COLUMBIA

SHIPMANAGEMENT

MARPOL
and
other legal requirements
for the
protection of the environment

Course Objectives

Objective and Approach

The objective of this course is to ensure the proper understanding and the knowledge of the environmental requirements and relevant regulations through presenting useful information, solving exercises, answering questions and creating discussions, in order to refresh the already acquired knowledge relative to the protection of the environment

This presentation should be considered as the vehicle for all the facilitators and participants to lead and participate receptively to an interactive and interesting training session

MARPOL
and
other legal requirements
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What is ECT?

Environmental Compliance Training - Initial

A systematic and controlled way for ensuring that all seafarers meet or exceed the minimum requirements of the Company's Environmental Management System (EMS) requirements

It consists of 3 different basic modules:

- Environmental Compliance
- MARPOL and legal environmental requirements
- Handling of E/R Waste – ORB entries

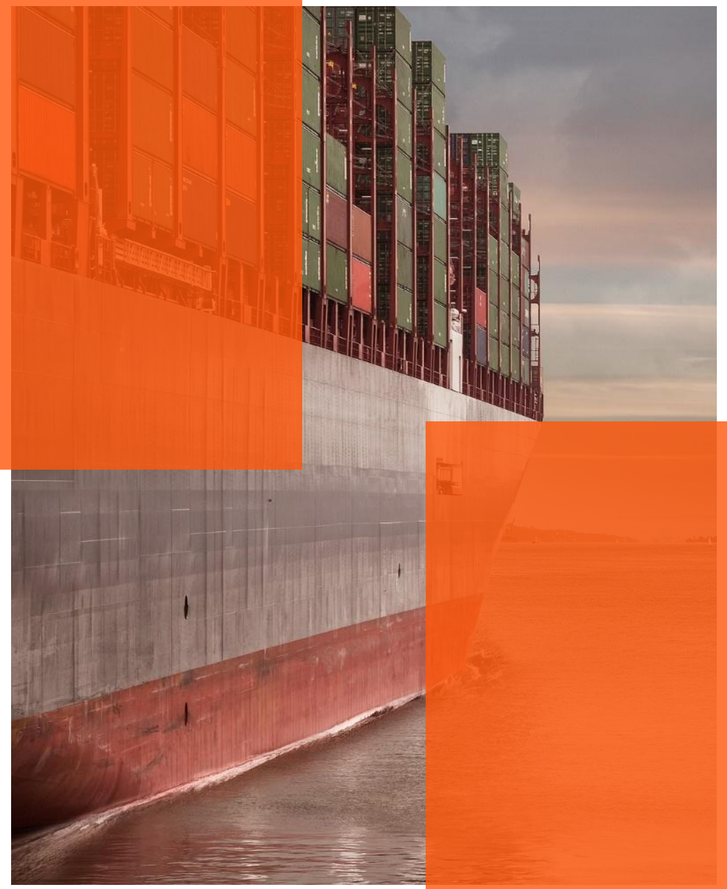
This is module 2: MARPOL and legal environmental requirements

Training Agenda

- MARPOL ANNEX I - Prevention of Pollution by Oil
- MARPOL ANNEX II - Prevention of Pollution by Noxious Liquid Substances
- MARPOL ANNEX III - Prevention of Pollution by Harmful Substances
- MARPOL ANNEX IV - Prevention of Pollution by Sewage from Ships
- MARPOL ANNEX V - Prevention of Pollution by Garbage from Ships
- MARPOL ANNEX VI - Prevention of Air Pollution from Ships
- SEEMP – Ship Energy Efficiency Management Plan
- EU MRV - IMO DCS
- VGP – Vessel General Permit
- BWM – Ballast Water Management
- BFMP – Biofouling Management Plan

Section 1

MARPOL ANNEX I
Prevention of Pollution by Oil



MARPOL ANNEX I

Handling of Oil and Oily Mixtures from Machinery Spaces

Applicable to all Ships

Definition of Oily Bilge Water - Oil Residue (Sludge)

- What is considered as oily bilge water?

