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REVISED GUIDELINES FOR SYSTEMS FOR HANDLING OILY WASTES IN MACHINERY SPACES OF SHIPS INCORPORATING GUIDANCE NOTES FOR AN INTEGRATED BILGE WATER TREATMENT SYSTEM (IBTS)

1 The revised Annex I of MARPOL 73/78, expected to come into force on 1 January 2007, contains certain regulations and unified interpretations related to equipment for the storage, handling and disposal of oily residues and engine-room oily bilge water.

2 In order to facilitate the work of Administrations on systems for handling oily wastes in machinery spaces of ships, the Marine Environment Protection Committee (MEPC) has continuously reviewed an appropriate technology for fulfilment of the Convention requirements.

3 The "Guidelines for systems for handling oily wastes in machinery spaces of ships" appended to MEPC/Circ.235 were developed as guidance for Administrations, shipowners and shipbuilders for consideration in achieving an efficient and effective system for the handling of oily bilge water and oily residues for ships, the keels of which were laid on or after 1 January 1992 and, where practicable, ships then in service.

4 The aforementioned Guidelines have been reviewed in accordance with the provisions of the revised MARPOL Annex I and revised as set out at annex to this circular.

5 For further prevention of oil pollution from machinery spaces of ships, MEPC was of the view that a considerable reduction of the generation of oily bilge water produced in machinery spaces can be achieved and, in this respect, approved the concept of an Integrated Bilge Water Treatment System (IBTS) which incorporates the means to reduce the amount of oily bilge water and process the oily bilge water and oil residue (sludge) in a holistic manner.

6 MEPC 54 recognized the need to disseminate the concept of IBTS and developed the Guidance notes for IBTS as set out in the appendix to the annexed Guidelines.

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ANNEX

REVISED GUIDELINES FOR SYSTEMS FOR HANDLING OILY WASTES IN MACHINERY SPACES OF SHIPS

1 The revised Annex I of MARPOL 73/78 contains certain regulations and unified interpretations related to equipment for the storage, handling and disposal of oily residues and engine-room oily bilge water.

2 In the continuous review by the Marine Environment Protection Committee (MEPC) of appropriate technology for fulfilment of the Convention requirements, substantial information has been collected which is valuable in the design, approval and surveying of installations in engine-rooms for systems handling oily bilge water, and oily residues, but this does not form part of the Convention regulations or the related interpretations.

3 The MEPC had decided that this information is, nevertheless, of substantial value to Administrations, shipowners and shipbuilders and, accordingly, decided that dissemination of the information should be in the format of an MEPC circular.

4 The information contained in these Guidelines should be regarded as guidance in achieving an efficient and effective system for the handling of oily bilge water and oily residues for new buildings and, where applicable and reasonable, for ships which are in service. The information should be considered in conjunction with specific conditions and circumstances, shipowners' and shipbuilders' practices, classification society rules, Administration requirements, etc., applicable to specific ships.

5 Definitions for the purpose of the Guidelines

5.1 Oily waste means oil residues (sludge) and oily bilge water.

5.2 Oil residue (sludge) means:

.1 separated sludge, which means sludge resulting from purification of fuel and lubricating oil;

.2 drain and leakage oil, which means oil resulting from drainages and leakages in machinery spaces; and

.3 exhausted oils, which means exhausted lubricating oil, hydraulic oil or other hydrocarbon-based liquids which are not suitable for use in machinery due to deterioration and contamination.

5.3 Sludge tanks mean:

.1 tanks for separated sludge;

.2 drain and leakage oil tanks; and

.3 exhausted oil tanks.

5.4 Bilge water holding tanks mean tanks for oily bilge water.

5.5 Regulations referred to in these Guidelines are those contained in the revised Annex I of MARPOL 73/78 adopted by resolution MEPC.117(52).

