



Assessment on how far the current Basel Convention technical guidelines cover wastes covered by the MARPOL Convention

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1. Background

The issue of waste generated on board ships and the need for clarity with regards to the application of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (hereinafter “Basel Convention”) to these waste streams was prompted by the August 2006 Probo Koala incident, including in the light of Article 1 paragraph 4 of the Basel Convention which provides that “wastes which derive from the normal operations of a ship, the discharge of which is covered by another international instrument, are excluded from the scope of this Convention.” This matter has since been discussed in several international fora, of which two in particular: the bodies of the Basel Convention and the International Maritime Organization (hereinafter “IMO”).

These bodies have, at request of their Parties, stressed the need to:

- identify loopholes and grey areas between the Basel Convention and other (inter)national legal instruments related to waste and shipping; and
- rule out possible ambiguity on the applicability of these instruments

in order to prevent waste streams ending up in the (marine) environment, dumped by unscrupulous business operators.

In response to this request, the IMO and the Basel Convention took several initiatives.

After adoption in IMO’s Maritime Safety Committee (MSC), an amendment to SOLAS Chapter VI on the “Carriage of Cargoes and Oil Fuels” came into force on 1 January 2014, adding a new regulation VI/5-2 that prohibits the blending of bulk liquid cargoes and production processes on board ships during the sea voyage.

In the framework of the Basel Convention, a legal analysis of the application of the Basel Convention to hazardous and other wastes generated on board ships was developed, in particular to clarify the relationship between the Basel Convention and the IMO conventions (such as the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto and as further amended by the Protocol of 1997 (hereafter “MARPOL”). After several iterations of the legal analysis, it was submitted to the eleventh meeting of the Conference of the Parties in 2013, which noted the conclusions contained therein.

In this legal analysis, it was noted that it would be helpful to assess the type of information notified under MARPOL through the advanced notification form of the nature of the wastes a ship intends to deliver to port reception facilities (hereinafter “PRFs”) in order to have a better idea of the nature of the MARPOL wastes offloaded from a ship.

In its conclusions, the legal analysis suggests that the Basel Convention’s provisions regarding the transboundary movements, the minimization and the environmentally sound management of “hazardous” or “other” wastes do not apply to MARPOL wastes originating from the normal operation of a ship, as long as those wastes are on board the vessel. Once the wastes that are “hazardous” or “other” are offloaded, for instance in a port reception facility intended to serve as an “adequate disposal facility”, the legal analysis suggests that the Basel provisions regarding the control of transboundary movements and environmentally sound management apply to those wastes¹.

¹For the legal analysis:

<http://www.basel.int/Implementation/LegalMatters/Ships/tabid/2405/Default.aspx>.

In addition, the COP to the Basel Convention, at its tenth and eleventh meetings, acknowledged the need to improve the sea-land interface to achieve the environmentally sound management of hazardous and other wastes generated on board ships, once offloaded at ports.

In view of this objective, the COP, during its 10th meeting, acknowledged the importance of assessing how far the current Basel Convention technical guidelines cover wastes covered by the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto and as further amended by the Protocol of 1997 (MARPOL). Parties, willing to do so, were invited to undertake this assessment, in close consultation with the International Maritime Organization. This request was reiterated at the 11th meeting of the Conference of the Parties:

“BC-11/17: Cooperation between the Basel Convention and the International Maritime Organization: The Conference of the Parties:

5. Reiterates the invitation to Parties contained in decision BC-10/16 to undertake an assessment on how far the current Basel Convention technical guidelines cover wastes covered by the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto and as further amended by the Protocol of 1997, or to provide funds to enable the Secretariat to undertake such an assessment, in close consultation with the International Maritime Organization.”

Shortly after, OVAM, the Public Waste Agency of Flanders, being the Belgian focal point for the Basel Convention, as well as a permanent member of the Belgian delegation to the Marine Environment Protection Committee (MEPC) of the IMO, informed the Secretariat of the Basel Convention of its offer to undertake this assessment.

2. Legal framework used to undertake the assessment

In order to fully comprehend what is and what is not covered by the requirements of the MARPOL Convention and its Guidelines, an overview of the most relevant definitions is given below. This will enable to define to what extent the common MARPOL waste flows generated on ships, as also mentioned in the IMO standard format of the advance notification form for waste delivery to port reception facilities (ANF)², show similarities with land based waste streams. Some of the Basel technical guidelines, although originally developed to address the environmentally sound management of land based waste streams, might also cover MARPOL waste flows when they are landed on shore (to a port reception facility). If not, it might be advisable to investigate at a later stage the necessity of developing additional guidelines.

2.1. Relevant definitions on MARPOL waste flows

In this section an overview is given of relevant definitions in the MARPOL Convention, its Annexes and Guidelines, in order to give an indication of waste flows covered.

2.1.1. General definitions

MARPOL Convention, Article 2

Harmful substance (Art. 2.2): means any substance which, if introduced into the sea, is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea, and includes any substance subject to control by the present Convention.

Discharge (Art. 2.3): any release howsoever caused from a ship and includes any escape, disposal, spilling, leaking, pumping, emitting or emptying.

- discharge does not include:
 - dumping within the meaning of the London Convention³
 - release of harmful substances directly arising from the exploration, exploitation and associated offshore processing of sea-bed mineral resources
 - release of harmful substances for purposes of legitimate scientific research into pollution abatement or control

Administration (Art. 1.5): means the Government of the State under whose authority the ship is operating. With respect to a ship entitled to fly a flag of any State, the Administration is the Government of that State. With respect to fixed or floating platforms engaged in exploration and exploitation of the seabed and subsoil thereof adjacent to the coast over which the coastal State exercises sovereign rights for the purposes of exploration and exploitation of their natural resources, the Administration is the Government of the coastal State concerned.

Organization (Art. 1.7): means the International Maritime Organization (IMO)

² See appendix 2 of the IMO Consolidated guidance for port reception facility providers and users (Resolution MEPC.1/Circ.834)

³ Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (Adoption: 13 November 1972; Entry into force: 30 August 1975; 1996 Protocol: Adoption: 7 November 1996; Entry into force: 24 March 2006)

2.1.2. MARPOL Annex I

This Annex contains regulations for the prevention of pollution by oil.

MARPOL Annex I, Regulation 1

Oil (1): means petroleum in any form including crude oil, fuel oil, sludge, oil refuse and refined products (other than those petrochemicals which are subject to the provisions of Annex II of the present Convention) and, without limiting the generality of the foregoing, includes the substances listed in appendix I to this Annex.

Oily mixture (3): means a mixture with any oil content

Special area (11): means a sea area where for recognized technical reasons in relation to its oceanographical and ecological condition and to the particular character of its traffic the adoption of special mandatory methods for the prevention of sea pollution by oil is required (see Reg. 1.11)

Slop tank (16): means a tank specifically designated for the collection of tank drainings, tank washings and other oily mixtures

Oil residue (sludge) (31): 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

Oily bilge water (33): 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.

2.1.3. MARPOL Annex II

This Annex contains regulations for the control of pollution by noxious liquid substances in bulk.

MARPOL Annex II, Regulation 1

Noxious Liquid Substance (10): means any substance indicated in the Pollution Category column of Chapter 17 or 18 of the International Bulk Chemical Code or provisionally assessed under the provisions of Regulation 6.3 as falling into category X, Y or Z.

Category X	Noxious liquid substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a major hazard to either marine resources or human health and, therefore, justify the prohibition of the discharge into the marine environment.
Category Y	Noxious liquid substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a hazard to either marine resources or human health or cause harm to amenities or other legitimate uses of the sea and therefore justify a limitation on the quality and quantity of the discharge into the marine environment.
Category Z	Noxious liquid substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a minor hazard to either marine resources or human health and therefore justify less stringent restrictions on the quality and quantity of the discharge into the marine environment.
Other substances	Substances indicated as Other Substances (OS) in the pollution category column of chapter 18 of the IBC Code ¹⁶ which have been

	evaluated and found to fall outside Category X, Y or Z because they are, at present, considered to present no harm to marine resources, human health, amenities or other legitimate uses of the sea when discharged into the sea from tank cleaning or deballasting operations. The discharge of bilge or ballast water or other residues or mixtures containing only substances referred to as "Other Substances" are not subject to any requirements of MARPOL Annex II
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Residue (12): means any noxious liquid substance which remains for disposal

Residues/water mixture (13): means residue to which water has been added for any purpose (e.g. tank cleaning, ballasting, bilge slops).

2.1.4. MARPOL ANNEX III

This Annex contains regulations for the prevention of pollution by harmful substances carried by sea in packaged form.

There are no definitions defining any waste or residues and, differing from all other MARPOL Annexes, there is no requirement for the provision of port reception facilities for their collection. However, it should be noted that packaging waste is covered by MARPOL Annex V. Therefore MARPOL Annex III will not be addressed individually in this assessment, but will be included in the assessment of MARPOL Annex V.

