.1, section 7
	Manual and guidance documents		
H.1	• **Guidance document on chemical pollution to address legal and administrative aspects of HNS incidents** *Strategic direction: 7.1* *High-level action: 7.1.2* *Planned output: 7.1.2.9*	2010 7 sessions (TG 5 to TG 11)	MEPC 55/23, paragraph 7.19; MEPC 59/WP.1, paragraphs 3.33 and 3.34
H.2	• **Manual on oil pollution: Section I – Prevention** *Strategic direction: 7.2* *High-level action: 7.2.3* *Planned output: 7.1.2.12*	2010 7 sessions (TG 4 to TG 10)	MEPC 54/WP.1, paragraph 9.5; MEPC 59/WP.1, paragraph 3.13
H.3	• **Technical guidelines on sunken oil assessment and removal techniques** *Strategic direction: 7.1* *High-level action: 7.1.2* *Planned output: 7.1.2.17*	2010 6 sessions (TG 6 to TG 11)	MEPC 56/23, paragraph 7.12.9; MEPC 59/WP.1, paragraph 3.47

* **Notes:** 1 This work programme should be considered together with the Provisional agenda for the ninth session of the MEPC/OPRC-HNS Technical Group as set out in MEPC/OPRC-HNS/TG 10/1.
2 "H" means a high priority item and "L" means a low priority item.
3 Items printed in bold letters have been selected for the provisional agenda for OPRC-HNS TG 10.

Priority	Title and reference to strategic directions, high-level actions and planned outputs for 2009-2010	Target completion date/number of sessions needed for completion	Reference
H.4	• **Guidance document on Incident Command System during oil spill response** *Strategic direction: 7.1* *High-level action: 7.1.2* *Planned output: 7.1.2.18, 7.1.2.19*	2010 4 sessions (TG 7 to TG 10)	MEPC 56/23, paragraph 7.6; MEPC 56/WP.1, paragraph 9.6.2 MEPC 59/WP.1, paragraph 3.10
H.5	• **Guideline for oil spill response in fast currents** *Strategic direction: 7.1* *High-level action: 7.1.2* *Planned output: 7.1.2.20*	2010 4 sessions (TG 7 to TG 10)	MEPC 56/23, paragraph 7.6; MEPC 59/WP.1, paragraphs 3.27 to 3.29
H.6	• **Waste Management Decision Support Tool** *Strategic direction: 7.1* *High-level action: 7.1.2* *Planned output: -*	2010 3 sessions (TG 9 to TG 11)	MEPC 59/WP.1, paragraph 3.18
H.7	• **Guidance on Sensitivity Mapping for Oil Spill Response** *Strategic direction: 7.1* *High-level action: 7.1.2* *Planned output: -*	2010 3 sessions (TG 9 to TG 11)	MEPC 59/WP.1, paragraphs 3.38 to 3.40
H.8	• **Operational guide on the use of sorbents** *Strategic direction: 7.1* *High-level action: 7.1.2* *Planned output: -*	2010 3 sessions (TG 9 to TG 11)	MEPC 59/WP.1, paragraph 3.43
H.9	• **Publication checklist for new IMO manuals, guidance documents and training materials** *Strategic direction: 7.1* *High-level action: 7.1.2* *Planned output: -*	2010 2 sessions (TG 9 to TG 10)	MEPC 59/WP.1, paragraph 9.3

Priority	Title and reference to strategic directions, high-level actions and planned outputs for 2009-2010	Target completion date/number of sessions needed for completion	Reference
L.1	• Guidance on obligations and actions required by States to prepare for implementation of the OPRC-HNS Protocol *Strategic direction: 7.1* *High-level action: 7.1.2* *Planned output: -*	2011 4 sessions (TG 10 to TG 13)	MEPC 59/WP.1, paragraph 3.35
L.2	• Oil Spill Response in Ice and Snow Conditions *Strategic direction: 7.1* *High-level action: 7.1.2* *Planned output: 7.1.2.21*	2011 3 sessions (TG 11 to TG 13)	MEPC 57/21, paragraph 6.8 MEPC 59/WP.1, paragraphs 8.2 and 8.3
L.3	• Updating of IMO Dispersant Guidelines *Strategic direction: 7.1* *High-level action: 7.1.2* *Planned output: 7.1.2.22*	2012 3 sessions (TG 11 to TG 13)	MEPC 57/21, paragraph 6.8
L.4	• Guideline for oil spill response – offshore in-situ burning *Strategic direction: 7.1* *High-level action: 7.1.2* *Planned output: -*	2012 4 sessions (TG 11 to TG 14)	MEPC 56/23, paragraph 7.6 MEPC 56/WP.1, paragraph 9.6.3 MEPC 59/WP.1, paragraph 8.3
	Training		
	No projects at this time		
	Information services and exchange		
2	• **Summary of incidents involving HNS and lessons learnt** *Strategic direction: 4.2,7.1, 13.2* *High-level Action: 4.2.1, 7.1.4, 13.2.1* *Planned output: 4.2.1.1, 7.1.1.2, 13.2.1.2*	Continuous	MEPC 56, paragraph 7.12.15; MEPC 58/WP.1, paragraph 5.5

Priority	Title and reference to strategic directions, high-level actions and planned outputs for 2009-2010	Target completion date/number of sessions needed for completion	Reference
H.10	• **Inventory of information, R&D and best practices related to HNS preparedness and response** *Strategic direction: 13.3* *High-level action:* *Planned output: -*	2010 2 sessions (TG 10 to TG 11)	MEPC 59/WP.1, paragraph 5.13.2.2
H.11	**Web platform for OPRC/ HNS-related information** *Strategic direction: 13.3* *High-level action:* *Planned output: -*	2010 2 sessions (TG 10 to TG 11)	MEPC 59/WP.1, paragraph 5.19

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ANNEX 26

PROVISIONAL AGENDA FOR TG 10

Opening of the session

1 Adoption of the agenda

2 Decisions of other bodies

3 Manuals and guidance documents

.1 Manual on chemical pollution to address legal and administrative aspects of HNS incidents;

.2 Manual on oil pollution, Section I – Prevention;

.3 Technical guidelines on sunken oil assessment and removal techniques;

.4 Manual on Incident Command System during oil spill response;

.5 Guideline for oil spill response in fast currents;

.6 Guidance on Sensitivity Mapping for Oil Spill Response;

.7 Publication checklist for new IMO manuals, guidance documents and training materials;

.8 Waste Management Decision Support Tool; and

.9 Operational guide on the use of sorbents.

4 Training

5 Information services and exchange

.1 Summary of incidents involving HNS and lessons learnt;

.2 Inventory of information on best practices/R&D – and HNS response; and

.3 Web platform for OPRC/HNS-related information.

6 Technical co-operation implementation on OPRC and HNS

7 Work programme and provisional agenda for TG 11

8 Any other business

9 Report to the Committee

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ANNEX 27

AMENDMENTS TO RESOLUTION MEPC.121(52) CONCERNING THE WESTERN EUROPEAN WATERS PSSA

The following amendments are made to annex 2 of resolution MEPC.121(52):

In paragraph 2, under **Traffic Separation Schemes,** delete:

- "Off Berlenga"

In paragraph 4, under **Areas to be avoided,** insert:

- "In the region of the Berlengas Islands"

In paragraph 6, under **Mandatory Ship Reporting Systems**, insert:

- "Off the coast of Portugal"

In paragraph 7, under **Coastal Vessel Traffic Services (VTS)**, insert:

- "Coast of Portugal VTS"

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ANNEX 28

DRAFT AMENDMENTS TO MARPOL ANNEX I

Addition of new chapter 9

Chapter 9 – Special requirements for the use or carriage of oils in the Antarctic area

Regulation 43
Special requirements for the use or carriage of oils in the Antarctic area

1 With the exception of vessels engaged in securing the safety of ships or in a search and rescue operation, the carriage in bulk as cargo or carriage and use as fuel of the following:

.1 crude oils having a density at 15°C higher than 900 kg/m^3;

.2 oils, other than crude oils, having a density at 15°C higher than 900 kg/m^3 or a kinematic viscosity at 50°C higher than 180 mm^2/s; or

.3 bitumen, tar and their emulsions,

shall be prohibited in the Antarctic area.

2 When prior operations have included the carriage or use of oils listed in paragraphs 1.1 to 1.3 of this regulation, the cleaning or flushing of tanks or pipelines shall not be required.

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ANNEX 29

AMENDMENTS TO THE GUIDELINES ON THE ORGANIZATION AND METHOD OF WORK OF THE MARITIME SAFETY COMMITTEE AND THE MARINE ENVIRONMENT PROTECTION COMMITTEE AND THEIR SUBSIDIARY BODIES (MSC-MEPC.1/CIRC.2)

New work programme items

1 The following new paragraph 2.11-1 is added after the existing paragraph 2.11:

"2.11-1 Committees should assess the implication for capacity-building and technical co-operation and assistance, initiated at the acceptance of a proposal for the work programme item concerning new, or amendments to existing, mandatory instruments, against the criteria for identification of capacity-building implications, set out in annex 2."