5.6 Oil sludge incinerators are systems proving incineration of oil sludge generated on board seagoing ships.

Sludge incinerators could be:

- main and auxiliary steam boilers with appropriate oil sludge processing systems;
- heaters of thermal fluid systems with appropriate oil sludge processing systems;
- incinerators with appropriate oil sludge processing systems designed for sludge incineration; or
- inert gas systems with appropriate oil sludge processing systems.

6 Collection and storage of oily wastes

6.1 A sludge tank or tanks are mandatory under regulation 12.

6.2 A bilge water holding tank is arranged to receive the daily generation of bilge water before this water is discharged ashore or discharged through the 15 ppm equipment overboard. A bilge water holding tank is not mandatory, but will enable ships to operate safely during port visits, during operation in special areas and coastal waters and during periods of maintenance of the 15 ppm equipment.

6.3 A bilge water holding tank will also provide additional safeguards in the purification of oily bilge water should quick-separating detergents be used for cleaning purposes.

7 Arrangements for oily waste tanks

7.1 Tanks for the purposes mentioned above should be arranged to satisfy the intended service of the ship.

7.2 Sludge tanks may be separate and independent but may also be combined, as suitable, depending on the size and the service of the ship.

7.3 The merits of arranging an independent tank for the collection of separated sludge should be considered, having regard to the smaller tank volume that needs to have cleaning and heating arrangements and the reduced space requirement for tank capacity that should preferably be arranged above the tank top.

7.4 If a bilge water holding tank is arranged, it should be separate and independent from other tanks for the collection of sludge.

7.5 Ships operating with residual fuel oil of a relative density greater than 0.94 at 15°C should be provided with a bilge water holding tank of adequate capacity and fitted with heating facilities to preheat the oily mixture prior to the discharge of the tank's contents into the sea through 15 ppm equipment.

8 Size of oily waste tanks

8.1 Tanks for collection of oily waste from various functions in the engine-room should have adequate capacity, having regard to the intended type of service of the ship. The information given below will provide guidance in this respect, but all other aspects applicable to the specific vessel trading pattern and time in port should additionally be taken into account.

8.2 The recommended capacity for oil residue (sludge) tanks is specified in the interpretations to regulation 12.

8.3 If an exhausted oil tank is installed, in addition to the requirement under regulation 12, it should be of sufficient capacity to receive lubricating oil or other oils and hydrocarbon-based liquids from engine-room systems being exhausted due to deterioration, contamination or due to maintenance activities. The oil being discharged from the 15 ppm equipment may also be discharged to this tank. For main and auxiliary engines, which require a complete change of the lubricating oil at sea, the capacity of the tank should be determined as 1.5 m³ for each 1,000 kW engine rating.

8.4 If a drain and leakage oil tank is installed, in addition to the requirement under regulation 12, it may be arranged at several locations in the engine-room. The oil being discharged from the 15 ppm equipment may also be discharged to this tank. The recommended capacity should be as follows:

Main engine rating (kW)	Capacity (m³)
up to 10,000	$20 \times D \times p/10^6$
above 10,000	$D \times (0.2 + 7 \times (P-10{,}000)/10^6)$

where, D = days; the same length of the voyage as used in the interpretation to regulation 12.
P = main engine rating in kW.

8.5 Bilge water holding tanks, if fitted, should have a capacity that provides to the ship the flexibility of operation in ports, coastal waters and special areas, without the need to discharge de-oiled water overboard. The operational merit of not having to operate the 15 ppm equipment frequently should also be considered. The capacity of bilge water holding tanks should be as follows:

Main engine rating (kW)	capacity (m³)
up to 1,000	1.5
Above 1,000 up to 20,000	1.5 + (P-1,000)/1,500
Above 20,000	14.2 + 0.2 (P-20,000)/1,500

where, P = main engine rating in kW.

9 Pumping, piping and discharge systems in machinery spaces

9.1 On board ships, the propulsion systems of which are operated by heavy fuel oil, the following guidelines are provided for the piping system comprising the plant components for the treatment and storage of oily bilge water, separated sludge, drain and leakage oil and exhausted oil.

