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統合ビルジ処理システムのガイドライン改正案の作成に関する調査研究

（平成１６年度報告書）

平成１７年３月

社団法人　日本造船研究協会

はしがき

本報告書は、日本財団の平成 16 年度助成事業「船舶関係諸基準に関する調査研究」の一環として、RR-SP10（統合ビルジ処理）プロジェクトにおいて実施した「統合ビルジ処理システムのガイドライン改正案の作成に関する調査研究」の成果をとりまとめたものである。

RR-SP10（統合ビルジ処理）プロジェクト　ステアリング・グループ　委員名簿（順不同、敬称略）

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（注）（　　）内は前任者を示す。

目　次

添付資料

1. はじめに

船舶の機関室で発生した油性ビルジは、「海洋汚染防止条約(MARPOL73/78)」附属書 I「油による汚染の防止のための規則」により、油水分離器で処理の上、油分濃度計を通して船外に排出することが義務づけられている。

これらビルジ処理設備の性能基準としては、IMO 決議 MEPC.60(33)「船舶の機関室ビルジにおける汚染防止装置の指針及び仕様書」が 1992 年に採択されていたが、その後の科学技術の進歩及び世界的な海洋環境保護に対する認識の高まりに対応すべく基準の見直しが進められ、2003 年 7 月開催の第 49 回海洋環境保護委員会(MEPC49)において、決議 MEPC.107(49) 「船舶の機関室ビルジにおける汚染防止装置の改正指針及び仕様書」が採択され 2005 年 1 月 1 日から施行されている。

しかしながら、改正された性能基準 MEPC.107(49)は、乳化したビルジへの対応等のビルジ処理装置の性能向上を目的としたものではあるが、油分を完全には分離できるものではなく、また、ビルジ処理作業のプロセスも従来と変わらないものであるため、乗組員の大きな負担となっているビルジ処理作業を軽減するものではない。

従って、機関室からの油の排出を根本的に抑制させ、また同時に、乗組員のビルジ処理作業の負担を軽減するためには、ビルジ処理装置の性能向上に加え、機関室で発生する油分を含んだビルジそのものの発生量を減少させる必要がある。

一方、大手邦船社は、従来より、油系ビルジと水系ビルジを発生の段階から分離して処理することにより、油分を含んだビルジの発生量を減少させるシステムを採用しており、また、これに発生した油性スラッジ、ドレン等を焼却あるいは燃料として再利用するシステムを併せた「機関室統合ビルジ処理システム(Integrated Bilge Water Treatment System (IBTS)」と呼ばれるシステムを構築し、既に大きな効果を上げている。

我が国では、このような認識のもと、本プロジェクトの前身である RR76, RR-E201「油排出管理分科会」及び RR-E203「ビルジ管理分科会」において、この IBTS に着目し、調査・検討を進めてきた。これらの検討結果をまとめ、2004 年 3 月開催の第 51 回海洋環境保護委員会(MEPC51)において、MEPC/CIRC.235「船舶の機関区域における油性廃棄物の処理システムに関する指針」（Guidelines for Systems for Handling Oily Wastes in Machinery Spaces of Ships）に IBTS のコンセプトを取入れて改正することを我が国より提案し、多くの国の支持を受け、作業を進めることが承認された。

本プロジェクトは、上記の検討を引き継ぎ、我が国提案の先進的なコンセプトである IBTS を取り入れた機関室ビルジ処理システムの設計指針等を IMO に提言し、本システムを普及させることにより、造船・海運先進国として国際的な海洋環境の保護に寄与することを目的としたものである。

2. IMO での審議状況

2.1 MEPC47

我が国は、2002 年 3 月開催の第 47 回海洋環境保護委員会(MEPC47)において「機関室統合ビルジ処理システム (IBTS)」のコンセプトを紹介し、IBTS に関するガイドラインを策定するよう提言をした。多くの国が IBTS に関心を示し、この作業を進めるよう支持を受けた。

2.2 MEPC 51

2004 年 3 月開催の第 51 回海洋環境保護委員会(MEPC51)において、我が国より、IBTS のコンセプトを普及させるため、MEPC/CIRC.235「船舶の機関区域における油性廃棄物の処理システムに関する指針」（Guidelines for Systems for Handling Oily Wastes in Machinery Spaces of Ships）に IBTS のコンセプトを取入れて改正する提案（MEPC51/20(添付資料 1.)）を IBTS の実績の調査結果（MEPC51/INF.6(添付資料 2.)）と供に提出したところ、独、ノルウェー、パキスタン及びシンガポール等の支持を受けた。委員会は MEPC/CIRC.235 の改正を船舶設計設備小委員会（DE）の High Priority 事項として新規作業項目に採り上げることを承認し、この改正作業が DE 小委員会に付託された。(添付資料 1.)