- What is considered as sludge?

Oil Pollution Prevention - Definitions

Oily Bilge Water

The water which may be contaminated by oil resulting from 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

Oily Bilge Water Holding Tank

The tank collecting oily bilge water prior to its discharge, transfer or disposal

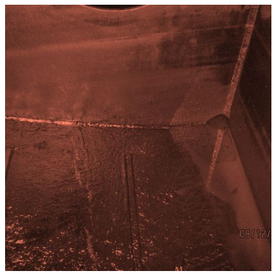
Oil Residue (Sludge)

The residual waste oil products generated during the normal operation of a ship such as those resulting from the purification of fuel or lubricant 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

Oil Residue (Sludge) Tank

The tank which holds oil residue (sludge) from which sludge may be disposed ashore through the standard discharge connection or any other approved means for disposal

Tank Identification in IOPP Supplement



As **oily bilge water holding tanks** are considered those listed in **item 3.3** of the Supplement of the vessel's IOPP Certificate

Any discharge overboard of bilge water shall be in accordance with MARPOL Annex I

As **oil residue/sludge tanks** are considered those listed in **item 3.1** of the Supplement of the vessel's IOPP Certificate

Must be provided with a designated pump for disposal

Must not have discharge connections connected directly to the bilge piping system, oily bilge water holding tanks, tank top or oily water separators

Sample of Tank Identification in IOPP Supplement

item 3.1

3.1 The ship is provided with oil residue (sludge) tanks for retention of oil residues (sludge) on board as follows:

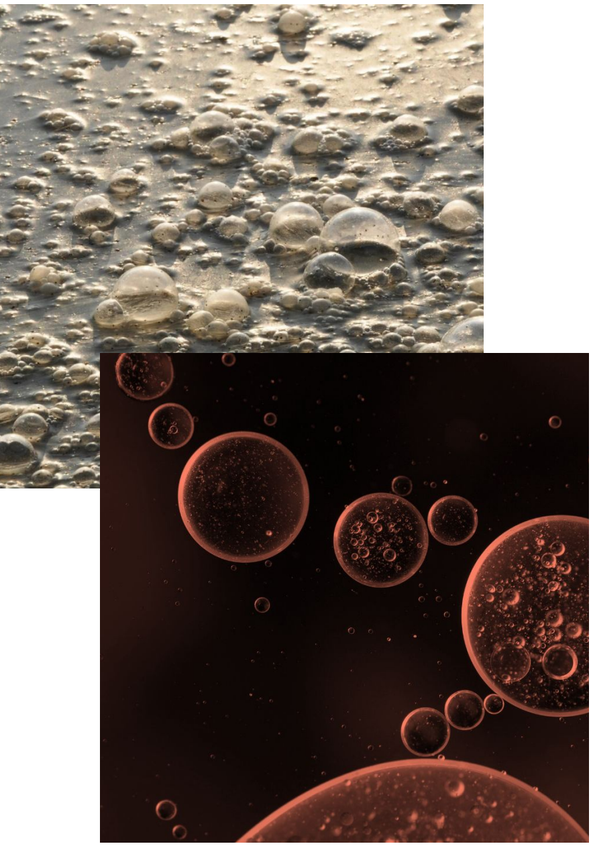
Tank Identification	Tank Location		Volume (m^3)
	Frames (from-to)	Lateral Position (P-C-S)	
Sludge Tank	**32-35**	**P**	**10.40**
Oily Bilge Tank	**18-25**	**P**	**8.60**
Incinerator Waste Oil Settling Tank	**17-19**	**S**	**1.50**
Incinerator Waste Oil Service Tank	**17-19**	**S**	**1.00**
Total volume			**21.50**

item 3.3

3.3 The ship is provided with holding tank(s) for the retention on board of oily bilge water as follows:

Tank Identification	Tank Location		Volume (m^3)
	Frames (from-to)	Lateral Position (P-C-S)	
Bilge Holding Tank	**11-18**	**C**	**28.60**
Total volume			**28.60**