9.2 The effluent from the 15 ppm equipment should be capable of being recycled to the bilge or bilge water holding tank.

9.3 If an integral pump is fitted, the discharge should not bypass the 15 ppm equipment.

9.4 The discharge piping system of the 15 ppm equipment should be completely separate from the bilge pumping and ballast water system except the recycling line referred to in paragraph 9.2.

9.5 The ship's discharge pipeline for oily wastes to the standard discharge connection should be separated from the bunker fuel oil.

9.6 The separated dirty water and exhausted control water of fuel oil purifiers should be discharged into a particular tank for this purpose in order to minimize the influx to the tank for separated sludge. This particular tank should be located above the double bottom for the purpose of facilitating its drain without the need for a drain pump. If dirty water and exhausted control water from purifiers is not discharged to a particular tank, and in lieu of this to a tank for separated sludge, the tank should be located above the double bottom for the purpose of the aforementioned draining facilities.

9.7 Piping to and from sludge tanks shall have no direct connection overboard, other than the standard discharge connection required by regulation 13.

10 Systems for separated sludge

10.1 Tanks for separated sludge and their pipework

Tanks for separated sludge, their pipework and pumps should be designed as follows:

10.1.1 Size of tanks

See paragraph 8.

10.1.2 Design of tanks and tank heating systems

The tanks and tank heating systems should be designed to the satisfaction of the Administration.

10.1.3 Tank heating system

Tanks for separated sludge should be equipped with tank heating systems. The heating pipes should be arranged so that, seen from the heating inlet, they are arranged away from the boundaries and then, across the whole bottom area, sufficiently high to avoid being covered totally by sediments in the tank.

The tank heating system should be designed so as to enable heating of the oil sludge up to 60°C.

The suction line from the sludge tank to the pump should be provided with heat tracing.

10.1.4 Pipelines from the heavy fuel oil purifier to the tank

Whenever possible, the sludge tank should be located below the heavy fuel oil purifier. If this is not possible, the sludge tank should be situated close to the heavy fuel oil purifier in such a way that the discharge line to the tank can be installed at the maximum gradient. The pipelines should, wherever possible, be straight or fitted with large radius elbows.

10.1.5 The submersible pump or opening of the suction line should be arranged so that the oil sludge's path to the suction opening is as short as possible, or the sludge tank should be mounted or designed, so that the oil sludge moves down a slope towards the suction opening. The openings should be placed as wide as possible in the frames above the tank bottom in such a way that the oil sludge has free access to the suction line.

10.1.6 Pump and pressure lines

The pump should be suitable for use with high viscosity oil sludge e.g., "self-priming displacement pump", with suitable means for protection against dry running. It should have a total head of at least 4 bar, and the delivery rate should be determined by applying the formula:

$$Q = v / t \ (m^3/h)$$

where V is the volume of the sludge tank as calculated by the interpretation to regulation 12. Four hours should be substituted for the time t. However, the pumping capacity should be not less than 2.0 m^3/h.

The geodetic suction head of the pump should not exceed 3.0 m for ships with a main engine rating up to 15,000 kW and 3.5 m for ships greater than 15,000 kW.

The pressure side of the pump should only be connected to the transfer line on deck, to sludge tanks and to the incineration equipment, if provided.

10.1.7 Sludge tank design to facilitate cleaning

Access holes should be arranged so that all areas of the tank can be cleaned. An access hole should be sited on top of the tank to facilitate the use of a portable pump.

10.1.8 Steaming-out lines

The top of sludge tanks should be fitted with steaming-out lines for cleaning.

11 Example of an on-board system for oil sludge incineration

11.1 General

In addition to the provision of sludge tanks, another means for the disposal of oil residue (sludge) are oil sludge incinerators.

11.2 Oil sludge incinerators

An oil sludge incinerator system is composed of:

- steam boiler or heater of thermal fluid systems or an incinerator;
- oil burner;
- oil sludge processing system; and
- tanks for separated sludge.

11.3 Oil sludge processing systems

The oil sludge processing system consists of:

- tank for mixing oil residues with fuel oil (mixing tank);
- oil sludge preheating system;
- filter; and
- homogenization system.