2.3 DE48

2005 年 2 月開催の IMO 第 48 回船舶設計設備小委員会（DE48）から検討が開始され、我が国より、統合ビルジ処理システム(IBTS)の概念を組み入れた、「船舶の機関区域における油性廃棄物の処理システムに関する指針(MEPC/CIRC.235)」の改正の提案である DE48/18 が紹介された。これに対し、独、スウェーデン、ノルウェー、蘭、ICS より若干のコメントはあるが、本提案は有益な提案であり提案を支持する旨の発言があった。ICS より、クリーンビルジがどの程度油分が混入しているか判断するのは困難であること、また、現状では、燃料油清浄器からのスラッジがタンクに導かれているが、燃料油清浄器からは大量の水がタンク排出されているため、スラッジタンクから頻繁にポンピングアウトする必要がある、との指摘が、パナマより、DE48/18　11 ページのスラッジタンクの先のポンプから受け入れ施設への配管に矢印が必要とのエディトリアルな指摘が、オーストラリアより、２つの Appendix の構成とせず､一つの Appendix としその中でセクションを分ける構成とすべきとの発言が、また INTERTANKO より CIMAC にて同様の検討がなされている旨発言があった。
これに対し、日本より次回会合にて各国からのコメントを反映した改正版の提案文書を提出する意図がある旨延べ、海技研・吉田氏がコメントの窓口で有る旨関係国に伝えた。また、ICS からのコメントに対しては、燃料油清浄器からの排出の配管は、現在の船舶の配管であり変更は加えてないこと、また、船外への排出は、MARPOL に従いいかなる場合も油分濃度が 15ppm 以下である旨監視される必要があり、MARPOL 規則を改正する意図は無い旨発言した。

3. 調査内容（DE48 への提案文書）

3.1 ”Revision of the Guidelines for Systems for Handling Oily Wastes in Machinery Spaces of Ships”
MEPC/CIRC.235「船舶の機関区域における油性廃棄物の処理システムに関する指針」(Guidelines for Systems for Handling Oily Wastes in Machinery Spaces of Ships）に IBTS のコンセプトを取入れた改正案を作成し、”Revision of the Guidelines for Systems for Handling Oily Wastes in Machinery Spaces of Ships (MEPC/CIRC.235) (DE 48/18)”として DE48 へ提出した。(添付資料 3.)

3.2 ガイドラインの構成
MEPC/CIRC.235のAppendixであった従来の”Guidelines for Systems for Handling Oily Wastes in Machinery Spaces of Ships”については、これを「Appendix 1」として、最新のMARPOLの要件との整合化を図る改正を行い、IBTSについての指針は、「Appendix 2 ”Guidelines for the Integrated Bilge Water Treatment System (IBTS)”」として別途作成した。

3.3 ”Guidelines for the Integrated Bilge Water Treatment System (IBTS)”
”Guidelines for the Integrated Bilge Water Treatment System (IBTS)”は、先の MEPC51 に提出した MEPC51/20 で示した IBTS のコンセプトを基に、機関室ビルジシステムを設計するための指針を以下の構成で取り纏めた。

1. Introduction
   ガイドラインの目的、IBTS の背景
2. Concept of Integrated Bilge Treatment System (IBTS)
3. Definitions for the purposes of these Guidelines in this Appendix
4. Outlines of IBTS
   システムの概要
   4.1 ドレンの収集
   4.2 油性ビルジの前処理
   4.3 油性ビルジの処理方法
   4.4 クリーンドレンの排出
   4.5 スラッジの処理方法
5. Additional installations of IBTS
   システムの構成要素
   5.1 ドレン収集システム
   5.2 油性ビルジの前処理装置
   5.3 貯蔵タンク
   5.4 クリーンドレンの排出システム
   5.5 ポンプ
   5.6 加熱装置
6. Example of IBTS
   概念図

4. 今後の検討

上述のとおり本プロジェクトの本年度の作業としては、”Guidelines for the Integrated Bilge Treatment System (IBTS)”の草案を作成し、これを取り込んだ MEPC/CIRC.235 ”Guidelines for Systems for Handling Oily Wastes in Machinery Spaces of Ships”の改正案”Revision of the Guidelines for Systems for Handling Oily Wastes in Machinery Spaces of Ships (MEPC/CIRC.235)”を 2005 年 2 月開催の DE48 へ提出した。

今後の作業としては、DE48 での審議の内容を踏まえ、2006 年 10 月開催予定の MEPC55 での承認を目標にして、最終案を作成し 2006 年 3 月開催の DE49 へ提出することである。

以上

INTERNATIONAL MARITIME ORGANIZATION

IMO

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MARINE ENVIRONMENT PROTECTION COMMITTEE
51st session
Agenda item 20

MEPC 51/20
7 November 2003
Original: ENGLISH

WORK PROGRAMME OF THE COMMITTEE AND SUBSIDIARY BODIES

Revision of MEPC/Circ.235 (Guidelines for systems for handling oily waters in machinery spaces of ships) incorporating the design concepts of the integrated bilge water treatment system (IBTS)

Submitted by Japan

SUMMARY	
Executive summary:	This paper proposes the addition of a new work programme item for the DE Sub-Committee to consider revising MEPC/Circ.235 incorporating the design concept of the Integrated Bilge Water Treatment System (IBTS).
Action to be taken:	Paragraph 13
Related documents:	DE 45/5/4, DE 45/27, DE 46/4/4 and DE 46/32

Introduction

1 The following proposal is submitted in accordance with the Guidelines on the organization and method of work of the Committee, as amended (MSC/Circ.1099 - MEPC/Circ.405). In particular, the format of this submission is in accordance with paragraph 2.20 of the Guidelines.

Scope of the proposal

2 The scope of the Japanese proposal is to revise MEPC/Circ.235 incorporating the design concept of the Integrated Bilge Water Treatment System (IBTS), which is a system that deals with possible leakage of oil or other liquids in machinery spaces in a manner to prevent oil from mixing with water, and which is expected to solve, in a holistic manner, the problem of treatment of oily bilge water.