Handling of Oil and Oily Mixtures



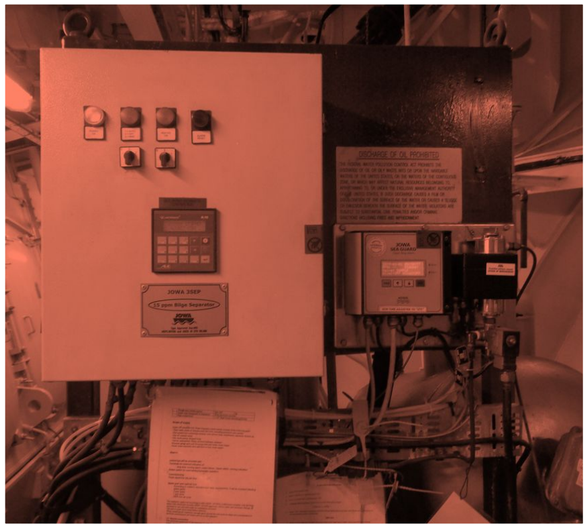
Oily Bilge Water

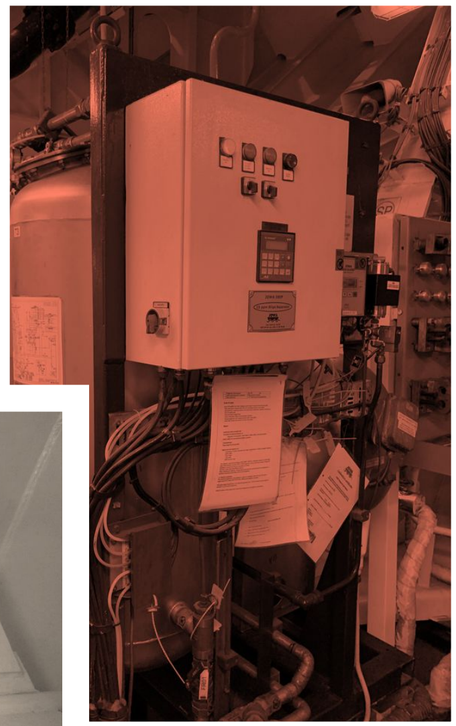
- Any discharge overboard should be according to **MARPOL Annex I** ……
- Transferred from the bilges to the bilge holding tank for discharge overboard via the **OWS**……
- Delivered to **reception facilities** ……..

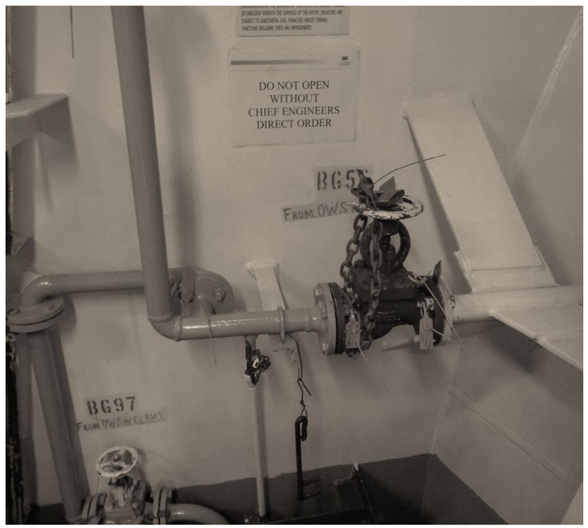
Oil Residues (sludge)

- Transferred to the oil residue (sludge) tank for later disposal
- Burned in the **incinerator** ……
- Delivered to **reception facilities** …… directly from the sludge tank through the standard discharge connection
- Disposed in accordance with items 3.2.2 and 3.2.3 of the IOPPC Supplement

Oily Water Separator (OWS)







The OWS separates oil from oily waste water accumulated in the E/R bilge holding tank(s) of the vessel, before discharging it to the sea

Under MARPOL - IMO Resolution MEPC.107(43), discharged water has to contain less than

.....