11.4 Mixing tank

The mixing tank should be provided in addition to the tank for separated sludge. It should be equipped with suitable drainage facilities. With a view to improving combustibility and calorific value, a fuel oil supply connection should be provided.

11.5 Homogenization system

The homogenization system should assure that the entire contents of the mixing tank should be processed into a homogenous and combustible mixture. This system should be put into operation following adequate draining of the tank. A device for continuous indication and monitoring of the water content of the oil sludge should be provided.

APPENDIX

Guidance notes for an Integrated Bilge Water Treatment System (IBTS)

1 Introduction

1.1 Oily bilge water is generated by the leakage of water and oil from the equipment and piping or maintenance works resulting from the routine operation in machinery space of ships. Such leaked oil and water are usually mixed and collected on the tank top or bilge wells as oily bilge water.

1.2 Oily bilge water shall be treated in accordance with the requirements of the Convention. The operation of such treatment, including the operation and maintenance of bilge filtering equipment, is a heavy load for engineers onboard.

1.3 After the revision of the Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilge of Ships adopted by resolution MEPC.107(49), the capability of bilge filtering equipment has been improved. However, the treatment process of oily bilge water with the improved equipment and the engineers' load will be basically unchanged as the amount of oily bilge water generated in ships has not been reduced.

1.4 To promote the prevention of oil pollution from machinery spaces of ships and reduce the load of the engineers onboard, it is effective to minimize the amount of oily bilge water generated in machinery spaces.

1.5 MEPC 54 noted the design with the concept of Integrated Bilge Water Treatment System (IBTS) which provides the means to minimize the amount of oily bilge water and process the oily bilge water and oil residue (sludge) as a drastic solution to prevent oil pollution from machinery spaces of ships.

1.6 MEPC 54, in recognizing the need to disseminate the concept of IBTS, agreed to append the Guidance notes on IBTS to the revised Guidelines for systems for handling oily wastes in machinery spaces of ships.

1.7 The purpose of these Guidance notes is to provide shipowners and shipbuilders with information to help in the design of ships incorporating the concept of IBTS.

2 Concept of Integrated Bilge Water Treatment System (IBTS)

The Integrated Bilge Water Treatment System (IBTS) is a system to minimize the amount of oily bilge water generated in machinery spaces by treating the leaked water and oil separately. It also provides an integrated means to process the oily bilge water and oil residue (sludge).

3 Definitions for the purposes of the Guidance notes

3.1 "Clean drains" mean drains resulting from the leakage of equipment used for sea water, fresh water, steam etc. which are not contaminated by oil.

3.2 "Oily drains" mean drains resulting from the leakage of equipment used for oil.

3.3 "Oily bilge water" means water collected in the bilge wells or the tank top resulting from the unexpected leakage from piping or the maintenance work in machinery spaces, which may be contaminated by oil.

3.4 "Oil residue (sludge)": refer to paragraph 5.2 of the revised Guidelines; includes oily drains.

3.5 "Bilge primary tank" means a pre-treatment unit for separation of oily bilge water.

4 Outline of IBTS

4.1 Collection of drains

4.1.1 Oily drains are collected through the fixed drainage arrangements to sludge tanks.

4.1.2 Clean drains are collected through the fixed drainage arrangements to clean drain tanks.

4.1.3 Oily drain and clean drain shall be collected separately so as not to contaminate clean drains with oil.

4.2 Pre-treatment of oily bilge water

To avoid feeding excessive oil to oil filtering equipment, oily bilge water in the bilge wells is transferred to the bilge primary tank for pre-separation of oil. The high oil content water is transferred to sludge tanks and the low oil content water is transferred to the bilge water holding tank.

4.3 Discharge of oily bilge water

Oily bilge water in the bilge water holding tank is discharged overboard through the oil filtering equipment in accordance with Regulation 14 of the Convention.

4.4 Discharge of clean drains

Clean drains may be discharged overboard directly through the discharge arrangement, independent from the system for oily bilge water or oil.