Need for the measure proposed

3 As a result of the revision of the Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilge of Ships adopted by resolution MEPC.107(49) at MEPC49, bilge treatment systems will be developed that are more effective than the systems currently available. However, the treatment process of bilge water using new bilge filtering equipment will be basically unchanged and the amount of bilge water generated in ships will not be reduced. Consequently, the operation time, maintenance time, and probability of failure of

bilge filtering equipment will be the same as before. Japan considers that a drastic reduction in the quantities of bilge water generated in the machinery spaces in ships is absolutely necessary to completely prevent marine pollution being caused by bilge water from a ship's machinery space. A drastic reduction in the quantities of bilge water generated in machinery spaces in ships could be achieved by separating the collection of oil and water (i.e. improvement of the design of piping, fitting and/or collecting tank). (The concept of IBTS is referred to in the annex to this document) To bring about the above-mentioned brand-new concept for the protection of the marine environment, Japan proposes to revise MEPC/Circ.235 incorporating the design concept of IBTS.

Analysis of the issues involved; Costs to the maritime industry

4 It is estimated that the installation and life-long running costs of IBTS are less than those of the existing oil-water separating system. Therefore, there is no substantial cost increase for the installation of IBTS.

Legislative and administrative burden

5 As this proposal is to revise the guidelines, which have a recommendatory status, there would be no legislative and administrative burden.

Benefits which would accrue from the proposal

6 The following benefits would accrue:

.1 IBTS is a holistic solution for preventing marine pollution by the discharge of oil containing bilge water, which may be generated in machinery spaces, and this should contribute making the oceans cleaner;

.2 Oil filtering equipment may be smaller than currently used as the quantities of oil water generated would be reduced; and

.3 It is expected that IBTS could reduce the workload of seafarers on board relating to operation and maintenance of the existing oil-water separating system and oil discharge monitoring and control system. This is a significant advantage of IBTS.

Priority and target completion date

7 This proposal should be a high priority item as it proposes measures aiming at the thorough protection of the marine environment by the drastic reduction of the quantities of oil water generated in machinery spaces in ships. Proposed revision of MEPC/Circ.235 should start to be considered by DE 48 in 2005. It is expected that the DE Sub-Committee will need two sessions to complete its consideration for this proposal.

Specific indication of the action required

8 The proposals will require appropriate revisions of MEPC/Circ.235 taking into account the concept of IBTS.

Remarks on the criteria for general acceptance

9 Is the subject of the proposal within the scope of IMO's objectives? This proposal is within the scope of IMO's objectives, as it would significantly contribute to the protection of the marine environment.

10 Do adequate industry standards exist? There is no industry standard at present. However, certain Japanese shipping companies have introduced the concept of IBTS to their own ships.

11 Do the benefits justify the proposed action? The expected benefits amply justify the proposal (see paragraph 6 above).

Identification of which Committee/Sub-Committee(s) are essential to complete the work

12 It is suggested that the DE Sub-Committee consider this proposal.

Action requested of the Committee

13 The Committee is invited to add a new item on *Revision of MEPC/Circ.235 incorporating the design concepts of the Integrated Bilge Treatment Systems (IBTS)* to the work programme of the DE Sub-Committee and the provisional agenda for DE 48.

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ANNEX

THE CONCEPTS OF INTEGRATED BILGE WATER TREATMENT SYSTEM (IBTS) IN ENGINE ROOM

By definition, engine room bilge water consists of water, oil, and oily-water which collects on tank tops or in bilge wells in the engine room.

At present, as in the past, water, oil, and oily water generated from machinery and pipelines due to air vents, leakage and draining is usually deposited on the tank top or bilge wells. This mixture of liquid substances is poured into the bilge well and a large volume of oily water or emulsified bilge water is then produced. Engineers have been struggling to separate oil and water with the bilge separator and the overhauling of the bilge separator, and have barely managed to discharge the bilge water with allowable oil content. This difficulty led engineers to design a bilge primary tank (separating oil and water by settling the oily bilge water by gravity before transferring bilge tank), which was an original idea. However, this method was only a temporary measure, and did not become permanent.

Recently, Japanese ship owners and engineers changed their way of thinking in regard to bilge treatment by choosing a sensible way of discharging bilge to ensure marine environmental protection. The solution is the Engine Room Integrated Bilge Treatment System which eliminates or minimizes bilge.

Concept of the system

1 Water and oil are completely segregated at source and are at no time mixed with each other.

2 Oily water is regarded as oil.

3 Water, oil, and oily water is deposited on tank tops or in bilge wells.

4 Clean water such as cooling fresh water, sea water, steam drain, boiler water, is directly led or transferred into the Clean Water Tank (Clean Drain Tank) through fixed pipelines and then this is discharged overboard with a pump.

5 Oil is directly led or transferred into the Sludge Tank (Bilge Separated Oil Tank) through fixed pipelines and then transferred to the Waste Oil Tank.

6 The waste oil is boiled off to remove the water and the oil is burned out by the Incinerator, to be used as a regenerative fuel or discharged to reception facilities through a standard discharge connection (Reg. 19 of MARPOL Annex I).