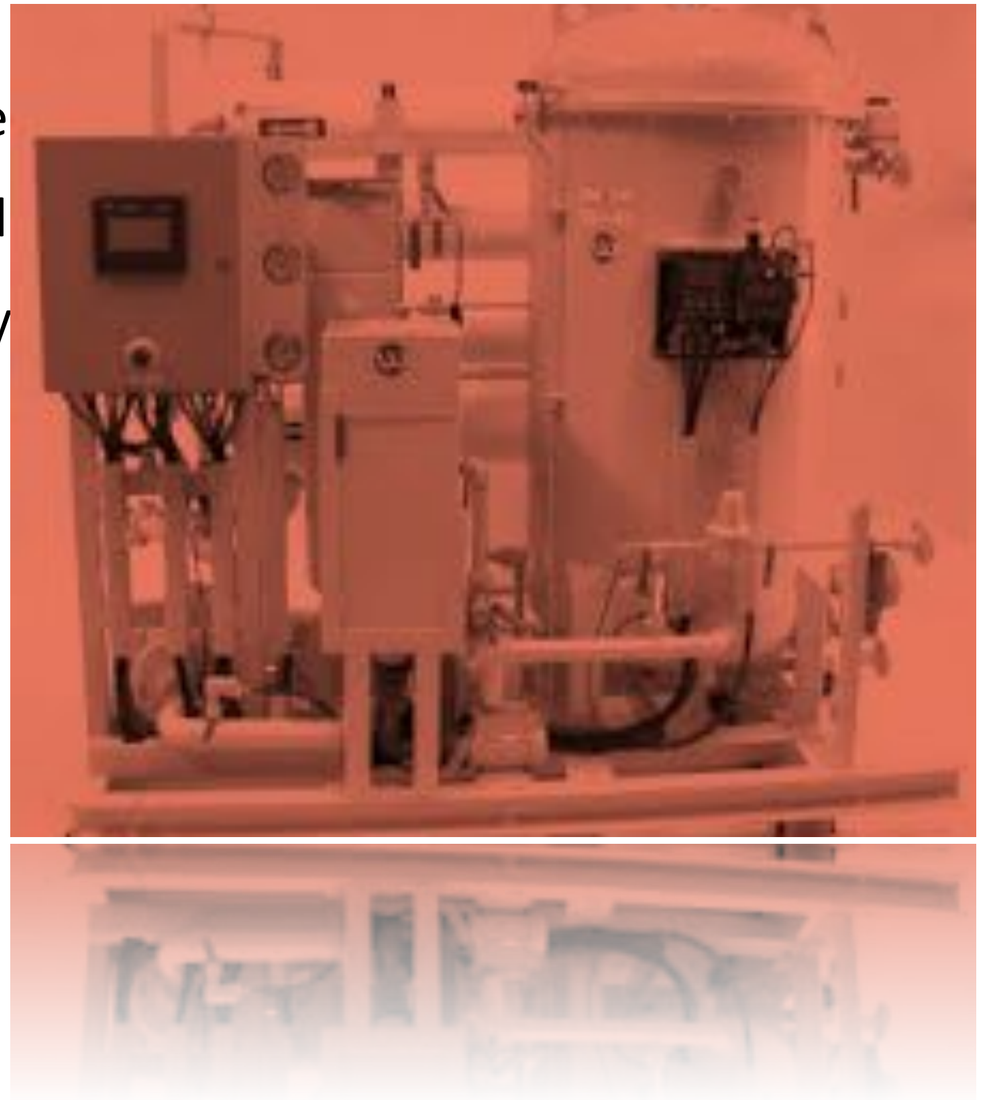
15 parts per million (ppm)