2 The following new annex 2 is added after the existing annex 1:

"**ANNEX 2**

PROCEDURES FOR THE ASSESSMENT OF IMPLICATIONS OF CAPACITY-BUILDING REQUIREMENTS WHEN DEVELOPING NEW, OR AMENDING EXISTING, MANDATORY INSTRUMENTS"

1 INTRODUCTION

1.1 Assembly resolution A.998(25) cautions that, unless the Council, the Committees and their subsidiary bodies adopt a *cradle to grave* approach in relation to matters concerning capacity-building, technical co-operation and assistance, the chances of success in the ratification and effective implementation of IMO instruments may be reduced by the level of unpreparedness or lack of capacity that Governments, particularly of Small Island Developing States (SIDS) and Least Developed Countries (LDCs), experience at the point when implementation of such instruments is urgently required and, therefore, the development of this procedure is in keeping with the provisions of resolution A.998(25).

1.2 Assessment of capacity-building implications for the implementation of new and/or amendment to existing instruments, is an iterative process that begins at the acceptance of the preliminary proposal and runs in parallel up to the process of its implementation.

1.3 The procedure does not prevent States from taking extra actions in promoting the advancement of the objectives of capacity-building through technical assistance or co-operation.

2 DEFINITIONS

For the purposes of this procedure, the following definitions apply:

2.1 "Work programme item" is a clearly defined item of work to achieve a definite goal through the delivery of one or more planned outputs.

2.2 "New work programme item" is any proposal to deliver an output that has not already been planned under the High-level Action Plan.

2.3 "Capacity-building" are sustainable, social, economical or legal measures undertaken through various means for the purposes of a comprehensive transformation of the performance of an Administration or industry player to implement and therefore comply with new or amended instruments.

2.4 "Technical assistance" is a methodology of providing capacity-building rendered through bilateral and/or multilateral exchange of technical knowledge, resources or expertise to a party who has requested such assistance in order to enhance the technical capability of that party to implement existing, new or amended instruments.

2.5 "Technical co-operation" refers to a methodology of providing capacity-building through a multilateral effort to a group of co-operating countries of a particular region by the provision of training and exchange of expertise, knowledge and information in support of efforts aimed at the promotion of the implementation of existing, new and/or amended instruments.

2.6 "Instruments" refers to IMO Conventions and other treaties.

3 PURPOSE AND OBJECTIVES

3.1 The purpose of this procedure is to give effect to resolution A.998(25) aimed at enhancing efforts to promote universal implementation of IMO instruments.

3.2 This procedure is intended to assist in the identification and assessment of capacity-building implications in the following cases:

.1 when the Committee has accepted a proposal for a new work programme item and/or on approval by the Committee of a new instrument;

.2 during implementation of new instruments or amended instruments; and

.3 during the scheduling of capacity-building measures or activities.

3.3 These procedures apply to the Committees of the Organization and they constitute a specific implementation response to resolution A.998(25).

3.4 Promoting universal ratification and compliance with newly adopted IMO instruments.

3.5 Improving the level and quality of implementation of new and/or amended instruments.

3.6 Promoting as far as possible a balanced level of implementation of new instruments.

4 PROCEDURE

4.1 Committees should conduct an assessment of capacity-building implications by following the procedure in the flow chart in Appendix 1.

4.2 Assessments of capacity-building implications should be initiated at acceptance of proposals for new work programme item.

Preliminary assessment of capacity-building implications

4.3 In order to facilitate the assessment of capacity-building implications by the Committee, its Vice-Chairman should, in consultation with the Chairman and assisted by the Secretariat, undertake a preliminary assessment of capacity-building implications, utilizing the checklist for the assessment of the need for capacity-building contained in appendix 2.

4.4 The outcome of the preliminary assessment should be submitted to the Committee concerned for consideration. This should contain the Vice-Chairman's appraisal of:

.1 whether there are or will be capacity-building implications or need for technical assistance;

.2 list of possible implications; and

.3 recommendations on the way forward.

Assessment of capacity-building implications

4.5 Following the preliminary assessment, the Committee should, if necessary, decide to convene the *Ad Hoc* Capacity-building needs Analysis Group (ACAG) to be chaired by the Vice-Chairman of that Committee. The ACAG should consider the preliminary assessment, taking into account comments and any further submissions thereto and, if appropriate, conduct further assessment and present its report and recommendations to the Committee.

4.6 The ACAG may refer a matter through the Committee for further consideration by another organ.

Post assessment of capacity-building implications for implementation of new measures

4.7 When new measures have been approved, the Committee may request ACAG to conduct a post-assessment exercise using the criteria and mechanism contained in appendix 3 to identify issues requiring special focus when implementing technical cooperation and assistance activities.

4.8 Prepare a draft circular communicating possible capacity-building implications and recommendations of a course of action for consideration by the Organization, the membership and/or industry.

5 TERMS OF REFERENCE OF ACAG

5.1 In conducting assessment of capacity-building, the ACAG should be guided by the following:

.1 consider the preliminary assessment of capacity-building and technical assistance actions;

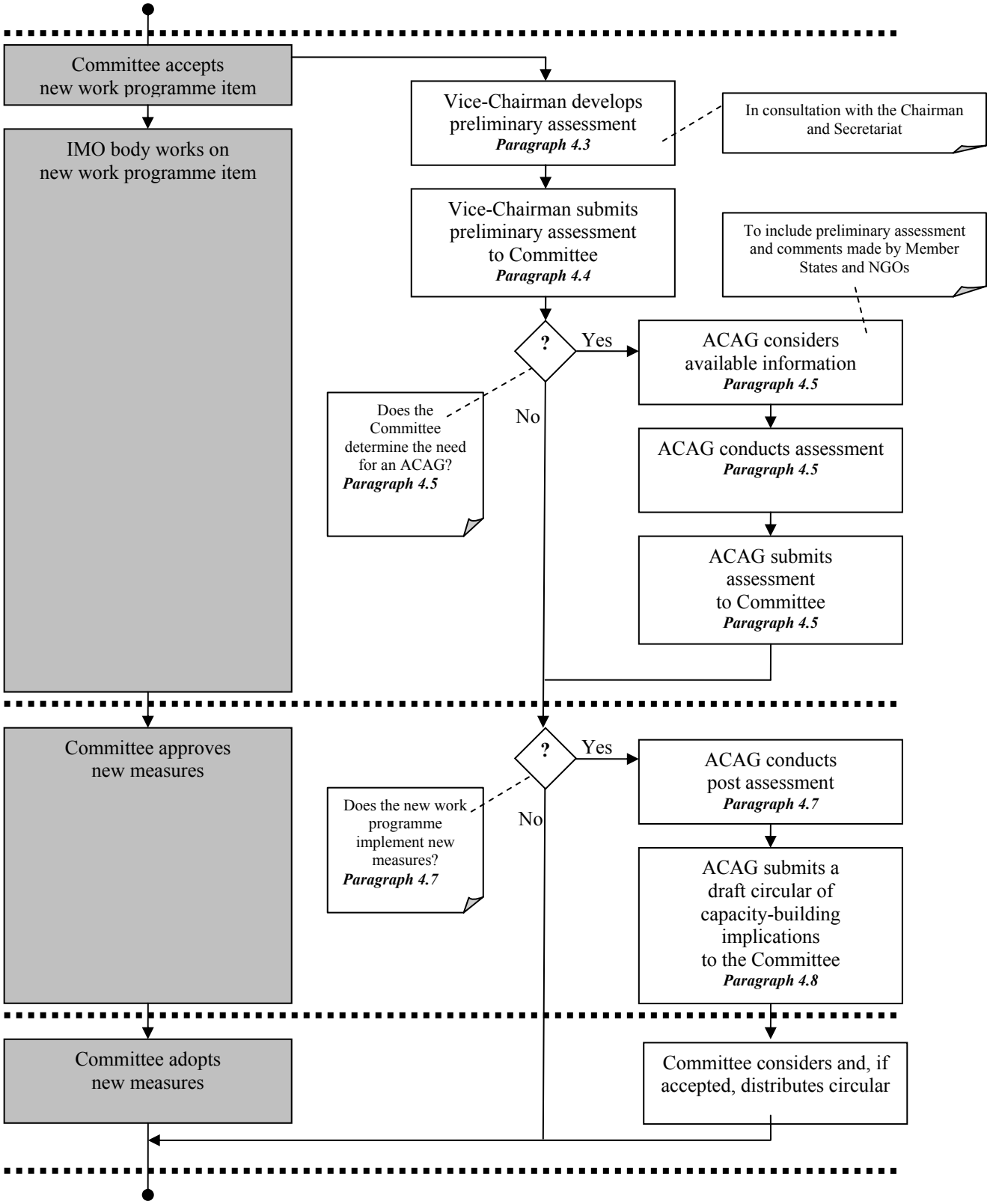
.2 make an assessment and when new measures have been approved, a post assessment of the capacity-building actions that may include technical assistance or technical co-operation required by Administrations for the implementation of the instrument;

.3 in consultation with the industry and non-governmental organizations, make an assessment and, when implementing new measures, a post assessment of the capacity-building actions that may be required or expected of the shipping industry for the implementation of the instrument; and

.4 advise the Committee of the implications for capacity-building relating to a new instrument or the proposed amendment to an existing instrument, whichever is being considered.