MARPOL Annex III, Regulation 1

- (1. 1) For the purpose of this Annex, "harmful substances" are those substances which are identified as marine pollutants in the International Maritime Dangerous Goods Code (IMDG Code)⁴ or which meet the criteria in the Appendix of this Annex.
- (1.4) For the purposes of this Annex, empty packaging, which have been used previously for the carriage of harmful substances, shall themselves be treated as harmful substances unless adequate precautions have been taken to ensure that they contain no residue that is harmful to the marine environment.

2.1.5. MARPOL ANNEX IV

This Annex contains regulations for the prevention of pollution by sewage from ships. Sewage is often also referred to as "black water".

MARPOL Annex IV, Regulation 1

(1.3) Sewage means:

1. Drainage and other wastes from any form of toilets and urinals;
2. Drainage from medical premises (dispensary, sick bay, etc.) via wash basins, wash tubs, and scuppers located in such premises;
3. Drainage from spaces containing living animals; or
4. Other waste waters when mixed with the drainages defined above.

⁴ Refer to the IMDG Code adopted by the IMO by Resolution MSC.122(75), as amended by the Marine Safety Committee

2.1.6. MARPOL ANNEX V

This Annex contains regulations for the prevention of pollution by garbage from ships. It seeks to eliminate and reduce the amount of garbage being discharged into the sea from ships.

In the revised MARPOL Annex V, which entered into force on 01.01.2013, the following definitions are to be applied:

MARPOL Annex V, Regulation 1

Animal carcasses (1) means the bodies of any animals that are carried on board as cargo and that die or are euthanized during the voyage.

Cargo residues (2) means the remnants of any cargo which are not covered by other MARPOL Annexes and which remain on the deck or in holds following loading or unloading, including loading and unloading excess and spillage, whether in wet or dry condition or entrained in wash water, but does not include cargo dust remaining on the deck after sweeping or dust on the external surfaces of the ship.

Cooking oil (3) means any type of edible oil or animal fat used or intended to be used for the preparation or cooking of food, but does not include the food itself that is prepared using these oils.

Domestic wastes (4) means all types of wastes not covered by other Annexes of MARPOL that are generated in the accommodation spaces on board the ship. It does not include grey water.

Fishing gear (6) means any physical device or part thereof or combination of items that may be placed on or in the water or on the sea-bed with the intended purpose of capturing, or controlling for subsequent capture or harvesting, marine or fresh water organisms.

Food wastes (8) means any spoiled or unspoiled food substances and includes fruits, vegetables, dairy products, poultry, meat products and food scraps generated aboard ship.

Garbage (9) means all kinds of food wastes, domestic wastes and operational wastes, all plastics, cargo residues, incinerator ashes, cooking oil, fishing gear, and animal carcasses generated during the normal operation of the ship and liable to be disposed of continuously or periodically except those substances which are defined or listed in other Annexes of MARPOL. Garbage does not include fresh fish and parts thereof generated as a result of fishing activities undertaken during the voyage, or as a result of aquaculture activities which involve the transport of fish including shellfish for placement in the aquaculture facility and the transport of harvested fish including shellfish from such facilities to shore for processing.

Incinerator ashes (10) means ash and clinkers resulting from shipboard incinerators used for the incineration of garbage.

Operational wastes (12) means all solid wastes (including slurries) not covered by other Annexes that are collected on board during normal maintenance or operations of a ship, or used for cargo stowage and handling. This also includes cleaning agents and additives contained in cargo hold and external wash water. It does not include grey water, bilge water or other similar discharges essential to the operation of a ship, taking into account the guidelines developed by the Organization.

Plastics (13) means a solid material which contains as an essential ingredient one or more high molecular mass polymers and which is formed (shaped) during either manufacture of the polymer or the fabrication into a finished product by heat and/or pressure. Plastics have material properties ranging from hard and brittle to soft and elastic. For the purposes of this annex, "all plastics" means all garbage that consists of or includes plastic in any form, including synthetic ropes, synthetic fishing nets, plastic garbage bags and incinerator ashes from plastic products.

Special Area (14) means a sea area where for recognized technical reasons in relation to its oceanographical and ecological condition and to the particular character of its traffic the adoption of special mandatory methods for the prevention of sea pollution by garbage is required (see Reg. 1.14)

Also the 2012 **Guidelines for the implementation of MARPOL Annex V** (Resolution MEPC.219(63)) contain the following relevant definitions:

(1.6.1) Dishwater means the residue from the manual or automatic washing of dishes and cooking utensils which have been pre-cleaned to the extent that any food particles adhering to them would not normally interfere with the operation of automatic dishwashers.

(1.6.2) Grey water means drainage from dishwater, shower, laundry, bath and washbasin drains. It does not include drainage from toilets, urinals, hospitals, and animal spaces, as defined in regulation 1.3 of MARPOL Annex IV (sewage), and it does not include drainage from cargo spaces. Grey water is not considered garbage in the context of Annex V.

(1.6.3) Recycling means the activity of segregating and recovering components and materials for reprocessing.

(1.6.4) Reuse means the activity of recovering components and materials for further use without reprocessing

(1.7.3) The definition of "operational wastes" (regulation 1.12 of MARPOL Annex V) excludes grey water, bilge water, or other similar discharges essential to the operation of a ship. "Other similar discharges" essential to the operation of a ship include, but are not limited to the following:

- boiler/economizer blowdown;
- boat engine wet exhaust;
- chain locker effluent;
- controllable pitch propeller and thruster hydraulic fluid and other oil to sea interfaces (e.g. thruster bearings, stabilizers, rudder bearings, etc.);
- distillation/reverse osmosis brine;
- elevator pit effluent;
- firemain systems water;
- freshwater layup;
- gas turbine washwater;
- motor gasoline and compensating discharge;
- machinery wastewater;
- pool, spa water and recreational waters;
- sonar dome discharge; and
- welldeck discharges.

It should be noted that grey water (including dishwater) is not being considered a MARPOL residue in the context of MARPOL Annex IV nor V. However, because of similarities with sewage (MARPOL Annex IV), this waste stream will be assessed in the chapter on Annex IV.

2.1.7. MARPOL ANNEX VI

This Annex contains regulations for the prevention of air pollution from ships.

Regulation 2

(9) Fuel oil means any fuel delivered to and intended for combustion purposes for propulsion or operation on board a ship, including distillate and residual fuels.

(16) Ozone depleting substances means controlled substances defined in paragraph (4) of article 1 of the Montreal Protocol on Substances that Deplete the Ozone Layer, 1987, listed in Annexes A, B, C or E to the said Protocol in force at the time of application or interpretation of this Annex.

Ozone depleting substances that may be found on board ship include, but are not limited to:

Halon 1211 Bromochlorodifluoromethane

Halon 1301 Bromotrifluoromethane

Halon 2402 1, 2-Dibromo -1, 1, 2, 2-tetrafluoroethane (also known as Halon 114B2)

CFC-11 Trichlorofluoromethane

CFC-12 Dichlorodifluoromethane

CFC-113 1, 1, 2 – Trichloro – 1, 2, 2 – trifluoroethane

CFC-114 1, 2 – Dichloro –1, 1, 2, 2 – tetrafluoroethane

CFC-115 Chloropentafluoroethane

(17) Shipboard incineration means the incineration of wastes or other matter on board a ship, if such wastes or other matter were generated during the normal operation of that ship.

(18) Shipboard incinerator means a shipboard facility designed for the primary purpose of incineration.

(20) Sludge oil means sludge from the fuel oil or lubricating oil separators, waste lubricating oil from main or auxiliary machinery, or waste oil from bilge water separators, oil filtering equipment or drip trays.

Also the 2011 **Guidelines for reception facilities under MARPOL Annex VI** (Resolution MEPC.199(62)) contain the following relevant definitions:

(2.4) Exhaust Gas Cleaning System (EGCS) Residues: are products of the water treatment process. The residue can be formed and removed from the water with different treatment techniques. Such residues contain sulphates, ash/soot, metals and hydrocarbons removed from the water.

(2.5) Ozone Depleting Substances (ODS) and equipment containing ODS are defined in regulation 2.16 and equipment as referred to in regulation 12.4⁵.

2.2. Discharge requirements in accordance with MARPOL

MARPOL provides requirements on how the ship-generated residues should be managed and/or disposed of on board of a vessel, and requires States to provide adequate reception facilities. It does not tackle the issue of further waste management such as recovery and/or disposal of the waste in land-based treatment/disposal facilities.

According to MARPOL, the ship-generated residues can be legally discharged in three ways:

- discharge at sea in compliance with the discharge requirements (potentially after onboard pre-treatment); and/or
- disposal through incineration in an on board type-approved incinerator; and/or
- delivery to a port reception facility.

For every MARPOL Annex, a general overview of the discharge requirements is listed below.