..... of oil

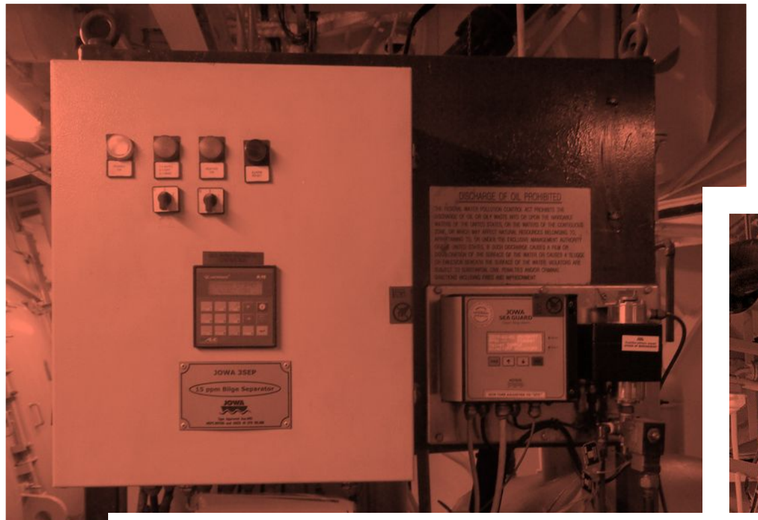
Oily Water Separator (OWS)

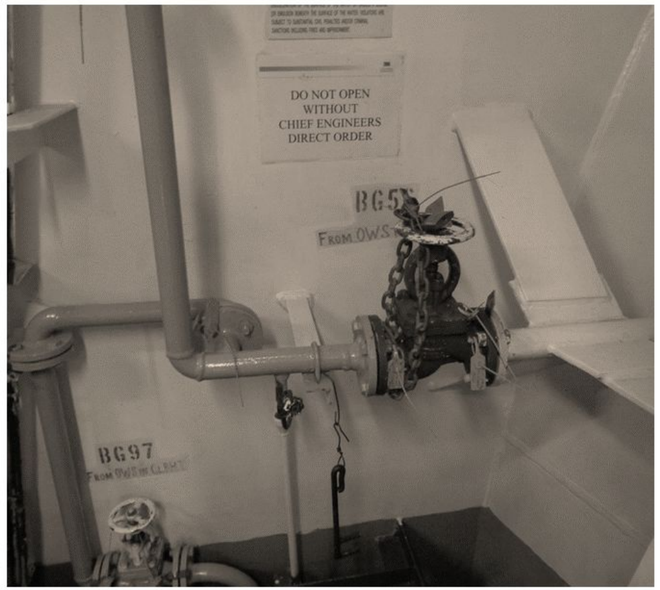
The OWS must be:

- capable of handling any oily mixtures from the machinery space
- effective over the complete range of oils which might be carried
- capable of handling satisfactorily oil of very high relative density emulsified mixtures



Discussion

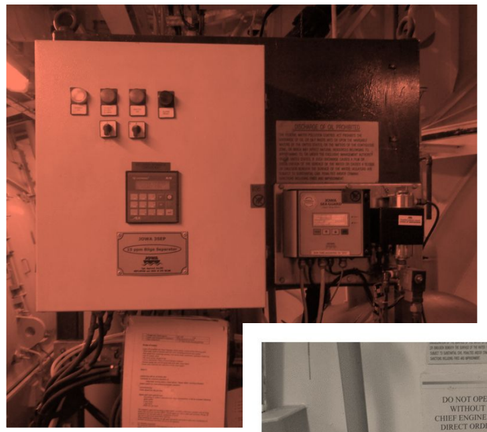


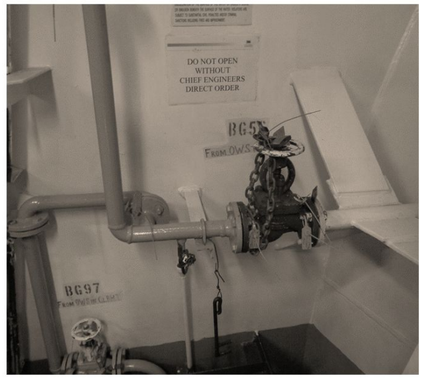


- Who are allowed to operate the OWS as per MSOPR-11.2 ?