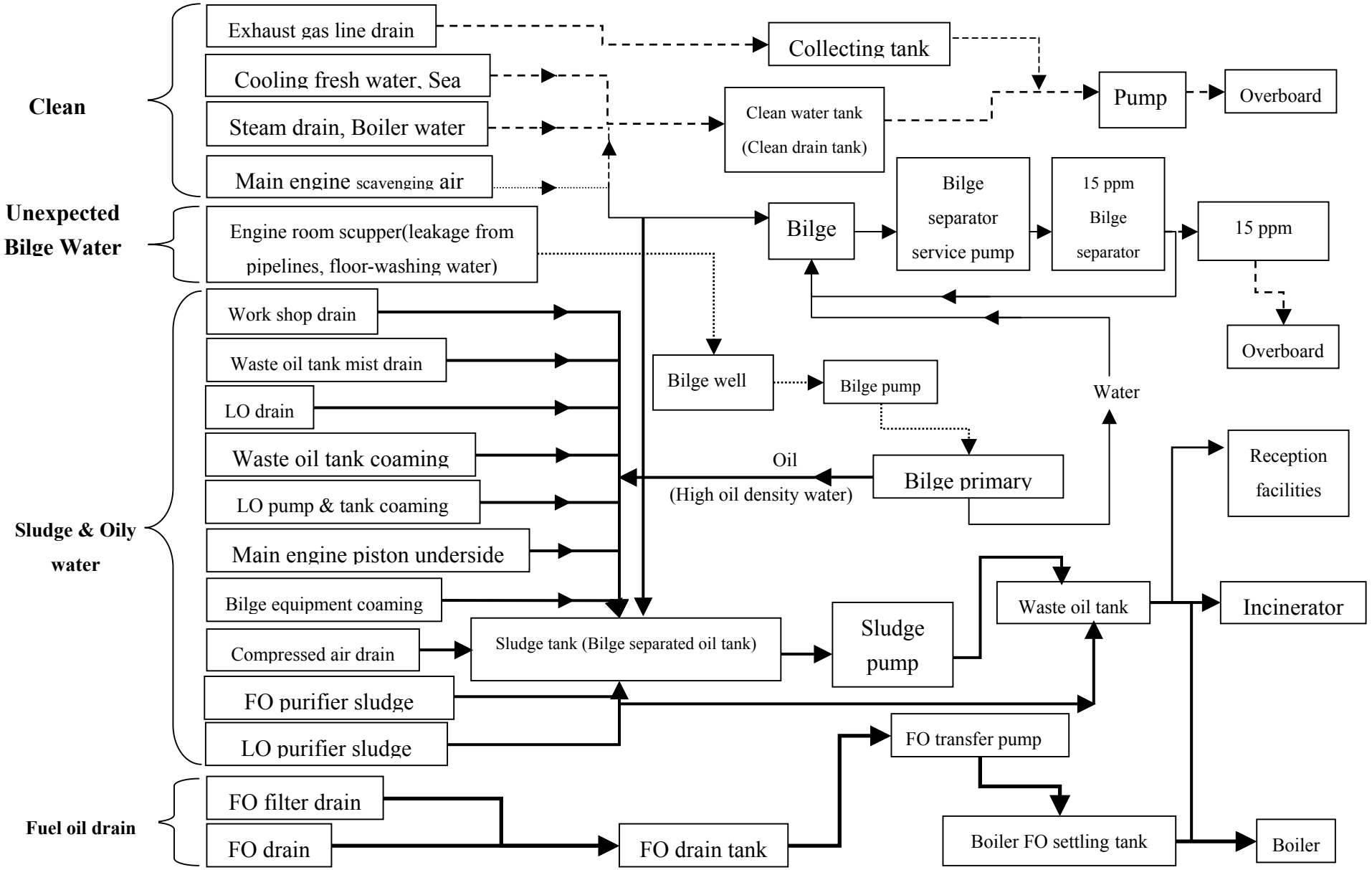
7 Unexpected bilge water, such as leakage from pipelines, floor-washing water, etc, is transferred to the Bilge Primary Tank to extract the oil from the bilge water by gravity separation. The high oil density water is transferred to the Waste Oil Tank and the low oil density water is transferred to the Bilge Tank.

8 Bilge in the Bilge Tank, which contains only a little oil, is discharged overboard through the 15ppm Bilge Separator and 15 ppm Bilge Alarm System (applied to ships of 10,000 tons gross tonnage and above) at rare intervals.

9 A small volume of water is transferred to the Waste oil tank, and then boiled off through the tank heating system.

Appendix

Flow Diagram of Integrated Bilge Water Treatment System (IBTS) in Engine Room



INTERNATIONAL MARITIME ORGANIZATION

IMO

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MARINE ENVIRONMENT PROTECTION COMMITTEE
51st session
Agenda item 20

MEPC 51/INF.6
23 January 2004
ENGLISH ONLY

WORK PROGRAMME OF THE COMMITTEE AND SUBSIDIARY BODIES

The concept of the Integrated Bilge Water Treatment System (IBTS) and the bilge volume generated in the IBTS machinery space

Submitted by Japan

SUMMARY

Executive summary:	This document contains information on the concept of the IBTS and the bilge volume generated in the machinery space designed under the concept of IBTS.
Action to be taken:	Paragraph 7
Related documents:	MEPC 51/ 20, MEPC 47/10/4, DE 45/5/4 and DE 46/4/4

Introduction

1 Water, oil, and oily water generated in the machinery space are usually deposited on the tank top. They are poured into the bilge well and then a large volume of oily water or emulsified bilge water is produced. Prior to discharge, oil and water with allowable oil content from such oily water or emulsified bilge water, must be separated through the bilge separator.

2 However, the performance of the bilge separator would not be sufficient to separate water and oil completely. As a result, ships' engineers have been struggling to separate oil and water with the bilge separator and its overhauling, and they have barely managed to discharge the bilge water with allowable oil content.