4.5 Treatment of oil residue (sludge)

4.5.1 Oil residue (sludge) in sludge tanks is transferred to the waste oil tanks.

4.5.2 Water in oil residue (sludge) is vaporized by heating in the waste oil tanks.

4.5.3 Oil residue (sludge) is incinerated by the sludge incinerator or discharged to the reception facilities through the standard shore connection.

4.5.4 Oily drains from fuel oil systems may be burnt by the boiler as re-generative fuel.

5 Additional installations of IBTS

In addition to the installations required by the Convention, the following installations are required to form part of the IBTS:

5.1 Drainage system

5.1.1 Drip trays or coamings with sufficient depth should be provided under the equipment used for oil such as diesel engines, burners, pumps, heaters, coolers, filters and tanks to contain spillage of oil.

5.1.2 Drip trays or coamings with sufficient depth should be provided under the equipment used for water such as pumps, heaters, coolers, filters, tanks, condensers and boilers to contain spillage of water.

5.1.3 Independent drainage arrangements for oil and water to sludge tanks and the clean drain tank should also be provided.

5.2 Pre-treatment unit for oil separation

A bilge primary tank is a tank which makes use of a cascade to separate oil from oily bilge water by gravity, with drainage facilities for the oil on the top so as to enable primary separation of oily bilge water. Refer to the example of a bilge primary tank shown in Figure 1.

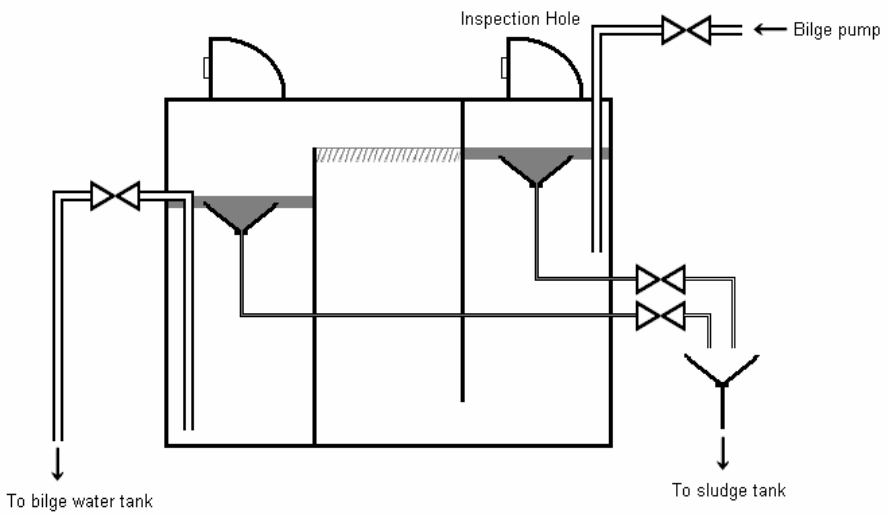

Figure 1 – Example of a bilge primary tank

5.3 Storage tanks

5.3.1 Clean drain tank: Tank for the retention of clean drains.

5.3.2 Bilge water holding tank: Tank for the retention of oily bilge water.

5.3.3 Waste oil tank: Tank for preparation of oil residue (sludge) for incineration.

5.4 Discharge arrangement of clean drains

The overboard discharge arrangement of clean drains should be independent from the system for oily bilge water.

5.5 Exclusive pump for the oil filtering equipment

It is preferable that an exclusive pump be provided to transfer the pre-treated bilge water from the bilge water holding tank to the oil filtering equipment so as not to mix the pre-treated bilge water with untreated oily bilge water.

5.6 Heating arrangement

5.6.1 Heating arrangement for the bilge primary tank to facilitate separation of oil.

5.6.2 Heating arrangement for the waste oil tank to vaporize water and facilitate incineration.

6 Example of IBTS

A typical flow diagram of IBTS is shown in Figure 2.