⁵ Regulation 12.4. The substances referred to in this regulation (ODS), and equipment containing such substances, shall be delivered to appropriate reception facilities when removed from ships.

2.2.1. MARPOL ANNEX I

The discharge requirements for MARPOL Annex I residues are defined in MARPOL, and are slightly different for ships sailing in/through special areas. For the Antarctic Area the most stringent requirements apply, as no Annex I residues can be discharged at any time when sailing through the Antarctic Area.

Table 1 - Control of discharge of oil from machinery spaces of all ships

Sea Area	Ship type and size	Discharge criteria
Anywhere outside a special area	All ships of 400 gross tonnage (GT) and above	No discharge except when: <ul style="list-style-type: none"> - The ship is en route; - The oily mixture is processed through an oil filtering equipment as required in the applicable parts of regulation 14 of Annex I (for ships between 400 GT and 10 000 GT regulation 14.6; for ships > 10 000 GT regulation 14.7) - The oil content of the effluent without dilution does not exceed 15 ppm; - On oil tankers, the oil mixture does not originate from cargo pump-room bilges and is not mixes with oil cargo residues.
Anywhere within a special area	All ships of 400 GT and above	Same as outside a special area, however, the oil filtering equipment should be provided with alarm arrangements and arrangements that the discharge is automatically stopped when the content of the effluent exceeds 15 ppm.
All areas except the Antarctic Area	Ships of less than 400 GT	No discharge except when: <ul style="list-style-type: none"> - The ship is en route; - Equipment approved by the Administration to ensure that the oil content of the effluent without dilution does not exceed 15 ppm shall be in operation; - On oil tankers, the oil mixture does not originate from cargo ppm-room bilges and is not mixes with oil cargo residues.
Antarctic area	All ships irrespective of their size	No discharge.
Special areas are the Mediterranean Sea, the Baltic Sea, the Black Sea, the Red Sea, the Gulfs area, the Antarctic area, the North West European waters, the Oman area of the Arabian Sea, the Gulf of Aden and the Southern South Africa waters.		

When a ship is equipped with a working type approved oil filtering equipment (separator), it can be assumed that in these cases the ship will, during its voyage, discharge the oily/water mixtures with an oil content of less than 15 ppm into the sea.

Another possibility to dispose of Annex I residues is to incinerate them in a type-approved on-board incinerator. It can be assumed that mainly the waste streams with a rather high oil content will be incinerated (e.g. sludge, oily rags, etc.), although some type approved incinerators can also destruct contaminated water through the use of bilge water injection systems.

Regulation 16 of MARPOL defines that shipboard incineration shall only be allowed in a shipboard incinerator, except for sewage sludge and sludge oil generated during the normal operation of a ship. That may also take place in the main or auxiliary power plant or boilers, but in those cases, it shall not take place inside ports, harbours and estuaries. There are no known environmental standards for the incineration of sewage sludge and sludge oil in the main or auxiliary power plant or boilers on board ships.

When residues are being incinerated in an onboard incinerator, this process shall meet the requirements contained in appendix IV⁶ of MARPOL Annex VI, when installed on board of a ship on or after 1 January 2000. Each incinerator shall be approved by the Administration taking into account the standard specifications for shipboard incinerators developed by the Organization⁷. Shipboard incineration of the substances as mentioned in regulation 16 of Annex VI⁸ are prohibited.

2.2.2. MARPOL ANNEX II

Regulation 18 of MARPOL Annex II requires where port reception facilities for noxious liquid substances have to be provided:

- .1 ports and terminals involved in ships' cargo handling shall have adequate facilities for the reception of residues and mixtures containing such residues of noxious liquid substances resulting from compliance with MARPOL Annex II, without undue delay for the ships involved; and
- .2 ship repair ports undertaking repairs to NLS tankers shall provide facilities adequate for the reception of residues and mixtures containing noxious liquid substances for ships calling at that port.

Important for the application of Annex II is that it provides mandatory discharge procedures for each category of cargo (categorized in X, Y, Z or other – see chapter 2.1.3 of this report), including requirements for tank cleaning operations. Before any prewash or discharge procedure is carried out in accordance with the regulation, the relevant tank needs to be emptied to the maximum extent in accordance with the procedures prescribed in the ship's Procedures and Arrangements Manual.

General discharge requirements for substances assigned to category X, Y or Z:

- ship is proceeding en route at a speed of at least 7 knots (self-propelled) or at least 4 knots (not self-propelled);
- discharge below the waterline; and
- discharge is made at a distance of not less than 12 nm from the nearest land in a depth of water of not less than 25 metres.

Specific requirements for category X:

- the tank **must** be prewashed before the ship leaves the port, and the resulting residues must be discharged to a reception facility until the concentration of the substance in the effluent to such facility is at or below 0.1% by weight;

⁶ See Appendix 1

⁷ Refer to resolution MEPC.76(40), Standard specification for shipboard incinerators, and resolution MEPC.93(45), Amendments to the standard specification for shipboard incinerators

⁸ See appendix 2

- remaining tank washings must be discharged to the reception facility until the tank is empty; and
- any water subsequently introduced into the tank may be discharged into the sea in accordance with the general discharge standards described above.

Specific requirements for high-viscosity or solidifying substances in category Y:

- a prewash procedure as specified in appendix 6 of MARPOL Annex II must be applied;
- the residue/water mixture generated during the prewash must be discharged to a reception facility until the tank is empty; and
- any water subsequently introduced into the tank may be discharged into the sea in accordance with the general discharge standards described above.

Specific requirements for category Y and Z:

- if the unloading of a substance of category Y or Z is not carried out in accordance with the ship's Procedures and Arrangements Manual, a prewash has to be carried out before the ship leaves the port of unloading; and
- the resulting tank washings of the prewash must be discharged to a reception facility.

After the prewash an additional main wash may be carried out, in order to avoid the risk of contamination of the new cargo by the residues of old cargo and, therefore, generally require more wash water than the prewash. This washing water may be discharged at sea in accordance with the provisions of MARPOL Annex II or be discharged to a port reception facility.

In the Antarctic area, which is a Special Area for MARPOL Annex II, any discharge into the sea of noxious liquid substances or mixtures containing such substances is prohibited.

2.2.3. MARPOL ANNEX III

As there are no definitions defining any waste or residues and as packaging waste is covered by MARPOL Annex V, the contaminated packaging is being addressed in the section on MARPOL Annex V.

2.2.4. MARPOL ANNEX IV

MARPOL Annex IV contains regulations regarding the discharge of sewage from ships into the sea, including regulations regarding the ships' equipment and systems for the control of sewage discharge, the provision of facilities at ports and terminals for the reception of sewage, and requirements for survey and certification.

The regulations in Annex IV prohibit the discharge of sewage into the sea, except when the ship has in operation an approved sewage treatment plant or when the ship is discharging comminuted and disinfected sewage using an approved system, at a distance of more than 3 nautical miles from the nearest land. Sewage, which is not comminuted or disinfected, can be discharged at a distance of more than 12 nautical miles from the nearest land.

Party States are also required to ensure the provision of adequate reception facilities at ports and terminals for the reception of sewage.

Within the framework of IMO a standard has been adopted for the maximum rate of discharge of untreated sewage from holding tanks when at a distance equal or greater than 12 nautical miles from the nearest land (see resolution MEPC.157(55)). In 2006 IMO adopted revised guidelines on

implementation of effluent standards and performance tests for sewage treatment plants (see resolution MEPC.159(55)).

After entry into force of resolution MEPC.200(62) on 1 January 2013, the Baltic Sea has been designated as a special area for Annex IV and added new discharge requirements for passenger ships while in a special area. The discharge of sewage from passenger ships within a special area is generally prohibited under these regulations, except when the ship has in operation a sewage treatment plant, which shall be of a type approved by the State.

The discharge requirements for sewage as stated in regulation 11 of Annex IV have been included to Appendix 4 to this report.

2.2.5. MARPOL ANNEX V

In the revised MARPOL Annex V practically all discharges of garbage into the sea are prohibited. This contains paper, plastic, glass, incinerator ashes, cooking oil, domestic wastes, fishing gear, etc. The only discharges allowed are:

Outside special areas:

- >3 nm from the nearest land for comminuted/ground food waste (able to pass through a screen with openings no greater than 25 mm)
- >12 nm from the nearest land for food waste and cargo residues that are not harmful to the marine environment
- Cleaning agents which are not harmful to the marine environment (contained in cargo hold, deck and external surfaces wash water)
- Animal carcasses (as far as possible from the nearest land and in accordance with IMO guidelines).

Inside special areas:

- >12 nm from the nearest land for comminuted/ground food waste (able to pass through a screen with openings no greater than 25mm)
- >12 nm for cargo residues that are not harmful to the marine environment (only if the ship is not transiting outside the special area between ports and no adequate reception facilities are available at those ports)
- Cleaning agents which are not harmful to the marine environment (contained in deck and external surfaces wash water).