Integrated Bilge Water Treatment System (IBTS)

3 In order to reduce the total volume of oily water or emulsified bilge water in the machinery space and reduce the burden on the bilge separator, a couple of Japanese shipping companies have designed the machinery space with a particular concept since the late 1980s.

4 This concept was introduced as the "Integrated Bilge Water Treatment System (IBTS)" at MEPC 47. The concept of IBTS is described in annex 1.

Elimination of oily water or emulsified bilge water

5 A remarkable elimination of oily water or emulsified bilge water volume in the machinery space designed under the IBTS concept has been observed. In connection with the elimination of such liquid, the reduction of the operation frequency of the bilge separator and the work burden on ships' engineers has been noted. The following data is a sample of the improvement in bilge generated amount and operation interval of the bilge separator in full container ships. Other data and details are set out in annex 2.

Table: Sample data of generated bilge amount in the machinery space

Machinery space bilge system	Vessel	Bilge generated amount		Bilge separator operation interval (days)	Gross tonnage
		m^3/day	m^3/6 months		
IBTS	A	0.488	87.9	35	53822
	B	0.028	5.0	30	75637
Non-IBTS	C	1.710	307.8	10	42145
	D	4.146	746.3	4	40354

6 It is concluded that the concept of the IBTS has a great advantage for the marine environmental protection and the reduction of the work burden on ships' engineers.

Action requested of the Committee

7 The Committee is invited to note the information provided in its consideration of the proposal by Japan (MEPC 51/20) on the revision of MEPC/Circ.235 incorporating the design concept of the IBTS.

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ANNEX 1

THE CONCEPT OF THE IBTS

1. The main concept of IBTS

.1 The water and oil are to be perfectly segregated at the original source and never be mixed with each other.

.2 The oily water is regarded as oil.

.3 The water, oil, and oily water are not to be deposited on the tank top or bilge wells.

2. The treatment methods of each liquid substance

.1 Clean water

The clean water such as cooling fresh water, sea water, steam drain, boiler water, is directly led or transferred into the Clean Water Tank (Clean Drain Tank) through fixed pipelines and then this is boiled off and/or discharged overboard with a pump.

.2 Oily water

.1 The oil is directly led or transferred into the Sludge Tank (Bilge Separated Oil Tank) through fixed pipelines and then transferred to the Waste Oil Tank.

.2 The waste oil is boiled off to remove the water and the oil is burned out by the Incinerator, used as a regenerative fuel or discharged to reception facilities through a standard discharge connection (Reg.19 of Annex I of MARPOL 73/78).

.3 The high oil content water is transferred to the Waste Oil Tank and the low oil content water is transferred to the Bilge Tank.

.4 Bilge in the Bilge Tank, which contains a small amount of oil, is discharged overboard through the 15 ppm Bilge Separator and 15 ppm Bilge Alarm System (applied to ships of 10,000 tons gross tonnage and above) at rare intervals.

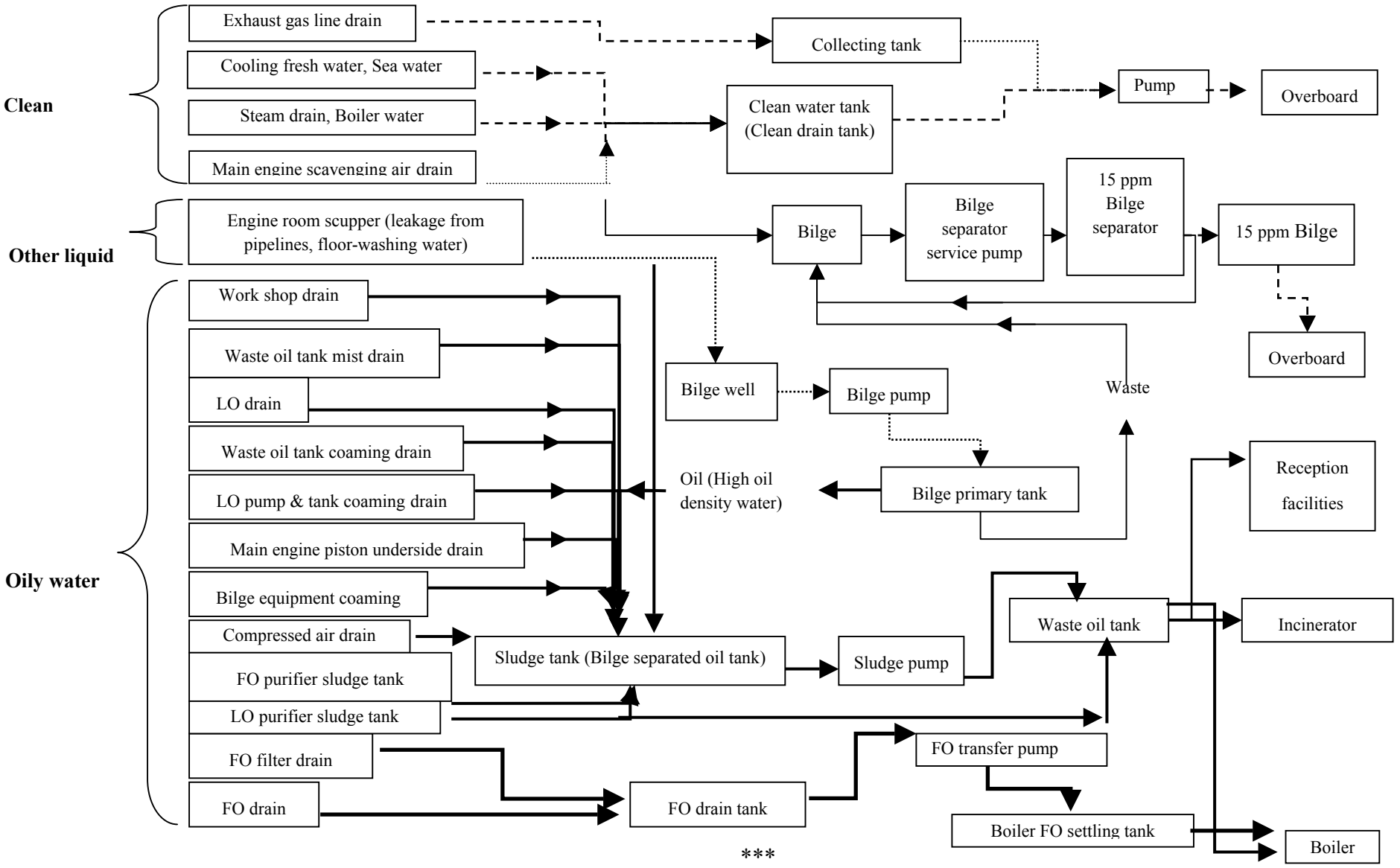
.5 A small volume of water is transferred to the Waste Oil Tank, and then boiled off through the tank heating system.