APPENDIX 1

IDENTIFICATION OF CAPACITY-BUILDING IMPLICATIONS FLOW CHART



APPENDIX 2

CHECKLIST FOR THE IDENTIFICATION OF CAPACITY-BUILDING IMPLICATIONS

1 For Administrations

- ☐ Is new legislation required
- ☐ Is there a requirement for new equipment and or systems
  - o Does equipment manufacturing capacity exist internationally
  - o Do equipment repair/servicing facilities exist internationally
  - o Is there capacity to develop new systems
- ☐ Will the implementation require additional financial resources
- ☐ Is there a need for additional human resources or new skills
- ☐ Will there be a need to upgrade current infrastructure
- ☐ Is there enough lead-time towards implementation
- ☐ Will there be a rapid implementation procedure adopted
- ☐ Is there a substantial modification of existing standards
- ☐ Will a guide to implementation be needed

2 For the industry

- ☐ Would the industry require new and/or enhancement of existing systems
  - o Does capacity exist internationally to develop new systems
- ☐ Is there a need for additional training of seafarers
  - o Do related and validated training courses exist
  - o Are there sufficient simulation training courses available internationally
- ☐ Will there be a requirement for new equipment
  - o Does manufacturing capacity exist internationally
- ☐ Is there repair/servicing and/or retrofitting and does maintenance capacity exist internationally

APPENDIX 3

CHECKLIST OF ISSUES REQUIRING SPECIAL FOCUS WHEN DEVELOPING CAPACITY-BUILDING RELATED TO THE IMPLEMENTATION OF NEW MEASURES

Capacity-building Measures Form

Instrument _____

Measure number _____ of _____

Required for
- □ Administration
- □□ Industry

Implementation
- □□ Prior to adoption
- □□ Once adopted
- □□ Prior to entry into force
- □□ Once ratified
- □□ Phased in

Description of capacity-building activity needed for the implementation of new measures:

_____

_____

_____

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ANNEX 30

DRAFT ASSEMBLY RESOLUTION

GUIDELINES ON IMPLEMENTATION OF THE INTERNATIONAL SAFETY MANAGEMENT (ISM) CODE BY ADMINISTRATIONS

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 maritime safety and the prevention and control of marine pollution from ships,

RECALLING ALSO resolution A.741(18), by which the Assembly adopted the International Management Code for the Safe Operation of Ships and for Pollution Prevention (International Safety Management (ISM) Code),

RECALLING FURTHER resolution A.788(19), by which the Assembly adopted Guidelines on implementation of the International Safety Management (ISM) Code by Administrations,

NOTING that the ISM Code became mandatory, under the provisions of chapter IX of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, for Companies operating certain types of ships, on 1 July 1998, and for Companies operating other cargo ships and mobile offshore drilling units propelled by mechanical means of 500 gross tonnage and upwards on 1 July 2002,

NOTING ALSO that the Maritime Safety Committee, at its eighty-fifth session, adopted amendments to the ISM Code by resolution MSC.273(85),

RECOGNIZING that an Administration, in establishing that safety standards are being maintained, has a responsibility to ensure that Documents of Compliance and Safety Management Certificates have been issued in accordance with the ISM Code taking into account the Guidelines,

RECOGNIZING ALSO that there may be a need for Administrations to enter into agreements in respect of issuance of certificates by other Administrations in compliance with chapter IX of the 1974 SOLAS Convention and in accordance with resolution A.741(18),

RECOGNIZING FURTHER the need for uniform implementation of the ISM Code,

HAVING CONSIDERED the recommendations made by the Marine Environment Protection Committee at its fifty-ninth session,

1. ADOPTS the Guidelines on implementation of the International Safety Management (ISM) Code by Administrations, set out in the annex to the present resolution;

2. URGES Governments, when implementing the ISM Code, to adhere to the Guidelines;

3. REQUESTS Governments to inform the Organization of any difficulties they have experienced in using the annexed Guidelines;

4. AUTHORIZES the Maritime Safety Committee and the Marine Environment Protection Committee to keep the annexed Guidelines under review and to amend them as necessary;

5. REVOKES resolution A.913(22) with effect as of [1 July 2010].

ANNEX

GUIDELINES ON IMPLEMENTATION OF THE INTERNATIONAL SAFETY MANAGEMENT (ISM) CODE BY ADMINISTRATIONS

Table of contents

INTRODUCTION

The ISM Code

The International Management Code for the Safe Operation of Ships and for Pollution Prevention (International Safety Management (ISM) Code) was adopted by the Organization by resolution A.741(18) and became mandatory by virtue of the entry into force on 1 July 1998 of SOLAS chapter IX on Management for the Safe Operation of Ships. The ISM Code provides an international standard for the safe management and operation of ships and for pollution prevention.

The Maritime Safety Committee, at its eighty-fifth session, adopted amendments to sections 1, 5, 7, 8, 9, 10, 12, 13, 14 and the Appendix of the ISM Code by resolution MSC.273(85). As a result it is necessary to revise the Guidelines contained in Assembly resolution A.913(22), which is being superseded by the present Guidelines.

The ISM Code requires that Companies establish safety objectives as described in section 1.2 of the ISM Code, and in addition that the Companies develop, implement and maintain a safety management system which includes functional requirements as listed in section 1.4 of the ISM Code.

The application of the ISM Code should *support and encourage* the development of a safety culture in shipping. Success factors for the development of a safety culture are, *inter alia***,** commitment, values and beliefs.

Mandatory application of the ISM Code

The appropriate organization of management, ashore and on board, is needed to ensure adequate standards of safety and pollution prevention. A systematic approach to management by those responsible for management of ships is therefore required. The objectives of the mandatory application of the ISM Code are to ensure:

.1 compliance with mandatory rules and regulations related to the safe operation of ships and protection of the environment; and

.2 the effective implementation and enforcement thereof by Administrations.

Effective enforcement by Administrations must include verification that the safety management system complies with the requirements as stipulated in the ISM Code, as well as verification of compliance with mandatory rules and regulations.

The mandatory application of the ISM Code should ensure, support and encourage the taking into account of applicable codes, guidelines and standards recommended by the Organization, Administrations, classification societies and maritime industry organizations.

Verification and certification responsibilities

The Administration is responsible for verifying compliance with the requirements of the ISM Code and for issuing Documents of Compliance to Companies and Safety Management Certificates to ships.

Resolutions A.739(18) – Guidelines for the authorization of organizations acting on behalf of the Administration and A.789(19) – Specifications on the survey and certification functions of recognized organizations acting on behalf of the Administration, which have been made mandatory by virtue of SOLAS regulation XI/1, and resolution A.847(20) – Guidelines to assist flag States in the implementation of IMO instruments, are applicable when Administrations authorize organizations to issue Documents of Compliance and Safety Management Certificates on their behalf.

1 SCOPE AND APPLICATION

1.1 Definitions

The terms used in these Guidelines have the same meaning as those given in the ISM Code.

1.2 Scope and application

1.2.1 These Guidelines establish basic principles:

.1 for verifying that the safety management system of a Company responsible for the operation of ships, or the safety management system for the ship or ships controlled by the Company, complies with the ISM Code; and

.2 for the issue and annual verification of the Document of Compliance and for the issue and intermediate verification of the Safety Management Certificate.

2 VERIFYING COMPLIANCE WITH THE ISM CODE

2.1 General

2.1.1 To comply with the requirements of the ISM Code, Companies should develop, implement and maintain a safety management system to ensure that the safety and environmental protection policy of the Company is implemented. The Company policy should include the objectives defined by the ISM Code.*

2.1.2 Administrations should verify compliance with the requirements of the ISM Code by determining:

.1 the conformity of the Company's safety management system with the requirements of the ISM Code; and

.2 that the safety management system ensures that the objectives defined in paragraph 1.2.3 of the ISM Code are met.

2.1.3 Determining the conformity or non-conformity of safety management system elements with the requirements specified by the ISM Code may demand that criteria for assessment be developed. Administrations are recommended to limit the development of criteria in the form of prescriptive management system solutions. Criteria for assessment in the form of prescriptive requirements may have the effect that safety management in shipping results in Companies implementing solutions prepared by others, and it may then be difficult for a Company to develop the solutions which best suit that particular Company, that particular operation or that specific ship.

2.1.4 Therefore, Administrations are recommended to ensure that these assessments are based on determining the effectiveness of the safety management system in meeting specified objectives, rather than conformity with detailed requirements in addition to those contained in the ISM Code, so as to reduce the need for developing criteria to facilitate assessment of the Companies' compliance with the Code.