  Only the Chief Engineer is personally responsible for the operation of the OWS

Discussion





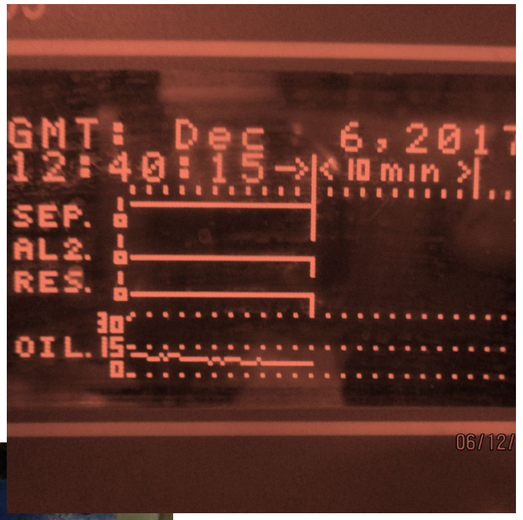
How can we ensure that there is no method to discharge bilges overboard by by-passing the OWS?

- By using Environmental Seals in:
  - Piping connections, fittings, the OCM, and other control equipment of the OWS
  - System crossover and connection valves where bilge systems tie into ballast, general service and other pumping or ejector systems, and systems capable of bilge removal without the use of the OWS
  - Every blank or potentially removable flange associated with any piping leading overboard
  - Any overboard valves connected to ejectors situated in compartments such as but not limited to steering gear, bow/stern thrusters, and compartments such as the Bosun store forward, pump rooms etc.
  - Sludge and dirty oil tanks manholes in engine room spaces and all attached level, temperature and other removable accessories fitted to them as far as practically possible
  - Portable pumps and flexible hoses
- By allowing specific personnel to discharge bilges and supervise them
- By enforcing the company's environmental policy
- By familiarizing the personnel with the consequences of the violations of MARPOL Annex I

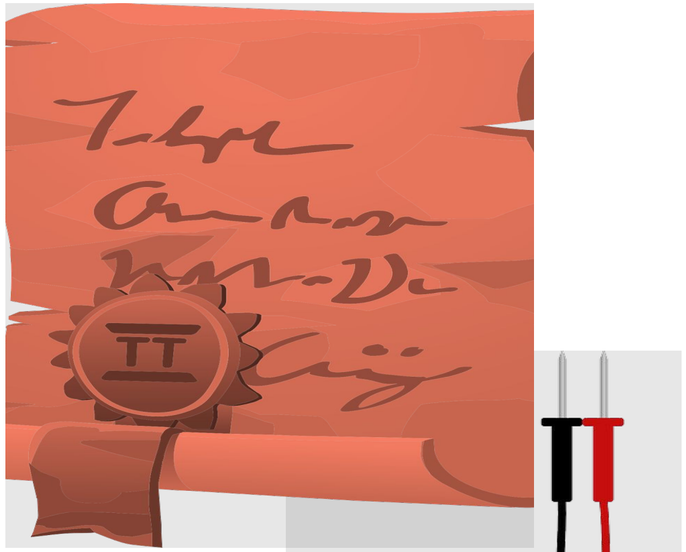
Oil Content Monitor (OCM)

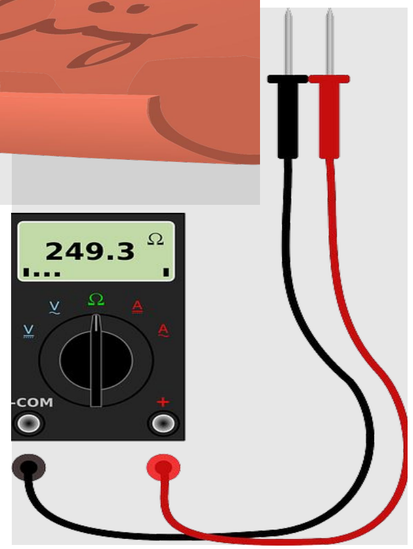
The **OCM** is a monitoring equipment connected with the OWS, for measuring, indicating and continuously detecting the oil content in water