Also an “en route” clause has been introduced, meaning that most allowable discharges are only permitted while the ship is en route. Discharges of any garbage from fixed or floating platforms and from any ship alongside or within 500m of a fixed or floating platform are prohibited.

Further guidance on the revised MARPOL Annex V can also be found in the 2012 Guidelines for the Implementation of Annex V (MEPC.219(63) adopted on 2 March 2012).

A relevant item in the guidelines is the management of cargo residues of solid bulk cargoes (paragraph 3). Some cargo residues are considered harmful to the marine environment (HME) and therefore subject to regulations 4.1.3 and 6.1.2.1 of the revised Annex V, if they meet the parameters in paragraph 3.2 of the 2012 guidelines.

When garbage is being incinerated in an onboard incinerator, this process shall meet the requirements contained in appendix IV⁹ of MARPOL Annex VI, when installed on board of a ship on or

⁹ See Appendix 1

after 1 January 2000. Each incinerator shall be approved by the Administration taking into account the standard specifications for shipboard incinerators developed by the Organization¹⁰. Shipboard incineration of the substances as mentioned in regulation 16 of Annex VI¹¹ are prohibited.

A schematic overview of the discharge provisions of the revised MARPOL Annex V has been presented in Appendix 5 to this report.

The 2012 guidelines for the implementation of MARPOL Annex V (Resolution MEPC.219(63)) contain **collection requirements**: the recommended garbage types that should be separated are:

- non-recyclable plastics and plastics mixed with non-plastic garbage;
- rags;
- recyclable material:
 - o cooking oil;
 - o glass;
 - o aluminium cans;
 - o paper, cardboard, corrugated board;
 - o wood;
 - o metal;
 - o plastics; (including styrofoam or other similar plastic material); and
- garbage that might present a hazard to the ship or crew (e.g. oily rags, light bulbs, acids, chemical, batteries, etc.).

Plastics and plastics mixed with non-plastic garbage:

Plastics are used for a variety of marine purposes including, but not limited to, packaging (vapour-proof barriers, bottles, containers, liners, bags, cargo wrapping material, foam cushioning material, etc.); ship construction (fibreglass and laminated structures, siding, piping, insulation, flooring, carpets, fabrics, paints and finishes, adhesives, electrical and electronic components, etc.); disposable eating utensils (styrofoam plates, bowls, food containers, cups, etc.); bags; sheeting; floats; fishing nets; fishing lines; strapping bands; wire rope with synthetic fibre sheaths; combination wire rope; rope; line; sails; and many other manufactured plastic items.

Food wastes:

Some governments have regulations for controlling human, plant, and animal diseases that may be carried by foreign food wastes and materials that have been associated with them (e.g. food packing and disposable eating utensils, etc.). These regulations may require incinerating, sterilizing, double bagging or other special treatment of garbage to destroy possible pest and disease organisms. This type of garbage should be kept separate from other garbage and preferably retained for discharge at port reception facilities in accordance with the laws of the receiving country. Governments are reminded of their obligation to ensure the provision of adequate reception facilities. Precautions must be taken to ensure that plastics contaminated by food wastes (e.g. plastic food wrappers) are not discharged into the sea with other food wastes.

Synthetic fishing net and line scraps:

As regulation 3.2 of MARPOL Annex V prohibits the discharge into the sea of synthetic fishing net and line scraps generated by the repair or operation of fishing gear, these items should be collected in a manner that avoids their loss overboard. Such material may be incinerated, compacted, or stored along with other plastics or it may be preferable to keep it separate from other types of garbage if it

¹⁰ Refer to resolution MEPC.76(40), Standard specification for shipboard incinerators, and resolution MEPC.93(45), Amendments to the standard specification for shipboard incinerators

¹¹ See appendix 2

has strong odour or is present in great volume. Unless such garbage is appropriately incinerated, the atmospheric incineration products could be toxic. On-board incineration should follow regulation 16 of MARPOL Annex VI.

2.2.6. MARPOL ANNEX VI

MARPOL Annex VI contains discharge requirements for residues from Exhaust Gas Cleaning System (EGCS) and Ozone Depleting Substances (ODS).

2.2.6.1. EGCS residues and washing waters

EGCS residues are often referred to as scrubber waste. The type and amount of residues and washing waters to be expected will depend on the (EGCS) installed and used on board ships. There are wet and dry scrubbers.

Wet scrubbers can be closed or open loop types, or hybrid (open systems that can also be operated in a closed mode). The open loop type is a system whereby water, taken from the sea and used for scrubbing, can be discharged back to the sea after treatment, as long as it meets the discharge requirements contained in the 2009 Guidelines for Exhaust Gas Cleaning Systems (resolution MEPC.184(59)). The closed scrubber systems use freshwater treated with an alkaline chemical as a reacting agent for neutralization and scrubbing. The wash water can be re-circulated and losses can be made up with additional freshwater. The scrubber sludge is to be retained in a storage tank, while a small quantity of the wash water is bled off to a treatment plant before discharge to sea.

Dry scrubbers are applied in a closed mode only, and the residue is a dry gypsum-like product that needs to be delivered to a port reception facility. It can easily be used as a raw material in construction works.

The on board incineration of EGCS residues is prohibited by MARPOL Annex VI, regulation 16.2.

2.2.6.2. Ozone depleting substances (ODS)

ODS include chlorofluorocarbons (CFC) and halons which were commonly used in older refrigeration and fire-fighting systems and portable equipment. ODS are also used in some insulation foams. Hydrochlorofluorocarbons (HCFC) were introduced to replace CFCs but are also ODS.

The production and use of all these materials is being phased out under the provisions of the Montreal Protocol. No CFC or halon containing system or equipment is permitted to be installed on ships constructed on or after 19 May 2005 and no new installation of the same is permitted on or after that date on existing ships. Similarly, no HCFC containing system or equipment is permitted to be installed on ships constructed on or after 1 January 2020 and no new installation of the same is permitted on or after that date on existing ships.

Existing systems and equipment are permitted to continue in service and may be recharged as necessary. However, the deliberate discharge of ODS to the atmosphere is prohibited. When servicing or decommissioning systems or equipment containing ODS the gases are to be duly collected in a controlled manner and, if not to be reused on-board, are to be landed to appropriate reception facilities for banking or destruction.

2.3. Relevant definitions in the Basel Convention and its Guidelines

Basel Convention (BC), Article 1

Hazardous wastes are:

- (a) Wastes that belong to any category contained in Annex I of the BC, unless they do not possess any of the characteristics contained in Annex III of the BC; and
- (b) Wastes that are not covered under paragraph (a) but are defined as, or are considered to be, hazardous wastes by the domestic legislation of the Party of export, import or transit.

Other wastes are wastes that belong to any category contained in Annex II.

Basel Convention (BC) Article 1 § 4

Exclusion clause: Wastes which derive from the normal operations of a ship, the discharge of which is covered by another international instrument, are excluded from the scope of this Convention

Basel Convention (BC), Article 2

Wastes (1) are substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law.

Management (2) means the collection, transport and disposal of hazardous wastes or other wastes, including after-care of disposal sites.

Disposal (4) means any operation specified in Annex IV¹² to this Convention;

Approved site or facility (5) means a site or facility for the disposal of hazardous wastes or other wastes which is authorized or permitted to operate for this purpose by a relevant authority of the State where the site or facility is located.

Environmentally sound management of hazardous wastes or other wastes (8) means taking all practicable steps to ensure that hazardous wastes or other wastes are managed in a manner which will protect human health and the environment against the adverse effects which may result from such wastes.

Basel Convention technical Guidelines on used oil re-refining or other re-uses of previously used oil.

Recycling (8): this is the commonly used generic term for the reprocessing, reclaiming and regeneration (re-refining) of used oils by use of an appropriate selection of physical and chemical methods of treatment.

2.4. Overview of relevant Basel Convention technical Guidelines

2.4.1. Overview

The Basel Convention stipulates in article 4.2 that each Party shall take the appropriate measures to:

- (a) Ensure that the generation of hazardous wastes and other wastes within it is reduced to a minimum, taking into account social, technological and economic aspects;
- (b) Ensure the availability of adequate disposal facilities, for the environmentally sound management of hazardous wastes and other wastes, that shall be located, to the extent possible, within it, whatever the place of their disposal;

¹² See Appendix 3

The legal analysis (see UNEP/CHW.11/INF/22) suggests that the Basel Convention’s provisions regarding the transboundary movements, the minimization and the environmentally sound management of “hazardous” or “other” wastes do not apply to MARPOL wastes originating from the normal operation of a ship, as long as those wastes are onboard the vessel. Once the wastes that are “hazardous” or “other” are offloaded, for instance in a port reception facility intended to serve as an “adequate disposal facility”, the legal analysis suggests that the Basel provisions regarding the control of transboundary movements and environmentally sound management apply to those wastes¹³.