* The ICS/ISF Guidelines on the application of the International Safety Management Code provide useful guidance on important individual elements of a safety management system and its development by Companies.

2.2 The ability of the safety management system to meet general safety management objectives

2.2.1 The ISM Code identifies general safety management objectives. These objectives are:

.1 to provide for safe practices in ship operation and a safe working environment;

.2 to assess all identified risks to its ships, personnel and the environment and establish appropriate safeguards; and

.3 to improve continuously the safety-management skills of personnel ashore and aboard, including preparing for emergencies related both to safety and to environmental protection.

The verification should support and encourage Companies in achieving these objectives.

2.2.2 These objectives provide clear guidance to Companies for the development of safety management system elements in compliance with the ISM Code. Since, however, the ability of the safety management system to achieve these objectives cannot be determined beyond whether the safety management system complies with the requirements of the ISM Code, they should not form the basis for establishing detailed interpretations to be used for determining conformity or non-conformity with the requirements of the ISM Code.

2.3 The ability of the safety management system to meet specific requirements of safety and pollution prevention

2.3.1 The main criterion which should govern the development of interpretations needed for assessing compliance with the requirements of the ISM Code should be the ability of the safety management system to meet the specific requirements defined by the ISM Code in terms of specific standards of safety and pollution prevention.

The specific standards of safety and protection of the environment specified by the ISM Code are:

.1 compliance with mandatory rules and regulations; and

.2 that applicable codes, guidelines and standards recommended by the Organization, Administrations, classification societies and other maritime industry organizations are taken into account.

2.3.2 All records having the potential to facilitate verification of compliance with the ISM Code should be open to scrutiny during an examination. For this purpose the Administration should ensure that the Company provide auditors with statutory and classification records relevant to the actions taken by the Company to ensure that compliance with mandatory rules and regulations is maintained. In this regard the records may be examined to substantiate their authenticity and veracity.

2.3.3 Some mandatory requirements may not be subject to statutory or classification surveys, such as:

.1 maintaining the condition of ship and equipment between surveys; and

.2 certain operational requirements.

Specific arrangements may be required to ensure compliance and to provide for the objective evidence needed for verification in these cases, such as:

.1 documented procedures and instructions; and

.2 documentation of the verification carried out by senior officers of day-to-day operation when relevant to ensure compliance.

2.3.4 The verification of compliance with mandatory rules and regulations, which is part of the ISM Code certification, neither duplicates nor substitutes surveys for other maritime certificates. The verification of compliance with the ISM Code does not relieve the Company, the master or any other entity or person involved in the management or operation of the ship of their responsibilities.

2.3.5 Administrations should ensure that the Company has:

.1 taken into account the recommendations, as referred to in 1.2.3.2 of the ISM Code, when establishing the safety management system; and

.2 developed procedures to ensure that these recommendations are implemented on shore and on board.

2.3.6 Within a safety management system, implementation of codes, guidelines and standards recommended by the Organization, Administrations, classification societies and other maritime industry organizations does not make these recommendations mandatory under the ISM Code. Nevertheless auditors should encourage Companies to adopt these recommendations whenever applicable to the Company.

3 THE CERTIFICATION PROCESS

3.1 Certification activities

3.1.1 The certification process relevant to a Document of Compliance for a Company and a Safety Management Certificate to a ship will normally involve the following steps:

.1 initial verification;

.2 annual or intermediate verification;

.3 renewal verification; and

.4 additional verification.

These verifications are carried out at the request of the Company to the Administration, or to the organization recognized by the Administration to perform certification functions under the ISM Code, or at the request of the Administration by another Contracting Government to the Convention.

The verifications will include an audit of the safety management system.

3.2 Initial verification

3.2.1 The Company should apply for ISM Code certification to the Administration.

3.2.2 An assessment of the shore side management system undertaken by the Administration would necessitate assessment of the offices where such management is carried out and possibly of other locations, depending on the Company's organization and the functions of the various locations.

3.2.3 On satisfactory completion of the assessment of the shoreside safety management system, arrangements/planning may commence for the assessment of the Company's ships.

3.2.4 On satisfactory completion of the assessment, a Document of Compliance will be issued to the Company, copies of which should be forwarded to each shoreside premises and each ship in the Company's fleet. As each ship is assessed and issued with a Safety Management Certificate, a copy of it should also be forwarded to the Company's head office.

3.2.5 In cases where certificates are issued by a recognized organization, copies of all certificates should also be sent to the Administration.

3.2.6 The safety management audit for the Company and for a ship will involve the same basic steps. The purpose is to verify that a Company or a ship complies with the requirements of the ISM Code. The audits include:

.1 the conformity of the Company's safety management system with the requirements of the ISM Code, including objective evidence demonstrating that the Company's safety management system has been in operation for at least three months and that a safety management system has been in operation on board at least one ship of each type operated by the Company for at least three months; and

.2 that the safety management system ensures that the objectives defined in paragraph 1.2.3 of the ISM Code are met. This includes verification that the Document of Compliance for the Company responsible for the operation of the ship is applicable to that particular type of ship, and assessment of the shipboard safety management system to verify that it complies with the requirements of the ISM Code, and that it is implemented. Objective evidence demonstrating that the Company's safety management system has been functioning effectively for at least three months on board the ship and ashore should be available, including, *inter alia*, records from the internal audit performed by the Company.

3.3 Annual verification of Document of Compliance

3.3.1 Annual safety management audits are to be carried out to maintain the validity of the Document of Compliance, and should include examining and verifying the correctness of the statutory and classification records presented for at least one ship of each type to which the Document of Compliance applies. The purpose of these audits is to verify the effective functioning of the safety management system, and that any modifications made the Safety Management System comply with the requirements of the ISM Code.

3.3.2 Annual verification is to be carried out within three months before and after each anniversary date of the Document of Compliance. A schedule not exceeding three months is to be agreed for completion of the necessary corrective actions.

3.3.3 Where the Company has more than one shoreside premises, each of which may not have been visited at the initial assessment, the annual assessments should endeavour to ensure that all sites are visited during the period of validity of the Document of Compliance.

3.4 Intermediate verification of Safety Management Certificates

3.4.1 Intermediate safety management audits should be carried out to maintain the validity of the Safety Management Certificate. The purpose of these audits is to verify the effective functioning of the safety management system and that any modifications made to the safety management system comply with the requirements of the ISM Code. In certain cases, particularly during the initial period of operation under the safety management system, the Administration may find it necessary to increase the frequency of the intermediate verification. Additionally, the nature of non-conformities may also provide a basis for increasing the frequency of intermediate verifications.

3.4.2 If only one intermediate verification is to be carried out, it should take place between the second and third anniversary date of the issue of the Safety Management Certificate.

3.5 Renewal verification

Renewal verifications are to be performed before the validity of the Document of Compliance or the Safety Management Certificate expires. The renewal verification will address all the elements of the safety management system and the activities to which the requirements of the ISM Code apply. Renewal verification may be carried out from three months before the date of expiry of the Document of Compliance or the Safety Management Certificate, and should be completed before their date of expiry.

3.6 Safety management audits

The procedure for safety management audits outlined in the following paragraphs includes all steps relevant for initial verification. Safety management audits for annual verification and renewal verification should be based on the same principles even if their scope may be different.

3.7 Application for audit

3.7.1 The Company should submit a request for audit to the Administration or to the organization recognized by the Administration for issuing a Document of Compliance or a Safety Management Certificate on behalf of the Administration.

3.7.2 The Administration or the recognized organization should then nominate the lead auditor and, if relevant, the audit team.

3.8 Preliminary review (Document review)

As a basis for planning the audit, the auditor should review the safety management manual to determine the adequacy of the safety management system in meeting the requirements of the ISM Code. If this review reveals that the system is not adequate, the audit will have to be delayed until the Company undertakes corrective action.

3.9 Preparing the audit

3.9.1 The nominated lead auditor should liaise with the Company and produce an audit plan.

3.9.2 The auditor should provide the working documents which are to govern the execution of the audit to facilitate the assessments, investigations and examinations in accordance with the standard procedures, instructions and forms which have been established to ensure consistent auditing practices.

3.9.3 The audit team should be able to communicate effectively with auditees.

3.10 Executing the audit

3.10.1 The audit should start with an opening meeting in order to introduce the audit team to the Company's senior management, summarize the methods for conducting the audit, confirm that all agreed facilities are available, confirm time and date for a closing meeting and clarify possible unclear details relevant to the audit.

3.10.2 The audit team should assess the safety management system on the basis of the documentation presented by the Company and objective evidence as to its effective implementation.

3.10.3 Evidence should be collected through interviews and examination of documents. Observation of activities and conditions may also be included when necessary to determine the effectiveness of the safety management system in meeting the specific standards of safety and protection of the environment required by the ISM Code.