.3 Other liquid

Unexpected bilge water, such as leakage from pipelines, floor-washing water, etc. is transferred to the Bilge Primary Tank to extract the oil from the bilge water by gravity separation.

3. A flow diagram of the IBTS is shown in the Appendix.

APPENDIX: Flow Diagram of Integrated Bilge Water Treatment System (IBTS) in Engine Room



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ANNEX 2

Comparison table for generated bilge amount in IBTS/Non-IBTS machinery space

Ship type	Machinery space bilge system	Vessel	Bilge generated amount		Bilge separator operation interval (days)	Main engine normal output rating (kw)	Gross tonnage	Built year
			m^3/day	m^3/6 months				
Full container ship	IBTS	A	0.488	87.9	35	42000	53822	2003
		B	0.028	5.0	30	45310	75637	1997
	Non-IBTS	C	1.710	307.8	10	21381	42145	1986
		D	4.146	746.3	4	16880	40354	1986
Vehicle carrier	IBTS	E	0.289	52.0	7	12003	55880	2000
		F	0.233	41.9	26	12709	57623	1998
	Non-IBTS	G	0.977	175.8	10	10154	46047	1981
		H	0.679	122.2	4	12577	52214	1977
Bulk carrier	IBTS	I	0.501	90.1	15	6875	27986	1999
		J	0.001	0.2	15	10812	50890	1995
	Non-IBTS	K	0.672	121.0	20	14122	108000	1987
		L	1.881	338.5	5	10782	102395	1985
Oil tanker	IBTS	M	1.000	180.0	5	21320	160079	2000
		N	0.000	0.0	20	27184	149407	1999
		O*	0.000	0.0	60	16475	145635	1987
	Non-IBTS	O*	1.853	333.6	No data			

* The machinery space bilge system vessel “O” was modified from Non-IBTS to IBTS.

INTERNATIONAL MARITIME ORGANIZATION

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SUB-COMMITTEE ON SHIP DESIGN AND EQUIPMENT
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REVISION OF THE GUIDELINES FOR SYSTEMS FOR HANDLING OILY WASTES IN MACHINERY SPACES OF SHIPS (MEPC/CIRC.235)

Proposal for revision of MEPC/Circ.235 incorporating the design concepts of Integrated Bilge Water Treatment System (IBTS)

Submitted by Japan

SUMMARY	
Executive summary:	This document provides the proposal for revision of MEPC/Circ.235 by incorporating the design concept of Integrated Bilge Water Treatment System (IBTS)
Action to be taken:	Paragraph 7
Related documents:	MEPC 51/22, MEPC 51/WP.1, MEPC 51/20 and MEPC 51/INF.6

Background

1 The Marine Environment Protection Committee, at its fifty-first session, agreed to include a high-priority item on the revision of MEPC/Circ.235 in the work programme of the Sub-Committee and in the agenda of this session with a target completion date of 2006.

Scope of the proposal

2 The scope of the Japanese proposal is to revise MEPC/Circ.235 by incorporating the design concept of Integrated Bilge Water Treatment System (IBTS), which is a system that deals with possible leakage of oil or other liquids in machinery spaces in a manner to prevent oil from mixing with water, and is expected to solve, in a holistic manner, the problem of treatment of oily bilge water.

3 As a result of the revision of the Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilge of Ships adopted by resolution MEPC.107(49) at MEPC 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 has not been basically unchanged and the amount of oily bilge-water generated in ships has not been reduced. Consequently, the operation time, maintenance time and probability of the occurrence of the failures for bilge filtering equipments would be same as current systems.

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 the oily bilge-water generated in machinery spaces. Drastic reduction of the quantities of bilge water generated in machinery spaces in ships could be done by the separating collection of oil and water (i.e. improvement of the design of piping, fitting and/or collecting tank).

5 To materialize and disseminate the above-mentioned brand-new concept for the protection of marine environment, Japan prepared the draft guidelines for the Integrated Bilge Treatment System (IBTS), attached as appendix 2 of the annex to this document.