The conclusions are reinforced on the observation that the MARPOL Convention does not state any requirements for the treatment and/or disposal of wastes received in a port, but only for the actual reception of such wastes. Once these wastes are offloaded from a ship, they must be managed in an environmentally sound manner, in accordance with the provisions of the Basel Convention.

In line with the exclusion clause set out in paragraph 4 of Article 1, paragraph 11 of the Framework document 1994 on the preparation of technical guidelines for the environmentally sound management of wastes subject to the Basel Convention provides that wastes which derive from the normal operations of a ship, the discharge of which is covered by another international instrument, are not subject to the Basel Convention.

Once offloaded, most ship generated waste streams are comparable to land based waste streams and should therefore be treated in the same manner, taking similar precautions, in order to protect people and the environment.

The Basel Secretariat already provides extensive guidance to its Parties for the management, treatment and disposal of waste, through the Technical Guidelines developed by the Conference of the Parties over the last decades. All technical Guidelines, as mentioned on the website of the Basel Convention¹⁴ are listed in table 2.

Because not all of the Guidelines are relevant for this assessment, it is also indicated in the table which Guidelines have and which have not been taken into consideration.

Table 2 - Basel technical Guidelines and their possible relevance for the management of ship generated waste stream

Technical Guidelines	Possible relevance for this assessment
Introduction document to the Basel Convention technical Guidelines	Yes (general document)
The Framework document 1994 on the preparation of technical guidelines for the environmentally sound management of wastes subject to the Basel Convention	Yes
Revised technical guidelines for the environmentally sound management of used and waste pneumatic tyres	No
Technical Guidelines on the environmentally sound co-processing of hazardous waste in cement kilns	Yes (incineration of MARPOL Annex I

¹³For the legal analysis:

<http://www.basel.int/Implementation/LegalMatters/Ships/tabid/2405/Default.aspx>.

¹⁴ www.basel.int

	residues)
Technical guidelines for the environmentally sound management of wastes consisting of element mercury and wastes containing or contaminated with mercury	Yes
Updated general technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with persistent organic pollutants (POPs)	No
Technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBBs).	No
Technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with 1,1,1 trichloro 2,2 bis(4 chlorophenyl)ethane (DDT)	No
Technical guidelines on the environmentally sound management of wastes containing or contaminated with unintentionally produced PCDDs, PCDFs, HCB or PCBs	No
Technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with the pesticides aldrin, chlordane, dieldrin, endrin, heptachlor, HCB, mirex or toxaphene or with HCB as an industrial chemical	No
Technical guidelines for the identification and environmentally sound management of plastic wastes and for their disposal	Yes
Technical guidelines for the environmentally sound management of the full and partial dismantling of ships	Yes (although end-of-life ships do not fall within the scope of MARPOL, some of the MARPOL residues are covered by this guideline)
Guidance paper on hazardous characteristic H6.2 (Infectious substances)	No
Work on hazard characteristics - Approach to Basel Convention hazard characteristic H11: characterization of chronic or delayed toxicity	Yes
Interim guidelines on the hazardous characteristic H12-Ecotoxic	Yes
Interim guidelines on hazard characteristic H13 of Annex III to the Basel Convention	Yes
Basel Convention Technical Guidelines on Hazardous Waste from the Production and use of Organic Solvents (Y6)	Yes
Basel Convention Technical Guidelines on Waste Oils from Petroleum Origins and Sources (Y8)	Yes
Technical Guidelines on Wastes Collected from Households (Y46)	Yes
Basel Convention Technical Guidelines on Specially Engineered Landfill (D5)	Yes
Basel Convention Technical Guidelines on Incineration on Land (D10)	Yes
Basel Convention Technical Guidelines on Used Oil Re-Refining or Other Re-Uses of Previously Used Oil (R9)	Yes
Basel Convention Technical Guidelines on Hazardous Waste Physico-Chemical Treatment (D9) / Biological Treatment (D8)	Yes
Technical Guidelines for the Environmentally Sound Management of Waste Lead-acid Batteries	Yes
Technical Guidelines on the Environmentally Sound Management of	Yes

Biomedical and Healthcare Wastes (Y1; Y3)	
Technical guidelines on the environmentally sound recycling/reclamation of metals and metal compounds (R4)	Yes

2.4.2. MARPOL Annex I residues

Used oil and oily/water emulsions can be recovered in various processes in land based facilities and/or disposed of through (co)incineration, with or without the recovery of energy. The following relevant Guidelines make notice of the different treatment and disposal options for oily/hazardous waste:

Basel Convention Technical Guidelines on Waste Oils from Petroleum Origins and Sources (Y8)

These Guidelines refer in paragraph 3 to waste oils originating from transport such as shipping. Furthermore they specifically include maritime wastes collected under the provisions of MARPOL (usually with medium to low oil content) in para 8 and list the different oily waste streams originating from ships.

The treatment and disposal options are discussed in para 12 to 34 and are in line with the principles of the waste management hierarchy:

Waste avoidance/minimization before recovery and recycling before disposal.

Worthwhile mentioning is the fact that these Guidelines state in para 33 that direct incineration, without the presence of emission control/gas cleaning equipment to achieve environmentally sound emission standards may well not be acceptable for oil wastes. This however is exactly what happens legally when oily waste is incinerated in an on-board incinerator, according to MARPOL.

Basel Convention Technical Guidelines on Used Oil Re-Refining or Other Re-Uses of Previously Used Oil (R9)

Used oils, as referred to in these Guidelines, are all oils from industrial and non-industrial sources which have been used for lubricating or other purposes and have become unsuitable for their original purpose. This implies that they also cover the used oils coming from ships, and delivered to a port reception facility. Some of the processes described in these Guidelines are indeed mentioned as well in IMO's Comprehensive Manual on Port Reception Facilities (under revision).

These Guidelines state that, used oil burning, in boilers or combustion processes not equipped with burners of high combustion and contaminant destruction efficiencies or without flue gas treatment devices should be strongly discouraged or prohibited if practicable.

Technical Guidelines on the environmentally sound co-processing of hazardous waste in cement kilns

It is important to indicate that co-processing of waste, being the use of alternative fuel and/or raw material for the purpose of energy and/or resource recovery, differs from co-incineration, being the production of materials while using waste as a fuel or the plant in which waste is thermally treated for the purpose of disposal.

In paragraph 52 hazardous wastes are listed that are, in principle, well-suited for co-processing in cement kilns. Amongst these are also tanks bottom sludges, oil spills, waste machining oils, bilge oils, oil/water separator sludges, solids and/or emulsions. There is no link to the exact origin of the waste (e.g. industry or transport).

Basel Convention Technical Guidelines on Incineration on Land (D10)

Incineration as a disposal method has been used to permanently destroy many of the hazardous characteristics of the waste streams.

As written in paragraph 45, waste mineral oils unfit for their original purpose could be incinerated. There is no reason to suspect that this would only be applicable for waste mineral oils originating from land-based industry. Again, it is reasonable to assume that that this is irrespective of the exact origin of the waste (e.g. industry or transport).

2.4.3. MARPOL Annex II residues

The transportation of chemicals is technically and logistically different from the transportation of oil and oil products, and due to the hazardous/noxious characteristics of the cargoes chemical transports are more advanced in many ways.

A common characteristic of these cargoes is also that they tend to be of high value, and require sophisticated handling for safety, health and loss prevention reasons. The ships are complex and technologically advanced. They are inherently more robust vessels compared to bulk tankers. The large number of separated cargo tanks, sophisticated cargo operating systems and supply of deck services enable them to carry a broad range of chemicals, in accordance with the requirements of the International Code for the Construction and Equipment of Ships Carrying Dangerous Cargoes in Bulk (IBC/BCH Code), and in strict accordance with regulations under MARPOL Annex II.

Every chemical cargo requires careful consideration during the planning process, and during the loading and unloading operations. Some cargoes are temperature sensitive, some are semi-gases, some need to be inhibited, some are sensitive to water, and some react with each other. Most of this information is set out in the IBC Code (The International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk) or BCH Code (Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk).

General industry practices indicate that these residues are often being handled and further disposed of by the cargo receiver: as these terminal operators know how to deal with the cargo and are familiar with the characteristics of the product they handle, they also (should) know how to deal with the residues.

Due to the huge variety of chemical cargoes covered by MARPOL Annex II and its accompanied technical codes, also the Annex II residues can differ a lot. Therefore it is extremely difficult, when looking at the treatment and final disposal methods of these MARPOL Annex II residues, to assess its coverage of the Basel Convention technical guidelines. In general MARPOL Annex II residues can either be incinerated, or treated physico-chemically (possibly in combination with a biological treatment).