3.10.4 Audit observations should be documented. After activities have been audited, the audit team should review their observations to determine which are to be reported as non-conformities. Non-conformities should be reported in terms of the general and specific provisions of the ISM Code.

3.10.5 At the end of the audit, prior to preparing the audit report, the audit team should hold a meeting with the senior management of the Company and those responsible for the functions concerned. The purpose is to present the observations in such a way as to ensure that the results of the audit are clearly understood.

3.11 Audit report

3.11.1 The audit report should be prepared under the direction of the lead auditor, who is responsible for its accuracy and completeness.

3.11.2 The audit report should include the audit plan, identification of audit team members, dates and identification of the Company, observations on any non-conformities and observations on the effectiveness of the safety management system in meeting the specified objectives.

3.11.3 The Company should receive a copy of the audit report. The Company should be advised to provide a copy of the shipboard audit reports to the ship.

3.12 Corrective action follow-up

3.12.1 The Company is responsible for determining and initiating the corrective action needed to correct a non-conformity or to correct the cause of the non-conformity. Failure to correct non-conformities with specific requirements of the ISM Code may affect the validity of the Document of Compliance and related Safety Management Certificates.

3.12.2 Corrective actions and possible subsequent follow-up audits should be completed within the time period agreed. The Company should apply for the follow-up audits.

3.13 Company responsibilities pertaining to safety management audits

3.13.1 The verification of compliance with the requirements of the ISM Code does not relieve the Company, management, officers or seafarers of their obligations as to compliance with national and international legislation related to safety and protection of the environment.

3.13.2 The Company is responsible for:

.1 informing relevant employees about the objectives and scope of the ISM Code certification;

.2 appointing responsible members of staff to accompany members of the team performing the certification;

.3 providing the resources needed by those performing the certification to ensure an effective and efficient verification process;

.4 providing access and evidential material as requested by those performing the certification; and

.5 co-operating with the verification team to permit the certification objectives to be achieved.

3.13.3 Where major non-conformities are identified, Administrations and recognized organizations (ROs) should comply with the procedures stated in MSC/Circ.1059-MEPC/Circ.401.

3.14 Responsibilities of the organization performing the ISM Code certification

The organization performing the ISM Code certification is responsible for ensuring that the certification process is performed according to the ISM Code and these Guidelines. This includes management control of all aspects of the certification according to the appendix to these Guidelines.

3.15 Responsibilities of the verification team

3.15.1 Whether the verifications involved with certification are performed by a team or not, one person should be in charge of the verification. The leader should be given the authority to make final decisions regarding the conduct of the verification and any observations. His responsibilities should include:

.1 preparation of a plan for the verification; and

.2 submission of the report of the verification.

3.15.2 Personnel participating in the verification are responsible for complying with the requirements governing the verification, ensuring confidentiality of documents pertaining to the certification and treating privileged information with discretion.

APPENDIX

STANDARDS ON ISM CODE CERTIFICATION ARRANGEMENTS

1 INTRODUCTION

The audit team involved with ISM Code certification, and the organization under which it may be managed, should comply with the specific requirements stated in this annex.

2 STANDARD OF MANAGEMENT

2.1 Organizations managing verification of compliance with the ISM Code should have, in their own organization, competence in relation to:

.1 ensuring compliance with the rules and regulations, including certification of seafarers, for the ships operated by the Company;

.2 approval, survey and certification activities;

.3 the terms of reference that must be taken into account under the safety management system as required by the ISM Code; and

.4 practical experience of ship operation.

2.2 The Convention requires that organizations recognized by Administrations for issuing a Document of Compliance and a Safety Management Certificate at their request should comply with resolutions A.739(18) – Guidelines for the authorization of organizations acting on behalf of the Administration and A.789(19) – Specifications on the survey and certification functions of recognized organizations acting on behalf of the Administration.

2.3 Any organization performing verification of compliance with the provisions of the ISM Code should ensure that there exists independence between the personnel providing consultancy services and those involved in the certification procedure.

3 STANDARDS OF COMPETENCE

3.1 ISM Code certification scheme management

Management of ISM Code certification schemes should be carried out by those who have practical knowledge of ISM Code certification procedures and practices.

3.2 Basic competence for performing verification

3.2.1 Personnel who are to participate in the verification of compliance with the requirements of the ISM Code should have a minimum of formal education comprising the following:

.1 qualifications from a tertiary institution recognized by the Administration or by the recognized organization within a relevant field of engineering or physical science (minimum two years programme); or

.2 qualifications from a marine or nautical institution and relevant seagoing experience as a certified ship officer.

3.2.2 They should have undergone training to ensure adequate competence and skills for performing verification of compliance with the requirements of the ISM Code, particularly with regard to:

.1 knowledge and understanding of the ISM Code;

.2 mandatory rules and regulations;

.3 the terms of reference which the ISM Code requires that Companies should take into account;

.4 assessment techniques of examining, questioning, evaluating and reporting;

.5 technical or operational aspects of safety management;

.6 basic knowledge of shipping and shipboard operations; and

.7 participation in at least one marine-related management system audit.

3.2.3 Such competence should be demonstrated through written or oral examinations, or other acceptable means.

3.3 Competence for initial verification and renewal verification

3.3.1 In order to assess fully whether the Company or the ship complies with the requirements of the ISM Code, in addition to the basic competence stated under 3.2 above, personnel who are to perform initial verifications or renewal verifications for a Document of Compliance or a Safety Management Certificate must possess the competence to:

.1 determine whether the safety management system elements conform or do not conform with the requirements of the ISM Code;

.2 determine the effectiveness of the Company's safety management system, or that of the ship, to ensure compliance with rules and regulations as evidenced by the statutory and classification survey records;

.3 assess the effectiveness of the safety management system in ensuring compliance with other rules and regulations which are not covered by statutory and classification surveys and enabling verification of compliance with these rules and regulations; and

.4 assess whether the safe practices recommended by the Organization, Administrations, classification societies and maritime industry organizations have been taken into account.

3.3.2 This competence can be accomplished by teams which together possess the total competence required.

3.3.3 Personnel who are to be in charge of initial verification or renewal verification of compliance with the requirements of the ISM Code should have at least five years' experience in areas relevant to the technical or operational aspects of safety management, and should have participated in at least three initial verifications or renewal verifications. Participation in verification of compliance with other management standards may be considered as equivalent to participation in verification of compliance with the ISM Code.

3.4 Competence for annual, intermediate and interim verification

Personnel who are to perform annual, intermediate and interim verifications should satisfy basic requirements for personnel participating in verifications and should have participated in a minimum of two annual, renewal or initial verifications. They should have received special instructions needed to ensure that they possess the competence required to determine the effectiveness of the Company's safety management system.

4 QUALIFICATION ARRANGEMENTS

Organizations performing ISM Code certification should have implemented a documented system for qualification and continuous updating of the knowledge and competence of personnel who are to perform verification of compliance with the ISM Code. This system should comprise theoretical training courses covering all the competence requirements and the appropriate procedures connected to the certification process, as well as practical tutored training, and it should provide documented evidence of satisfactory completion of the training.

5 CERTIFICATION PROCEDURES AND INSTRUCTIONS

Organizations performing ISM Code certification should have implemented a documented system to ensure that the certification process is performed in accordance with this standard. This system should, *inter alia*, include procedures and instructions for the following:

.1 contract agreements with Companies;

.2 planning, scheduling and performing verification;

.3 reporting results from verification;

.4 issuance of Documents of Compliance, Safety Management Certificates and Interim Documents of Compliance and Safety Management Certificates; and

.5 corrective action and follow-up of verifications, including actions to be taken in cases of major non-conformity.

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ANNEX 31

REVISED WORK PROGRAMME OF THE BLG SUB-COMMITTEE AND PROVISIONAL AGENDA FOR BLG 14

		Target completion date/number of sessions needed for completion	Reference
1	**Evaluation of safety and pollution hazards of chemicals and preparation of consequential amendments** *Strategic direction: 7.2* *High-level action: 7.2.2* *Planned output: 7.2.2.1*	Continuous	BLG 13/18, section 3
2	**Casualty analysis** (coordinated by FSI) *Strategic direction: 12.1* *High-level action: 12.1.2* *Planned output: 12.1.2.1 to .2*	Continuous	MSC 70/23, paragraphs 9.17 and 20.4; MSC 80/24, paragraph 21.6; BLG 13/18, section 7
3	**Consideration of IACS Unified Interpretations** *Strategic direction: 1.1* *High-level action: 1.1.2* *Planned output: 1.1.2.1*	Continuous	MSC 78/26, paragraph 22.12; BLG 13/18, section 8
H.1	Environmental and safety aspects of alternative tanker designs under MARPOL, Annex I, regulation 19 *Strategic direction: 7.2* *High-level action: 7.2.2* *Planned output: 7.2.2.1*		BLG 3/18, paragraph 15.7
	.1 assessment of alternative tanker designs, if any (as necessary)	Continuous	BLG 1/20, section 16; BLG 4/18, paragraph 15.3
H.2	**Development of provisions for gas-fuelled ships** (in cooperation with FP and DE) *Strategic direction: 5.2* *High-level action: 5.2.1* *Planned output: 5.2.1.1*	2012	MSC 78/26, paragraph 24.11; BLG 13/18, section 6

Notes: 1 "H" means a high priority item and "L" means a low priority item. However, within the high and low priority groups, items have not been listed in any order of priority.
2 Items printed in bold letters have been selected for the provisional agenda for BLG 14.