6 Japan proposes that the draft MEPC Circular prepared in the annex, for MEPC/Circ.235, reviewed to harmonize with the current rules of the Convention and added newly draft guidelines for the Integrated Bilge Treatment System (IBTS) by Japan.

Action requested of the Sub-Committee

7 The Sub-Committee is invited to consider the above proposal and the annex and take action as appropriate.

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ANNEX

Draft
REVISION TO THE GUIDELINES FOR SYSTEMS FOR HANDLING OILY WASTES IN MACHINERY SPACES OF SHIPS
AND
THE GUIDELINES FOR THE
INTEGRATED BILGE TREATMENT SYSTEM (IBTS)

(For the purpose of drafting, the parts with underline are added, and the parts with deletion line are deleted.)

1 Annex I of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (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 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 fulfillment of the Convention requirements.

3 "Guidelines for system for handling oily wastes in machinery spaces of ships" appendixed to ~~this circular~~ MEPC/Circ.235 were developed as ~~are~~ 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 are laid on or after 1 January 1992 and, where practicable, ships already in service.

4 The aforementioned Guidelines are reviewed in accordance with the current provisions of the Convention and revised as appendix 1 to this circular.

5 For further prevention of oil pollution from machinery spaces of ships, MEPC consider that the reduction of the generation of oily bilge water generated in machinery spaces is effective and noted the concept of Integrated Bilge 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) integratedly.

6 MEPC recognized the need to disseminate the concept of IBTS and developed the Guidelines for IBTS as Appendix 2 to this circular.

APPENDIX 1

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

1 Annex I of the 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 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 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 the 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 ship.

5 Definitions for the purpose of these Guidelines in this Appendix

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 liquid 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 Annex I of MARPOL 73/78.

5.6 Oil sludge incinerators are systems serving for 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 17.

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 ~~or 100 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 ~~or 100 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 of 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 to the sea through ~~or 100 ppm~~ or 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 17.

8.3 If an exhausted oil tank is installed, in addition to the requirement under regulation 17, 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 ~~and 100 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 m^3 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 17 it may be arranged at several locations in the engine-room. The oil being discharged from the 15 ppm ~~and 100 ppm~~ equipment may also be discharged to this tank. The recommended capacity should be as follows:

Main engine rating (kW)	Capacity (m^3)
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 17.
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 deoiled water overboard. The operational merit of not having to operate the 15 ppm ~~and 100 ppm~~ equipment frequently should also be considered. The capacity of bilge-water holding tanks should be as follows:

Main engine rating (kW)	capacity (m^3)
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 ~~and 100 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 ~~or 100 ppm~~ equipment.

9.4 The discharge piping system of the 15 ppm ~~and 100 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 of 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 19.

NOTE:

Subparagraph 9.7 will become mandatory when paragraph 3 of regulation 17 of Annex I of MARPOL 73/78 comes into force. In existing ships having piping connections to overboard discharge outlets, compliance with this requirement may be met by the installation of blanks in such pipings.

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 subparagraph 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 such that, seen from the heating inlet, to start with they are arranged in a way of the boundaries and then across the whole bottom area sufficiently high, in order to avoid being covered totally by sediments in the tank:

The tank heating system should be designed such 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:

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

where V is the volume of the sludge tank as calculated by the interpretation to regulation 17. 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 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

11.1.1 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

11.2.1 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

11.3.1 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

11.4.1 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

11.5.1 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 2

Guidelines for the Integrated Bilge Treatment System (IBTS)

1 Introduction

1.1 Bilge 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 Convention. This operation of such treatment, including the operation and maintenance of bilge filtering equipment, is a heavy load of engineers onboard.

1.3 By 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 and 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 the oily bilge-water generated in machinery spaces.

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

1.6 MEPC recognized the need to disseminate the concept of IBTS and decided to provide the guidelines on IBTS.

1.7 The purpose of these guidelines is to provide shipowners and shipbuilders with information to help the design of the ship incorporating the concept of IBTS.

2 Concept of Integrated Bilge Treatment System (IBTS)

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

3 Definitions for the purposes of these Guidelines in this Appendix

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 5.2 of appendix 1. It includes oily drains.

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

4 Outlines of IBTS

4.1 Collection of drains

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

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

.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 contained water is transferred to sludge tanks and the low oil contained water is transferred to the bilge water tank.

4.3 Discharge of oily bilge-water

Oily bilge-water in the bilge water tank is discharged overboard through the oil filtering equipment in accordance with Reg.16 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)

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

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

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

.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 Conventions, the following installations are required to compose IBTS:

5.1 Drainage system

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

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

.3 Independent drainage arrangements for oil and water to sludge tanks and the clean drain tank.

5.2 Pre-treatment unit for oil separation

Bilge primary tank with construction of cascade, which is able to separate oil from oily bilge-water by gravity with drainage facilities of the oil on the top as primary separation of oily bilge-water.

Refer to the example of bilge primary tank shown in Fig. 1.