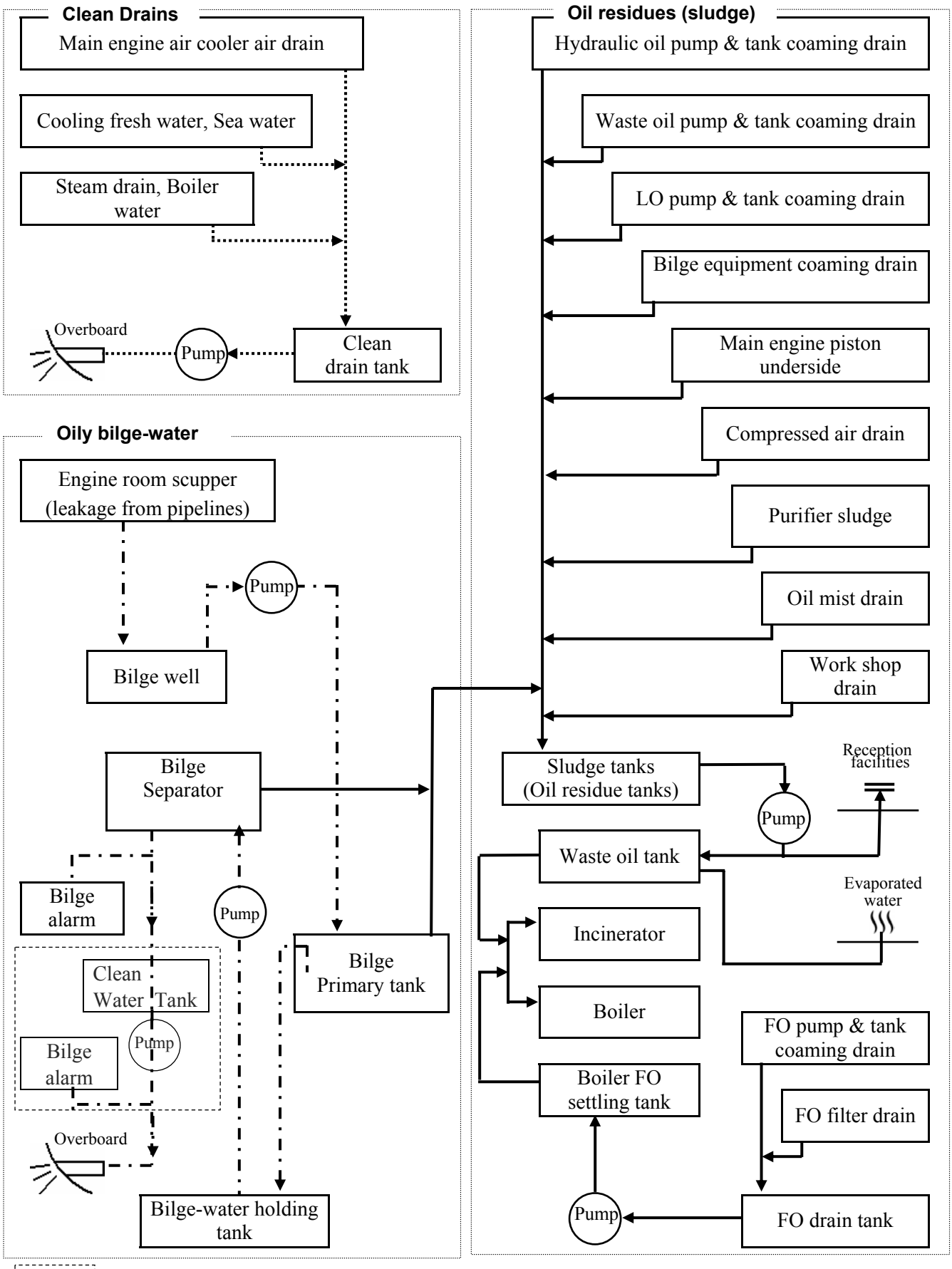

Figure 2 – Flow Diagram of Integrated Bilge Water Treatment System (IBTS)