Sub-Committee on Bulk Liquids and Gases (BLG) (continued)

		Target completion date/number of sessions needed for completion	Reference
H.3	**Development of guidelines and other documents for uniform implementation of the 2004 BWM Convention** *Strategic direction: 7.1* *High-level action: 7.1.2* *Planned output: 7.1.2.2 to .5*	2010	MEPC 57/21, paragraph 18.11; BLG 13/18, section 5
H.4	**Application of the requirements for the carriage of bio-fuels and bio-fuel blends** *Strategic direction: 7.2* *High-level action: 7.2.2* *Planned output: 7.2.2.1*	2010	MEPC 55/23, paragraphs 19.4 and 19.5; BLG 13/18, section 4
H.5	**Development of international measures for minimizing the transfer of invasive aquatic species through bio-fouling of ships** *Strategic direction: 7.1* *High-level action: 7.1.1* *Planned output: -*	2010	MEPC 56/23, paragraph 19.12; BLG 13/18, section 9
H.6	**Revision of the IGC Code** (in cooperation with FP, DE, SLF and STW as necessary) *Strategic direction: 5.2* *High-level action: 5.2.1* *Planned output: -*	2010	MSC 83/28, paragraph 25.7; BLG 13/18, section 11
H.7	**Safety requirements for natural gas hydrate pellet carriers** *Strategic direction: 5.2* *High-level action: 5.2.1* *Planned output: -*	2011	MSC 83/28, paragraph 25.6; BLG 13/18, section 12

Sub-Committee on Bulk Liquids and Gases (BLG) (continued)

		Target completion date/number of sessions needed for completion	Reference
H.8	**Review of relevant non-mandatory instruments as a consequence of the amended MARPOL Annex VI and the NO_x Technical Code** *Strategic direction: 7.3* *High-level action: 7.3.1* *Planned output: -*	2010	MEPC 57/21, paragraph 18.11; BLG 13/18, section 13
H.9	**Revision of the Recommendations for entering enclosed spaces aboard ships** (coordinated by DSC) *Strategic direction: 5.2* *High-level action: 5.2.3* *Planned output: -*	2010	MSC 85/26, paragraph 23.4

REVISED PROVISIONAL AGENDA FOR BLG 14

	Opening of the session
1	Adoption of the agenda
2	Decisions of other IMO bodies
3	Evaluation of safety and pollution hazards of chemicals and preparation of consequential amendments
4	Application of the requirements for the carriage of bio-fuels and bio-fuel blends
5	Development of guidelines and other documents for uniform implementation of the 2004 BWM Convention
6	Development of provisions for gas-fuelled ships
7	Casualty analysis
8	Consideration of IACS Unified Interpretations
9	Development of international measures for minimizing the transfer of invasive aquatic species through bio-fouling of ships
10	Revision of the IGC Code
11	Safety requirements for natural gas hydrate pellet carriers
12	Review of relevant non-mandatory instruments as a consequence of the amended MARPOL Annex VI and the NO_x Technical Code
13	Revision of the Recommendations for entering enclosed spaces aboard ships
14	Work programme and agenda for BLG 15
15	Election of Chairman and Vice-Chairman for 2011
16	Any other business
17	Report to the Committees

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ANNEX 32

REVISED WORK PROGRAMME OF THE FSI SUB-COMMITTEE AND PROVISIONAL AGENDA FOR FSI 18

		Target completion date/number of sessions needed for completion	Reference
1	**Mandatory reports under MARPOL** *Strategic direction:* *2* *High-level action:* *2.1.1* *Planned output:* *2.1.1.6*	Continuous	MSC 70/23, paragraph 20.12.1; MEPC 56/23, paragraph 14.4; FSI 17/20, section 4
2	**Casualty statistics and investigations** *Strategic direction:* *1.1/2/4/5.3/ 12.1/12.3* *High-level action:* *1.1.2/2.1.1/ 4.2.1/5.3.1/ 12.1.2/12.3.1* *Planned output:* *1.1.2.1/2.1.1.1/ 4.2.1.1/4.2.1.3/ 5.3.1.5/12.1.2.1/ 12.1.2.2/12.3.1.1*	Continuous	MSC 68/23, paragraphs 7.16 to 7.24; FSI 17/20, section 6
3	**Harmonization of port State control activities** *Strategic direction:* *1.1/2/4/5.3/12.3* *High-level action:* *1.1.2/2.1.1/ 4.2.1/5.3.1/12.3.1* *Planned output:* *1.1.2.1/2.1.1.7/ 4.2.1.1/4.2.1.3/ 5.3.1.2/5.3.1.3/ 5.3.1.4/5.3.1.5/12.3.1.2*	Continuous	MSC 71/23, paragraph 20.16; MSC 80/24, paragraph 21.16; FSI 17/20, section 7
4	**Responsibilities of Governments and measures to encourage flag State compliance** *Strategic direction:* *2/4/5.3* *High-level action:* *2.1.1/4.2.1/5.3.1* *Planned output:* *2.1.1.5/4.2.1.2/5.3.1.5*	Continuous	MSC 68/23, paragraphs 7.2 to 7.8; FSI 17/20, section 3

Notes: 1 "H" means a high priority item and "L" means a low priority item. However, within the high and low priority groups, items have not been listed in any order of priority.

2 Items printed in bold letters have been selected for the provisional agenda for FSI 18.

Sub-Committee on Flag State Implementation (FSI) (continued)

		Target completion date/number of sessions needed for completion	Reference
5	**Comprehensive analysis of difficulties encountered in the implementation of IMO instruments** *Strategic direction: 2* *High-level action: 2.1.1* *Planned output: 2.1.1.5*	Continuous	MSC 69/22, paragraph 20.28; FSI 8/19, paragraph 4.3; FSI 17/20, section 10
6	**Review of the Survey Guidelines under the HSSC** *Strategic direction: 5.2* *High-level action: 5.2.1* *Planned output: 5.2.1.2*	Continuous	MSC 72/23, paragraph 21.27; FSI 17/20, section 11
7	**Consideration of IACS Unified Interpretations** *Strategic direction: 1.1* *High-level action: 1.1.2* *Planned output: 1.1.2.1*	Continuous	MSC 78/26, paragraph 22.12; FSI 17/20, section 12
8	**Review of the Code for the Implementation of Mandatory IMO Instruments** *Strategic direction: 2* *High-level action: 2.2.1* *Planned output: 2.2.1.2*	Continuous	MSC 83/28, paragraph 25.27; FSI 17/20, section 13
H.1	**PSC guidelines on seafarers' working hours and PSC guidelines in relation to the Maritime Labour Convention, 2006** *Strategic direction: 1.1* *High-level action: 1.1.2* *Planned output: 1.1.2.1*	2010	MSC 70/23, paragraph 20.12.3; FSI 17/20, section 8
H.2	**Development of guidelines on port State control under the 2004 BWM Convention** *Strategic direction: 2/5.3* *High-level action: 2.1.1/5.3.1* *Planned output: 2.1.1.2/5.3.1.2*	2010	MEPC 52/24, paragraph 2.21.2; FSI 17/20, section 9

Sub-Committee on Flag State Implementation (FSI) (continued)

		Target completion date/number of sessions needed for completion	Reference
H.3	**Port reception facilities-related issues** *Strategic direction: 7.1* *High-level action: 7.1.3* *Planned output: 7.1.3.1/7.1.3.2*	2010	MEPC 53/24, paragraph 9.7; FSI 17/20, section 5
H.4	**Development of a Code for Recognized Organizations** *Strategic direction: 2* *High-level action: 2.1.1* *Planned output: 2.1.1.1*	2010	MSC 84/24, paragraph 22.27; FSI 17/20, section 14
H.5	**Measures to protect the safety of persons rescued at sea** *Strategic direction: 5.1* *High-level action: 5.1.2* *Planned output: -*	2010	MSC 84/24, section 22; FSI 17/20, section 15
H.6	**Review of the Guidelines for inspection of anti-fouling systems on ships** *Strategic direction: 5.3, 7* *High-level action: 5.3.1/7.1.2* *Planned output: 5.3.1.2/7.1.2.8*	2010	MEPC 59/24, paragraph 10.41