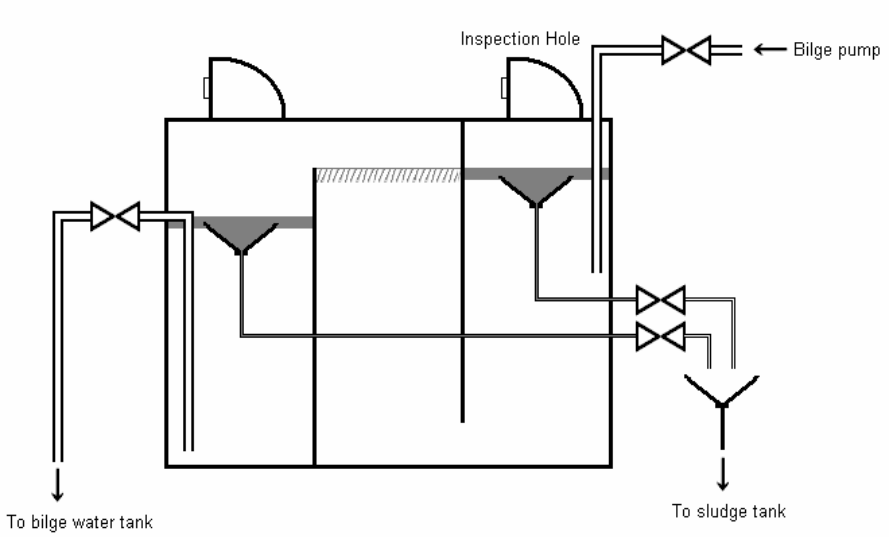

Fig. 1 Example of bilge primary tank

5.3 Storage tanks

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

.2 Bilge water tank : Tank for the retention of oily bilge-water

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

5.4 Discharge arrangement of clean drains

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

5.5 Exclusive pump for the oil filtering equipment

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

5.6 Heating arrangement

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

.2 Heating arrangement of the waste oil tank to vaporize water and facilitate incineration

6 Example of IBTS

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

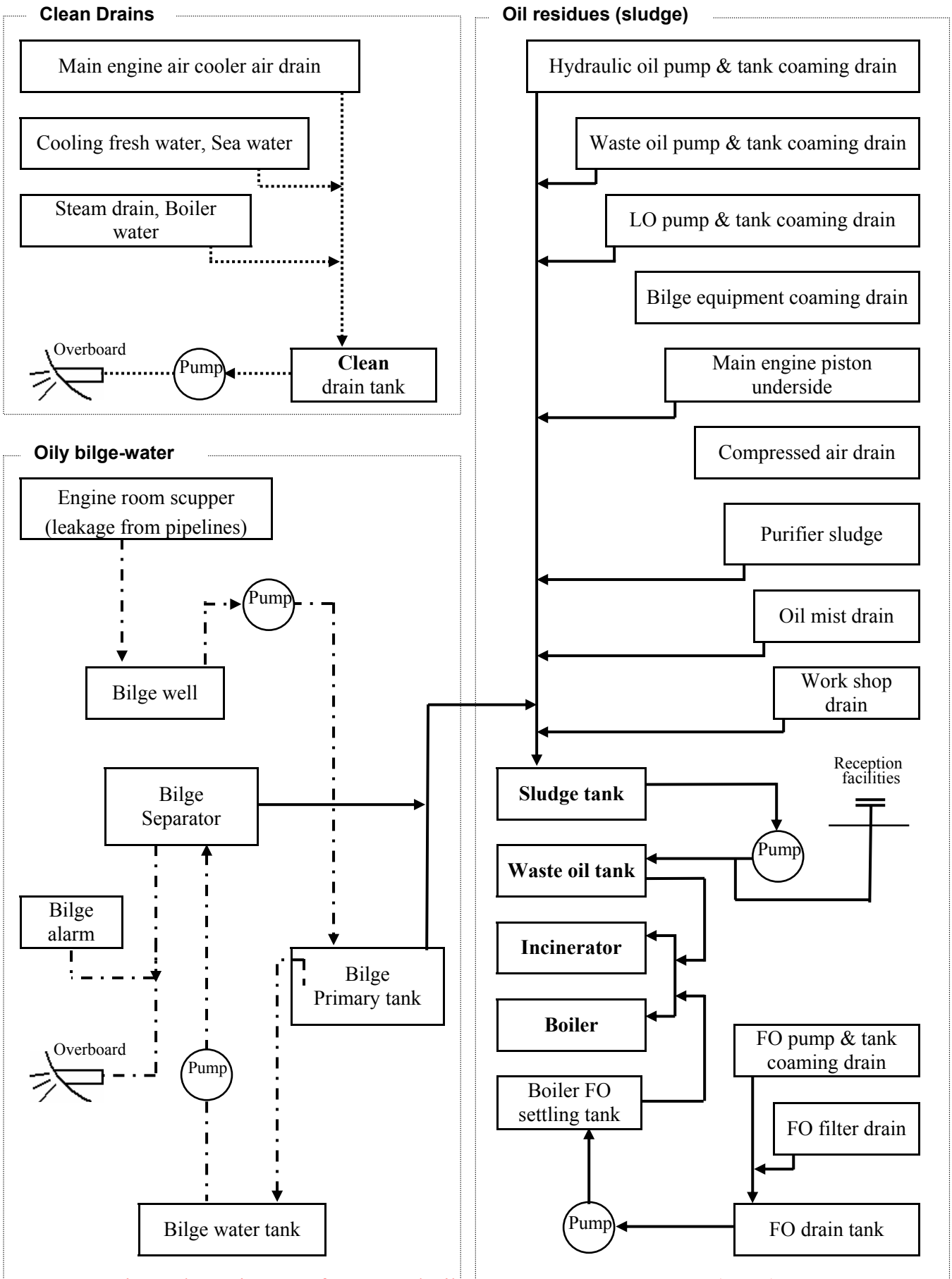

Fig. 2 Flow Diagram of Integrated Bilge Water Treatment System (IBTS)

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