For the land-based treatment of MARPOL Annex II residues, the following Basel technical guidelines can be taken into consideration:

- Basel technical guidelines on the environmentally sound co-processing of hazardous waste in cement kilns
- Work on hazard characteristics - Approach to Basel Convention hazard characteristic H11¹⁵: characterization of chronic or delayed toxicity

¹⁵ Explanatory notes on the Y / H codes can be found in Appendix V

- Interim guidelines on the hazardous characteristic H12 (ecotoxic)
- Interim guidelines on hazard characteristic H13 of Annex III to the Basel Convention
- Basel Convention Technical Guidelines on Hazardous Waste from the Production and use of Organic Solvents (Y6)
- Basel technical guidelines on Incineration on Land (D10)
- Basel technical guidelines on Hazardous Waste Physico-Chemical Treatment (D9) / Biological Treatment (D8)

2.4.4. MARPOL Annex III residues

In this assessment the relation of the Basel technical guidelines for the treatment and disposal of MARPOL Annex III residues are being covered in the section related to MARPOL Annex V.

2.4.5. MARPOL Annex IV residues

The issue of sewage is only being slightly touched upon in the BC technical guidelines on wastes collected from households. Some remarks have been given in relation to the discharge and treatment of sewage, mainly on collection, sewage treatment (e.g. usage as fertilizer), and even incineration (after partial dewatering and possibly in association with household wastes).

However, as sewage sludge is not a material/residue which directly falls within the scope of the Basel Convention, its environmentally sound management has not been considered further by the Basel Technical Working Group.

2.4.6. MARPOL Annex V residues

To a great extent the MARPOL Annex V residues (garbage) can be compared with average household wastes, such as plastics, food wastes, domestic wastes (paper, rags, glass, metal, bottles, crockery, etc.) and cooking oil. These types of waste are in general either being recycled, incinerated or disposed of in a landfill. Therefore the following Basel technical guidelines can be taken into consideration:

- Technical Guidelines on the environmentally sound co-processing of hazardous waste in cement kilns
- Technical guidelines for the identification and environmentally sound management of plastic wastes and for their disposal
- Technical Guidelines on Wastes Collected from Households
- Basel Convention Technical Guidelines on Specially Engineered Landfill
- Basel Convention Technical Guidelines on Incineration on Land
- Technical guidelines on the environmentally sound recycling/reclamation of metals and metal compounds

For some of the hazardous waste streams (e.g. light bulbs containing mercury, rags contaminated with paints and solvents, batteries, medical waste, incinerator ashes, etc.), in addition to the ones mentioned above also the following Basel technical guidelines can be taken into account:

- Technical guidelines for the environmentally sound management of wastes consisting of element mercury and wastes containing or contaminated with mercury
- Basel Convention Technical Guidelines on Hazardous Waste Physico-Chemical Treatment / Biological Treatment

- Technical Guidelines for the Environmentally Sound Management of Waste Lead-acid Batteries
- Technical Guidelines on the Environmentally Sound Management of Biomedical and Healthcare Wastes

Furthermore MARPOL Annex V also covers other specific wastes from shipping such as operational wastes, dry cargo residues and washing waters containing these residues, animal carcasses and fishing gear. For these specific waste streams it is not always that obvious to identify its common ways of treatment/disposal. However, taking into account general practices it can be assumed that for the treatment of these wastes the following Basel technical guidelines can be taken into account:

- *operational wastes*:
 - Basel Convention Technical Guidelines on Specially Engineered Landfill
 - Basel Convention Technical Guidelines on Incineration on Land
- *dry cargo residues and washing waters containing these residues*:
 - Basel Convention Technical Guidelines on Specially Engineered Landfill
 - Basel Convention Technical Guidelines on Hazardous Waste Physico-Chemical Treatment / Biological Treatment
- animal carcasses¹⁶:
 - Basel Convention Technical Guidelines on Incineration on Land
 - Basel Convention Technical Guidelines on Specially Engineered Landfill
- fishing gear:
 - Basel Convention Technical Guidelines on Incineration on Land
 - Basel Convention Technical Guidelines on Specially Engineered Landfill
 - Technical guidelines for the identification and environmentally sound management of plastic wastes and for their disposal

2.4.7. MARPOL Annex VI residues

2.4.7.1. EGCS residues and washing waters

The type and amount of residues and washing waters to be expected will depend on the Exhaust Gas Cleaning System (EGCS) installed and used on board ships.

It is most likely to expect that the scrubber washing waters and the EGCS residues will differ significantly from washing waters and residues originating from gas exhaust cleaning in land-based facilities. This is mainly due to the following elements:

- The possible use of salty sea water for exhaust gas cleaning;
- The nature and composition of the gasses to be cleaned (originates from burning heavy fuel oil, with a high sulphur content).

As today only few scrubbers have been installed on board ships, not much data is available on the types and characteristics of scrubber wastes. Therefore it is recommendable to investigate in-depth the effect that the legal (MARPOL) discharge of some of these washing waters might have, especially in ports and harbours, and whether or not this can be classified as an environmentally sound manner to dispose this waste stream while in port.

¹⁶ Treatment/disposal of animal carcasses mainly depends on its hazardous character or not (e.g. in case of infectious diseases).

The sludges originating from the scrubber treatment plant, are likely to be classified as hazardous waste. As little is known today on the exact composition of this waste stream, it is advisable to first investigate the waste composition. This might allow to decide whether or not this waste stream can be incinerated end/or disposed of in an ESM according to the BC technical Guidelines.

2.4.7.2. ODS

Given the fact that the type of equipment containing ODS or halocarbons is similar on land to on board ships, the facilities for these Annex VI residues most likely can be integrated with land-based collection and treatment facilities.

ODS are more in detail dealt with through the Montreal Protocol. Still, the Basel technical Guidelines on Hazardous Waste from the Production and use of Organic Solvents (Y6) can be applied here, as ODS are included as solvents.

3. MARPOL waste flows and their relation to Basel technical guidelines

Based on the waste classification on the IMO advanced notification form and the waste delivery data received from several European ports, the waste streams mentioned in table 3 were withheld for this assessment¹⁷.

Table 3 - MARPOL residues and their relation to existing Basel Technical Guidelines

MARPOL residues, commonly notified in ports	Basel classification of similar land base waste streams ¹⁸	Summary of MARPOL discharge requirements	Land based treatment options, according to technical BC GL
Annex I - Oily waste			
Oily bilge water	Y9, A 4060 Waste oils/water, hydrocarbons/water mixtures, emulsions	As Annex I residues may be discharged at sea (under certain conditions), the bilges expected to be delivered to a PRF will in most cases contain more than 15 ppm of oil. Some type approved incinerators can destruct contaminated water as well through bilge water injection systems.	Covered by the Basel Convention Technical Guidelines.
Oily residues (sludge)	Y9, A 4060 Waste oils/water, hydrocarbons/water mixtures, emulsions Y8, A3020 Waste mineral oils unfit for their originally intended use	Sludges, as defined by MARPOL, can be expected to have a higher oil content than bilge water. It is therefore more likely that they are incinerated on board as well. They are often delivered to reception facilities, especially in those cases where there is a financial incentive to do so.	Covered by the Basel Convention Technical Guidelines
Oily tank washings	Y9, A 4060 Waste oils/water, hydrocarbons/water mixtures, emulsions	Waste waters contaminated with oil, originating from the cleaning of the tanks. While the cleaning is done on route, the waste waters can be discharged legally at sea and/or destructed through incineration.	Covered by the Basel Convention Technical Guidelines

¹⁷ Based on data gathered from several European ports: Antwerp, Ostend, Zeebrugge, Amsterdam, Rotterdam and Ghent.