REVISED PROVISIONAL AGENDA FOR FSI 18

	Opening of the session
1	Adoption of the agenda
2	Decisions of other IMO bodies
3	Responsibilities of Governments and measures to encourage flag State compliance
4	Mandatory reports under MARPOL
5	Port reception facilities-related issues
6	Casualty statistics and investigations
7	Harmonization of port State control activities
8	PSC Guidelines on seafarers' working hours and PSC Guidelines in relation to the Maritime Labour Convention, 2006
9	Development of Guidelines on port State control under the 2004 BWM Convention
10	Review of the Guidelines for inspection of anti-fouling systems on ships
11	Comprehensive analysis of difficulties encountered in the implementation of IMO instruments
12	Review of the Survey Guidelines under the HSSC
13	Consideration of IACS Unified Interpretations
14	Review of the Code for the Implementation of Mandatory IMO Instruments
15	Development of a Code for Recognized Organizations
16	Measures to protect the safety of persons rescued at sea
17	Work programme and agenda for FSI 19
18	Election of Chairman and Vice-Chairman for 2011
19	Any other business
20	Report to the Committees

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ANNEX 33

REVISED WORK PROGRAMMES OF THE DSC, NAV AND DE SUB-COMMITTEES WHICH RELATE TO ENVIRONMENTAL ISSUES

SUB-COMMITTEE ON DANGEROUS GOODS, SOLID CARGOES AND CONTAINERS (DSC)

		Target completion date/number of sessions needed for completion	Reference
2	**Reports on incidents involving dangerous goods or marine pollutants in packaged form on board ships or in port areas** *Strategic direction: 12.3* *High-level action: 12.3.1* *Planned output: -*	Continuous	DSC 13/20, section 6
H.1	**Amendment (35-10) to the IMDG Code and supplements** *Strategic direction: 5.2* *High-level action: 5.2.3* *Planned output: 5.2.3.1*	2009	DSC 13/20, section 3
H.10	**Amendments to MARPOL Annex III**[*] *Strategic direction: 5.2* *High-level action: 5.2.3* *Planned output: -*	2009	DSC 13/20, section 16

SUB-COMMITTEE ON SAFETY OF NAVIGATION (NAV)

1	**Routeing of ships, ship reporting and related matters** *Strategic direction: 5.2* *High-level action: 5.2.4* *Planned output: 5.2.4.1*	Continuous	MSC 72/23, paragraphs 10.69 to 10.71, 20.41 and 20.42; NAV 54/25, section 3

Notes: 1 "H" means a high priority item and "L" means a low priority item. However, within the high and low priority groups, items have not been listed in any order of priority.

2 Items printed in bold letters have been selected for the provisional agenda for Sub-Committees.

[*] Subject to the decision of MEPC 59.

SUB-COMMITTEE ON SHIP DESIGN AND EQUIPMENT (DE)

		Target completion date/number of sessions needed for completion	Reference
H.1	**Amendments to resolution A.744(18)** *Strategic direction: 5.2* *High-level action: 5.2.1* *Planned output: 5.2.1.1*	2010*	DE 45/27, paragraphs 7.18 and 7.19; DE 52/21, section 3
H.10	**Protection against noise on board ships** *Strategic direction: 5.2* *High-level action: 5.2.1* *Planned output: -*	2010	MSC 83/28, paragraph 25.41
H.16	**Interpretation on application of SOLAS, MARPOL and Load Line requirements for major conversions of oil tankers** *Strategic direction: 2* *High-level action: 2.1.1* *Planned output: 2.1.1.2 and 2.1.1.4*	2010	MSC 85/26, paragraph 23.28
H.17	**Development of a mandatory Code for ships operating in polar waters** *Strategic direction: 5.2* *High-level action: 5.2.1* *Planned output: -*	2012	DE 52/21, paragraph 9.31; MSC 86/26, paragraph 23 ; MEPC 59/24, paragraph 20.19
L.3	**Guidelines on equivalent methods to reduce onboard NO_x emissions** *Strategic direction: 7* *High-level action: 7.3.1* *Planned output: -*	2 sessions	MEPC 41/20, paragraph 8.22.1; BLG 10/19, paragraph 12.3; MEPC 55/23, paragraph 19.9

* To be included in the provisional agenda for DE 54.

SUB-COMMITTEE ON SHIP DESIGN AND EQUIPMENT (DE) (continued)

		Target completion date/number of sessions needed for completion	Reference
H.22	**Improvement of existing pollution prevention equipment** .1 Development of test standards for type approval of add-on equipment .2 Promotion of integrated bilge water treatment system *Strategic direction:* *7.1* *High-level action:* *7.1.2* *Planned output:* -	2011	MEPC 59/24, paragraph 20.20; DE 52/21, paragraphs 20.22 to 20.31
H.23	**Development of guidelines for a shipboard oil waste pollution prevention plan** *Strategic direction:* *7.1* *High-level action:* *7.1.2* *Planned output:* -	2011	MEPC 59/24, paragraph 20.13
H.24	**Manually operated alternatives in the event of pollution prevention equipment malfunctions** *Strategic direction:* *7.1* *High-level action:* *7.1.2* *Planned output:* -	2011	MEPC 59/24, paragraphs 10.31 and 20.21

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ANNEX 34

ITEMS TO BE INCLUDED IN THE AGENDAS FOR MEPC 60, MEPC 61 AND MEPC 62

No.	Item	MEPC 60 March 2010	MEPC 61 October 2010	MEPC 62 July 2011
1	Harmful aquatic organisms in ballast water	X	RG X	X
2	Recycling of ships	WG X	X	X
3	Prevention of air pollution from ships	WG X	[WG] X	X
4	Consideration and adoption of amendments to mandatory instruments	DG X	[X]	[X]
5	Interpretations of, and amendments to, MARPOL and related instruments	X	X	X
6	Implementation of the OPRC Convention and the OPRC-HNS Protocol and relevant Conference resolutions	X	X	X
7	Identification and protection of Special Areas and PSSAs	X	X	X
8	Inadequacy of reception facilities	X	X	X
9	Reports of sub-committees	X	X	X
10	Work of other bodies	X	X	X
11	Status of Conventions	X	X	X

No.	Item	MEPC 60 March 2010	MEPC 61 October 2010	MEPC 62 July 2011
12	Harmful anti-fouling systems for ships	X	X	X
13	Promotion of implementation and enforcement of MARPOL and related instruments	X	X	X
14	Technical Co-operation Sub-programme for the Protection of the Marine Environment	X	X	X
15	Role of the human element	X	X	[WG] X
16	Formal safety assessment	WG X	[X]	[X]
17	Noise from commercial shipping and its adverse impacts on marine life	X	X	X
18	Work programme of the Committee and subsidiary bodies	X	X	X
19	Application of the Committees' Guidelines	X	X	[X]
20	Election of the Chairman and Vice-Chairman		X	X
21	Any other business	X	X	X

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ANNEX 35

CLOSING REMARKS OF THE SECRETARY-GENERAL AT THE END OF MEPC 59 (17 July 2009)

Mr. Chairman, distinguished delegates,

We are approaching the end of an **exceptionally busy** session that has also been a **momentous** one with regard to all the issues you dealt with. So, after five days of strenuous efforts, you can look back with satisfaction on what you were able to achieve.

From amongst the many milestones of this session, I will focus **exclusively** on your work relating to **climate change** and where we go from here. This, not only because of the importance and significance of the issue but also because of the pressure of time under which complex decisions had to be made, with the Copenhagen Conference only **five** months away.

I would be carrying coal to Newcastle if, on this occasion, I stressed again the need to intensify our efforts to reduce GHG emissions from shipping operations. However, to effectively tackle climate change, the endeavour should be consistent, holistic and global: we must, as the "Times" newspaper suggested recently, demand much of our scientists, our economists, our politicians, our writers and ourselves.

We need our **scientists** to lay out, brutally if necessary, the scale of the problem. And we need them to apply all their ingenuity and inventiveness to the putative technological responses to climate change. The best hope for man will be found in a laboratory, not on a soapbox.

But we also need **economists**. It is only by finding a way of painting green the age-old and inescapable laws of supply and demand, that we will find sustainability. Man's story is one of the pursuit and defence of natural resources and riches. An economic template based solely on a self-denying frugality that goes against Man's nature will not provide a lasting solution to the problem.

We will also need **politicians** of the highest calibre. Our nightmarish scenario painted by the prophets of climate doom is the fragmenting of the world into entities fighting for the world's dwindling resources. We need politicians capable of creating and sustaining a consensus. Copenhagen will test their mettle.

The war on climate change also needs its **poets**. Hearts must be won and minds changed; jargon and sloganeering cannot speak to the hearts of the unconvinced.

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Distinguished delegates,

Balancing the future growth of world trade against an essential reduction in greenhouse gases is not, as "Lloyd's List" remarked recently, a decision to be taken lightly. It is, however, a decision that needs to be made – and made now, in the harsh glare of public scrutiny and political perceptions. The world is watching – and this and future generations are expecting. We do not have the right to let them down.

As I said in my opening speech, the time for apportioning blame as to who is responsible for the state of the planet has passed. Now it is time for action. Developed and developing countries, industrialized and emerging economies alike are left with no option other than to get together and, **together**, work out solutions that will serve well the good cause of reversing the route to planet destruction. Time cannot wait: IMO, that is, its Member Governments, must act – and act in such a manner that the Copenhagen Conference will find it easy to repeat the decision made in Kyoto, to continue entrusting the Organization with the regulation of shipping from the reduction and limitation of GHG emissions points of view. We have every good reason to try to achieve that.

Your sterling work to drive forward the Committee's agreed action plan on **greenhouse gas emissions from ships** deserves to be recognized as compelling proof that IMO **can**, indeed, **be entrusted** with the regulation of international shipping on the issue of climatic change – an unequivocal message that needs to be heard, and fully understood, all over the globe. To that end, I urge each of you to actively promote, on your return home, the successful outcome of this session, by **explaining** it to your colleagues, in particular those who will participate in the Copenhagen Conference in December, and by **publicizing** it widely to other interested parties and all those concerned with the survival of the planet.

What, then, would I consider to be "concrete progress" in pursuing the objectives you set out to attain at this session? I think I can identify them as:

- **one**, your agreement to the circulation of guidelines on the **Energy Efficiency Design Index** and on the **Energy Efficiency Operational Indicator**;
- **two**, your similar agreement with respect to the **Ship Energy Efficiency Management Plan**; and
- **three**, the focused and well-structured discussion on **market-based instruments** and your elaboration of a work plan to progress the matter further.

The complexity of the issue as to which market-based instrument to choose is exacerbated by the need to provide convincing answers not only to the question "which of the schemes proposed is the more politically palatable" but also which one stands the best chance, once selected and implemented, of achieving its main purposes: namely, that it benefits the environment by helping to stem climate change, at the same time casting shipping as an environment-conscious industry whose credentials continue to include those of being the most energy-efficient and environment-friendly mode of transport; an industry determined to form part of the solution to the climatic problem, not a contributor to its creation and persistence.

When, back at home, you continue enquiring which scheme to support, I believe you should, in your analysis of the situation, try to answer questions such as these:

- **Which** of the schemes proposed has the potential to **contribute** most to the world efforts to stem climate change and global warming by ensuring participation by **all** the IMO Members?

- **How** best might it satisfy the aspirations of all Members, in particular those of the developing countries, without moving away from the level playing field consistently advocated by IMO?

- **Who** will contribute to the preferred system's proper functioning, by **how much** and **how**?

- **Who** will enforce/audit it?

- **How best** will the proceeds from the chosen system be utilized to effect and promote its objectives?

- If it is decided that IMO is to be the body establishing the scheme – and I cannot see who else – **how** will the function of the scheme be monitored and supervised; and **how** will disputes that may arise in its operation be settled?

- **How** will the system be introduced, given the need to have it up and running in a very short period of time?

These and many other relevant questions you should engage yourselves with back home. And while you will be busy analyzing them, in order to come up with the best recommendations on action to be taken that you will eventually present to your Ministers, please remember to ensure that **all the competent Ministers** involved (of Transport or Mercantile Marine, Environment and Foreign Affairs) are properly briefed on all the aspects pertaining to shipping, and that the complexities of this most international of all industries are duly taken into account when shaping your country's official policies and determining its position on the issue at hand – both at Copenhagen and at the post-Copenhagen rounds of consultations at IMO. It will be most unfortunate to promote the issue of shipping's contribution to the world efforts to stem climate change in the manner we do here, conscientiously and painstakingly, comprehensively involving all parties concerned (governments, industry organizations and environmental groups), only to hear in Copenhagen comments from representatives of countries present here shedding doubts on – worse, ignoring – the work you have been doing with such commendable dedication and commitment for so long and suggesting action that might not maintain IMO's central and pivotal role in the regulation of shipping from the environmental point of view. I sincerely hope that national policies decided, and positions articulated, will not ignore the particularities of shipping and thus miss the opportunity to render sound and sustainable services to the environment and the industry, which, from consultations I have had with its representatives, is determined and has the potential to play its role **positively**, **constructively** and **responsibly**.

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Distinguished delegates,

When joining in your satisfaction with the outcome of the elections of officers of your Committee for next year, I praised your Chairman for his stewardship of the Committee's affairs since he took over. I mentioned, in particular, the Committee's most spectacular achievements in delivering the BWM Convention in 2004; the revision of MARPOL Annex VI in 2007; the Ship Recycling Convention this year; and the progress currently being made on GHG emissions.

These are sterling examples of IMO's most recent success on the environmental front, highlighting, at the same time, the Organization's and the shipping industry's concern and sensitivity about the environment and all the issues associated with it. It may have gone largely unnoticed so far but, I believe, the time has now come for us all to realize that, **of the 51 treaty instruments IMO has adopted so far, 21 are environment-related** – 23, if we consider the environmental aspects of the Salvage and Wreck Removal Conventions.

These are strong environmental credentials for our Organization, which, while making us proud of our record, would, **and should**, provide convincing answers to any doubters or sceptics of IMO's concern over, and work on, the environment – both marine and atmospheric.

Of course, the beneficial impact of our regulatory work on the environment will become more visible when all the relevant outstanding IMO conventions come into force and are effectively implemented and rigorously enforced. It is for this important reason that I will ask you again, once back home, to work towards achieving these aims.

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Distinguished delegates,

It is no easy task to do justice to the exceptionally heavy and critically important workload of this particular session in just a few summary remarks. Let me, therefore, round them off by thanking and congratulating all of you – and I especially thank you, **Mr. Chairman**, for having performed so well – exceptionally, I would suggest, even by your own standards. In leading the session to its successful conclusion, you applied the strength and wisdom that was needed to **build consensus** on many complex and sensitive issues – adding, for good measure, your unique brand of firm leadership and infectious cheerfulness. The Committee, quite rightly, expressed its undiminished appreciation for you by re-electing you by acclamation.

Our appreciation also goes to the Committee's officers and to those of its subsidiary bodies; and to the chairmen and coordinators of working, drafting, correspondence and other groups. It is, of course, not possible to mention them all by name, but I am sure nobody will object if I do name Mr. Koichi Yoshida of Japan, Mr. Chris Wiley of Canada, Ms. Katy Ware of the United Kingdom, Dr. William Moore of Liberia, Mr. Zafrul Alam of Singapore and, last but by no means least, Ms Lindy Johnson of the United States – a loyal friend to all of us and ever-indefatigable in her service to IMO.

And in thanking these officers of the Committee, I extend congratulations to Mr. Manuel Nogueira of Spain on his election as Vice Chairman for the rest of the year and the next and wish him every success in the discharge of his duties.

I wish to pay a special tribute to all the **staff of the Marine Environment Division** for their tremendous input this week and over the long preparatory months when they were also engaged in the equally demanding preparations for the Hong Kong Conference. All this is only possible through hard team work and leadership, which the Division's Director, **Miguel Palomares**, has delivered with commendable commitment, supported by **all** the staff in the Division **under the guidance** of **Messrs. Du**, **Coenen** and **Micallef**.

My special thanks also go to all the staff of the **Conference Division**, ably led by **Mrs. O'Neil**, including staff in the **Conference** and **Documents Sections**, the **translators** and **interpreters**; all of them, together with colleagues from the MSD, LEG and TCD, service your meetings tirelessly and with high-quality support.

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Mr. Chairman, distinguished delegates,

It is customary at this stage of the week to pay **tribute to delegates or observers** who are leaving us. In saying our farewells, we thank them wholeheartedly for their valuable contributions to the work of the Committee and IMO. I wish to mention, in particular:

- **Mr. Ajoy Chatterjee** of India, who retired in December 2008, having served the Committee as Vice-Chairman from 2005 until this year;
- **Mr. Zafrul Alam** of Singapore, who is to relinquish his duties as Chairman of the BLG Sub-Committee (and I welcome his successor **Mr. Sveinung Oftedal** of Norway);
- **Miss Liliana Fernández** of Panama, on completing her tour of duty as Ambassador to the Court of St. James's and Permanent Representative to IMO;
- **Mr. Ki-tack Lim** of the Republic of Korea, who is about to return home to assume higher duties; and
- **Mr. Richard Leslie**, Permanent Secretary of IACS, who, at a very young age, has decided to call it a day.

All of them leave behind many colleagues and friends and shall be missed. We wish them all the best in their new endeavours.

Our farewells are also, sadly, extended to **Tony Mangion**, an IMO and personal friend to many of us, who passed away earlier this year. He had been associated with the Organization for more than thirty years and had a distinguished maritime career in Malta.

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In closing my remarks, it only remains for me to wish you a well-deserved rest, a good weekend and a safe journey for those who have to travel home. I hope that those of you returning to southern hemisphere countries will not experience as harsh a winter as we enjoy over here these days.

I look forward to welcoming you all back at IMO soon, at NAV 55 and certainly at MEPC 60 – when we shall vigorously continue our efforts to protect and preserve the environment in many areas, and especially in climate change abatement.

Thank you.

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