¹⁸ Based on the Basel Convention, Annex I, VIII and Annex IX

	Y8, A3020 waste mineral oils unfit for their originally intended use	When originating from tank cleaning while in port, the waste water will be in most cases delivered to a PRF.	
Scale and sludge from tank cleaning	Y8, A3020 waste mineral oils unfit for their originally intended use	Waste waters contaminated with oil, originating from the cleaning of the tanks. While the cleaning is done on route, the waste waters can be discharged legally at sea and/or destructed through incineration. When originating from tank cleaning while in port, the waste water will be in most cases delivered to a PRF.	Covered by the Basel Convention Technical Guidelines.
Used Oil	Y8, A3020 waste mineral oils unfit for their originally intended use	Used oil is more likely to be incinerated on board. They are also often delivered to reception facilities as well, especially in those cases where there is a financial incentive to do so.	Covered by the Basel Convention Technical Guidelines
Cargo washing waters (when cargo is crude/petrol/fuel...)	Y9, A 4060 Waste oils/water, hydrocarbons/water mixtures, emulsions Y8, A3020 waste mineral oils unfit for their originally intended use	Cargo residues may not be incinerated. If the cleaning is done on route, the waste waters can be discharged legally at sea. When originating while in port, the waste water will be in most cases delivered to a PRF.	Covered by the Basel Convention Technical Guidelines
MARPOL ANNEX II - Chemical washing waters			
Cat X substance	-	Tanks must be prewashed, and residues must be discharged to reception facility. Remaining tank washings must be discharged to reception facility. Any water subsequently introduced into the tank may be discharged into the sea in accordance with the discharge standards.	Depending on multiple factors
Cat Y substance	-	Prewash procedure must be applied. The residue/water mixture generated during prewash must be discharged to reception facility.	Depending on multiple factors

		Any water subsequently introduced into the tank may be discharged into the sea in accordance with the discharge standards.	
Cat Z substance	-	Prewash depends on unloading process. Resulting tank washings must be discharged to a reception facility	Depending on multiple factors
OS – Other substances	-	Depends on unloading process.	Depending on multiple factors
Ballast water contaminated with chemicals	-	Depends on type of contamination.	Depending on multiple factors
MARPOL ANNEX IV - Sewage			
Sewage	Not applicable	<p>Prohibited to discharge into the sea, except when:</p> <ul style="list-style-type: none"> ○ ship has sewage treatment plant; or ○ when the sewage is comminuted and disinfected; and ○ at a specified distance from the nearest land <p>Sewage which is not comminuted or disinfected can be discharged at a distance of more than 12 nautical miles from the nearest land.</p>	No Basel technical guidelines available
Black water	Not applicable	<p>Prohibited to discharge into the sea, except when:</p> <ul style="list-style-type: none"> ○ ship has sewage treatment plant; or ○ when the sewage is comminuted and disinfected; and ○ at a specified distance from the nearest land <p>Sewage which is not comminuted or disinfected can be discharged at a distance of more than 12 nautical miles from the nearest land.</p>	No Basel technical guidelines available
Grey water	Not applicable	<p>Prohibited to discharge into the sea, except when:</p> <ul style="list-style-type: none"> ○ ship has sewage treatment plant; or ○ when the sewage is comminuted and disinfected; and ○ at a specified distance from the nearest land <p>Sewage which is not comminuted or disinfected can be discharged at a</p>	No Basel technical guidelines available

		distance of more than 12 nautical miles from the nearest land.	
Sewage sludge	-	Prohibited to discharge into the sea, except when: <ul style="list-style-type: none"> ○ ship has sewage treatment plant; or ○ when the sewage is comminuted and disinfected; and ○ at a specified distance from the nearest land Sewage which is not comminuted or disinfected can be discharged at a distance of more than 12 nautical miles from the nearest land.	No Basel technical guidelines available
MARPOL Annex V - Garbage			
Animal Carcasses	A4020	Discharge at sea only permitted <i>en route</i> and outside special areas, at least 12 nm from nearest land.	When incinerated/dumped in landfill: covered by the Basel technical guidelines
Cargo residues ¹⁹	-	Discharge at sea only permitted <i>en route</i> and outside special areas, at least 12 nm from nearest land.	Depending on multiple factors
Cleaning agents and additives ²⁰		Outside special areas: discharge at sea permitted. Within special areas: discharge permitted (in specific circumstances)	Covered by the Basel Convention Technical Guidelines
Cooking Oil	B3065	Discharge at sea prohibited.	Covered by the Basel Convention Technical Guidelines
Domestic wastes	Y46	Discharge at sea prohibited.	Covered by the Basel Convention Technical Guidelines
Fishing gear		Discharge at sea prohibited.	Covered by the Basel Convention Technical Guidelines
Food wastes		When comminuted/ground: discharge at sea permitted. When not comminuted/ground: discharge only permitted <i>en route</i> and outside special areas, at least 12 nm from nearest land.	Covered by the Basel Convention Technical Guidelines
Incinerator ashes	Y47	Discharge at sea prohibited.	Covered by the Basel Convention Technical Guidelines

¹⁹ Not harmful to the marine environment

²⁰ Not harmful to the marine environment

Operational wastes		Discharge at sea prohibited.	Covered by the Basel Convention Technical Guidelines
Plastics	B3010	Discharge at sea prohibited.	Covered by the Basel Convention Technical Guidelines
Paper, cardboard	B3020	Discharge at sea prohibited.	Covered by the Basel Convention Technical Guidelines
Glass	A2010, B2020	Discharge at sea prohibited.	Covered by the Basel Convention Technical Guidelines
Metal cans, metals	A1010, A1020	Discharge at sea prohibited.	Covered by the Basel Convention Technical Guidelines
Electric and electronic waste	A1180, A1190, A2010	Discharge at sea prohibited.	Covered by the Basel Convention Technical Guidelines (and specific guidelines in development)
Textiles	B3030	Discharge at sea prohibited.	Covered by the Basel Convention Technical Guidelines
Floating dunnage, lining, or packaging materials		Discharge at sea prohibited.	Covered by the Basel Convention Technical Guidelines
MARPOL ANNEX VI			
ODS and equipment containing such	Y41, Y6, Y17, Y45		No Basel technical guidelines available
Exhaust gas cleaning residues - waste water - sludge			No Basel technical guidelines available

4. Conclusions

Basically the focus of the MARPOL Convention requirements is on the collection and storage on board, while the Basel technical Guidelines focus on the environmentally sound management of waste, including treatment and disposal, once offloaded, for instance in a port reception facility intended to serve as an “adequate disposal facility”.

MARPOL Annex I:

While the treatment/disposal of all MARPOL Annex I residues are covered under the existing Basel technical guidelines, it is worthwhile mentioning that all relevant Basel technical guidelines strongly advise not to incinerate waste oils without the necessary precautions being taken (e.g. the use of gas cleaning systems and monitoring). MARPOL however, allows to incinerate, amongst other waste streams, waste oils in on board incinerators. Even more so for the sewage sludge and sludge oil generated during the normal operation of a ship. That may also be incinerated in the main or auxiliary power plant or boilers, without any monitoring.

It is therefore advisable to investigate further to what extent the MARPOL provisions for the incineration on board are comparable with the strict(er) requirements for land based waste incineration plants.

MARPOL Annex II:

Due to the variety of chemical cargoes covered by MARPOL Annex II also the Annex II residues can differ a lot. Therefore it is extremely difficult to assess its coverage of the Basel Convention technical guidelines. In general MARPOL Annex II residues can either be incinerated, or treated physico-chemically (possibly in combination with a biological treatment). Several Basel technical guidelines can be applied, so it is fair to conclude that in general the treatment of this type of MARPOL residue is covered.

MARPOL Annex IV:

As sewage sludge is not a material/residue which directly falls within the scope of the Basel Convention, its environmentally sound management has not been considered by the Basel Technical Working Group.

MARPOL Annex V:

To a great extent the MARPOL Annex V residues (garbage) can be compared with average household wastes. These types of waste are in general either being recycled, incinerated or disposed of in a landfill. Therefore the several of the Basel technical guidelines can be taken into consideration, and it is fair to conclude that in general the treatment of this type of MARPOL residue is covered.

MARPOL Annex VI:

As today not many scrubbers have been installed on board ships, it is recommendable to investigate in-depth the effect that the legal discharge of some of these washing waters might have, especially in ports and harbours. In addition it is advisable to perform thorough analyses on the composition of the waste streams and, based on those, to decide to what extent the ESM of these (possible hazardous) waste streams are covered by the existing Basel Convention Technical Guidelines.

Given the fact that the type of equipment containing ODS or halocarbons is similar on land to on board ships, the facilities for these Annex VI residues most likely can be integrated with land-based collection and treatment facilities.

Appendix 1: MARPOL Annex VI, Appendix VI

Type approval and operating limits for shipboard incinerators (Regulation 16)

Shipboard incinerators described in regulation 16(2) shall possess an IMO type approval certificate for each incinerator. In order to obtain such certificate, the incinerator shall be designed and built to an approved standard as described in regulation 16(2). Each model shall be subject to a specified type approval test operation at the factory or an approved test facility, and under the responsibility of the Administration, using the following standard fuel/waste specification for the type approval test for determining whether the incinerator operates within the limits specified in paragraph (2) of this appendix:

Sludge oil consisting of:	75% sludge oil from HFO; 5% waste lubricating oil; and 20% emulsified water
Solid waste consisting of:	50% food waste 50% rubbish containing approx. 30% paper, approx. 40% cardboard, approx. 10% rags, approx. 20% plastic The mixture will have up to 50% moisture and 7% incombustible solids.

Incinerators described in regulation 16(2) shall operate within the following limits:

O ₂ in combustion chamber:	6-12%
CO in flue gas maximum average:	200 mg/MJ
Soot number maximum or average:	Bacharach 3 or Ringelman 1 (20% opacity) (A higher soot number is acceptable only during very short periods such as starting up)
Unburned components in ash residues:	maximum 10% by weight
Combustion chamber flue gas outlet temperature range:	850-1200°C

Appendix 2: Shipboard incineration

1 Except as provided in paragraph 4 of this regulation, shipboard incineration shall be allowed only in a shipboard incinerator.

2 Shipboard incineration of the following substances shall be prohibited:

- .1 residues of cargoes subject to Annex I, II or III or related contaminated packing materials;
 - .2 polychlorinated biphenyls (PCBs);
 - .3 garbage, as defined by Annex V, containing more than traces of heavy metals;
 - .4 refined petroleum products containing halogen compounds;
 - .5 sewage sludge and sludge oil either of which are not generated on board the ship;
- and
- .6 exhaust gas cleaning system residues.

3 Shipboard incineration of polyvinyl chlorides (PVCs) shall be prohibited, except in shipboard incinerator for which an IMO Type Approval Certificates²¹ has been issued.

4 Shipboard incineration of sewage sludge and sludge oil generated during normal operation of a ship may also take place in the main or auxiliary power plant or boilers, but in those cases, shall not take place inside ports, harbours and estuaries.

5 Nothing in this regulation neither:

- .1 affects the prohibition in, or other requirements of, the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972, as amended, and the 1996 Protocol thereto, nor
- .2 precludes the development, installation and operation of alternative design shipboard thermal waste treatment devices that meet or exceed the requirements of this regulation.

6.1 Except as provided in subparagraph 6.2 of this paragraph, each incinerator on a ship constructed on or after 1 January 2000 or incinerator which is installed on board a ship on or after 1 January 2000 shall meet the requirements contained in appendix IV to this Annex. Each incinerator subject to this subparagraph shall be approved by the Administration taking into account the standard specification for shipboard incinerators developed by the Organization²²; or

6.2 The Administration may allow exclusion from the application of subparagraph 6.1 of this paragraph to any incinerator which is installed on board a ship before 19 May 2005, provided that the ship is solely engaged in voyages within waters subject to the sovereignty or jurisdiction of the State the flag of which the ship is entitled to fly.

7 Incinerators installed in accordance with the requirements of paragraph 6.1 of this regulation shall be provided with a manufacturer's operating manual which is to be retained with the unit and which

²¹ Type Approval Certificates issued in accordance with resolution MEPC.59(33) or MEPC.76(40)

²² Refer to resolution MEPC.76(40), Standard specification for shipboard incinerators.

shall specify how to operate the incinerator within the limits described in paragraph 2 of appendix IV of this Annex.

8 Personnel responsible for the operation of an incinerator installed in accordance with the requirements of paragraph 6.1 of this regulation shall be trained to implement the guidance provided in the manufacturer's operating manual as required by paragraph 7 of this regulation.

9 For incinerators installed in accordance with the requirements of paragraph 6.1 of this regulation the combustion chamber gas outlet temperature shall be monitored at all times the unit is in operation. Where that incinerator is of the continuous-feed type, waste shall not be fed into the unit when the combustion chamber gas outlet temperature is below 850°C. Where that incinerator is of the batch-loaded type, the unit shall be designed so that the combustion chamber gas outlet temperature shall reach 600°C within five minutes after start-up and will thereafter stabilize at a temperature not less than 850°C.

Appendix 3: Annex IV of the Basel Convention

DISPOSAL OPERATIONS

A. OPERATIONS WHICH DO NOT LEAD TO THE POSSIBILITY OF RESOURCE RECOVERY RECYCLING, RECLAMATION, DIRECT RE-USE OR ALTERNATIVE USES

Section A encompasses all such disposal operations which occur in practice.

- D1 Deposit into or onto land, (e.g., landfill, etc.)
- D2 Land treatment, (e.g., biodegradation of liquid or sludgy discards in soils, etc.)
- D3 Deep injection, (e.g., injection of pumpable discards into wells, salt domes of naturally occurring repositories, etc.)
- D4 Surface impoundment, (e.g., placement of liquid or sludge discards into pits, ponds or lagoons, etc.)
- D5 Specially engineered landfill, (e.g., placement into lined discrete cells which are capped and isolated from one another and the environment, etc.)
- D6 Release into a water body except seas/oceans
- D7 Release into seas/oceans including sea-bed insertion
- D8 Biological treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations in Section A
- D9 Physico chemical treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations in Section A, (e.g., evaporation, drying, calcination, neutralization, precipitation, etc.)
- D10 Incineration on land
- D11 Incineration at sea
- D12 Permanent storage (e.g., emplacement of containers in a mine, etc.)
- D13 Blending or mixing prior to submission to any of the operations in Section A
- D14 Repackaging prior to submission to any of the operations in Section A
- D15 Storage pending any of the operations in Section A

B. OPERATIONS WHICH MAY LEAD TO RESOURCE RECOVERY, RECYCLING RECLAMATION, DIRECT RE- USE OR ALTERNATIVE USES

Section B encompasses all such operations with respect to materials legally defined as or considered to be hazardous wastes and which otherwise would have been destined for operations included in Section A

- R1 Use as a fuel (other than in direct incineration) or other means to generate energy
- R2 Solvent reclamation/regeneration
- R3 Recycling/reclamation of organic substances which are not used as solvents
- R4 Recycling/reclamation of metals and metal compounds
- R5 Recycling/reclamation of other inorganic materials
- R6 Regeneration of acids or bases
- R7 Recovery of components used for pollution abatement
- R8 Recovery of components from catalysts
- R9 Used oil re-refining or other reuses of previously used oil

- R10 Land treatment resulting in benefit to agriculture or ecological improvement
- R11 Uses of residual materials obtained from any of the operations numbered R1-R10
- R12 Exchange of wastes for submission to any of the operations numbered R1-R11
- R13 Accumulation of material intended for any operation in Section B

Appendix 4: MARPOL sewage discharge requirements

Regulation 11: discharge of sewage

1. Subject to the provisions of regulation 3 (exceptions) of MARPOL Annex IV, the discharge of sewage into the sea is prohibited, except when:
 - 1.1. the ship is discharging comminuted and disinfected sewage using a system approved by the Administration in accordance with regulation 9.12 of this Annex at a distance of more than 3 nautical miles from the nearest land, or sewage which is not comminuted or disinfected at a distance of more than 12 nautical miles from the nearest land, provided that, in any case, the sewage that has been stored in holding tanks shall not be discharged instantaneously but at a moderate rate when the ship is en route and proceeding at not less than 4 knots; the rate of discharge shall be approved by the Administration based upon standards developed by the Organization; or
 - 1.2. the ship has in operation an approved sewage treatment plant which has been certified by the Administration to meet the operational requirements referred to in regulation 9.1.1 of this Annex, and
 - 1.2.1. the test results of the plant are laid down in the ship's International Sewage Pollution Prevention Certificate; and
 - 1.2.2. additionally, the effluent shall not produce visible floating solids nor cause discoloration of the surrounding water.
2. The provisions of paragraph 1 shall not apply to ships operating in the waters under the jurisdiction of a State and visiting ships from other States while they are in these waters and are discharging sewage in accordance with such less stringent requirements as may be imposed by such State.
3. When the sewage is mixed with wastes or waste water covered by other Annexes of MARPOL, the requirements of those Annexes shall be complied with in addition to the requirements of this Annex.

Appendix 5: MARPOL garbage discharge requirements

Type of garbage	Ships outside special areas	Ships within special areas	Offshore platforms and all ships within 500 m of such platforms
Food waste comminuted or ground	Discharge permitted ≥ 3 nm from the nearest land and <i>en route</i>	Discharge permitted ≥ 12 nm from the nearest land and <i>en route</i>	Discharge permitted ≥ 12 nm from the nearest land
Food waste not comminuted or ground	Discharge permitted ≥ 12 nm from the nearest land and <i>en route</i>	Discharge prohibited	Discharge prohibited
Cargo residues ¹ not contained in wash water	Discharge permitted ≥ 12 nm from the nearest land and <i>en route</i>	Discharge prohibited	Discharge prohibited
Cargo residues ¹ contained in wash water		Discharge only permitted in specific circumstances ² and ≥ 12 nm from the nearest land and <i>en route</i>	Discharge prohibited
Cleaning agents and additives ¹ contained in cargo hold wash water	Discharge permitted	Discharge only permitted in specific circumstances ² and ≥ 12 nm from the nearest land and <i>en route</i>	Discharge prohibited
Cleaning agents and additives ¹ contained in deck and external surfaces wash water		Discharge permitted	Discharge prohibited
Carcasses of animals carried on board as cargo and which died during the voyage	Discharge permitted as far from the nearest land as possible and <i>en route</i>	Discharge prohibited	Discharge prohibited
All other garbage including plastics, domestic wastes, cooking oil, incinerator ashes, operational wastes and fishing gear	Discharge prohibited	Discharge prohibited	Discharge prohibited
Mixed garbage	When garbage is mixed with or contaminated by other substances prohibited from discharge or having different discharge requirements, the more stringent requirements shall apply		