- Must be approved by the……flag administration……..
- The content of oil is measured in……parts per million (ppm)……
- Records of the date and time of the total quantity discharged, of the oil content and the rate of discharge shall be kept for……at least 3 years……
- OWS and OCM to be maintained and operated as per……manufacturer's instructions……
- If OWS or OCM is defective no discharge overboard is allowed until its rectification and confirmation by the……Chief Engineer……



OCM Calibration





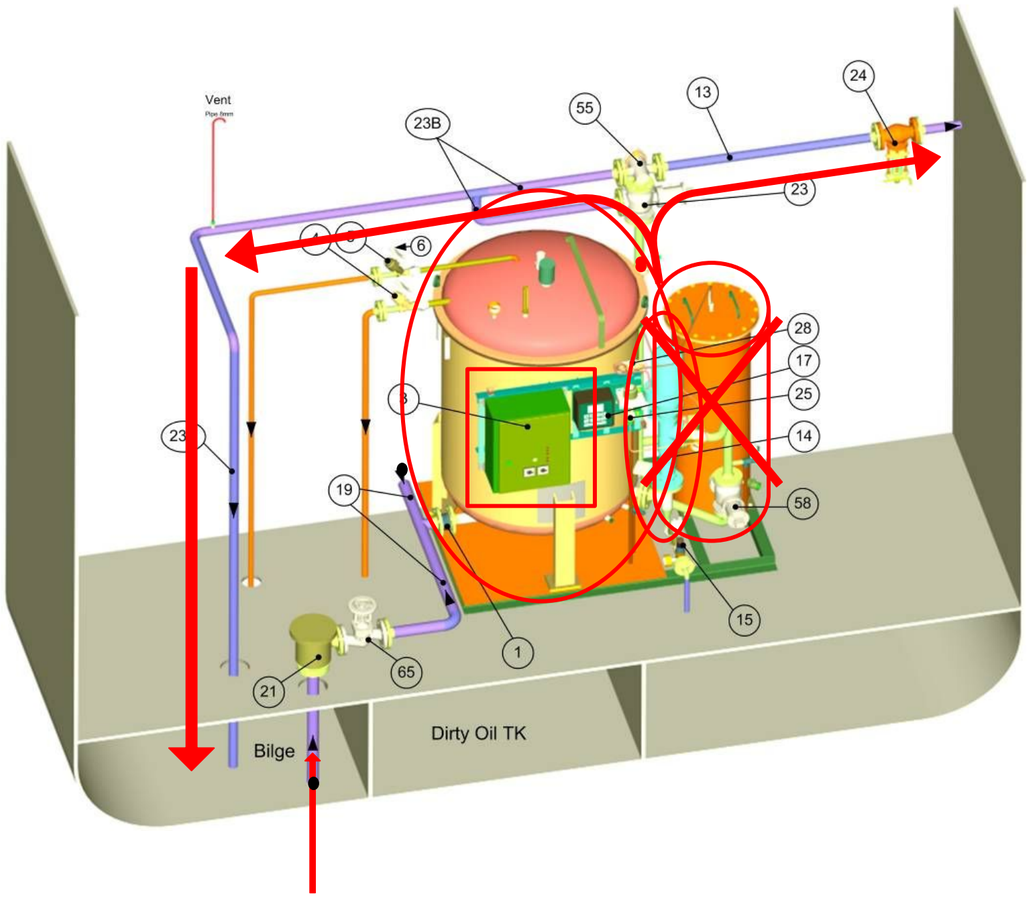
The OCM must be calibrated at intervals not exceeding 5 years after its commissioning, or as specified in the manufacturer's instructions, whichever is shorter as required by MEPC.285 (70) and Company’s instructions

Calibration certificates are issued every 5 years by an approved contractor ashore and must be:

- **maintained on board**
- **maintained ashore by the Technical Department**

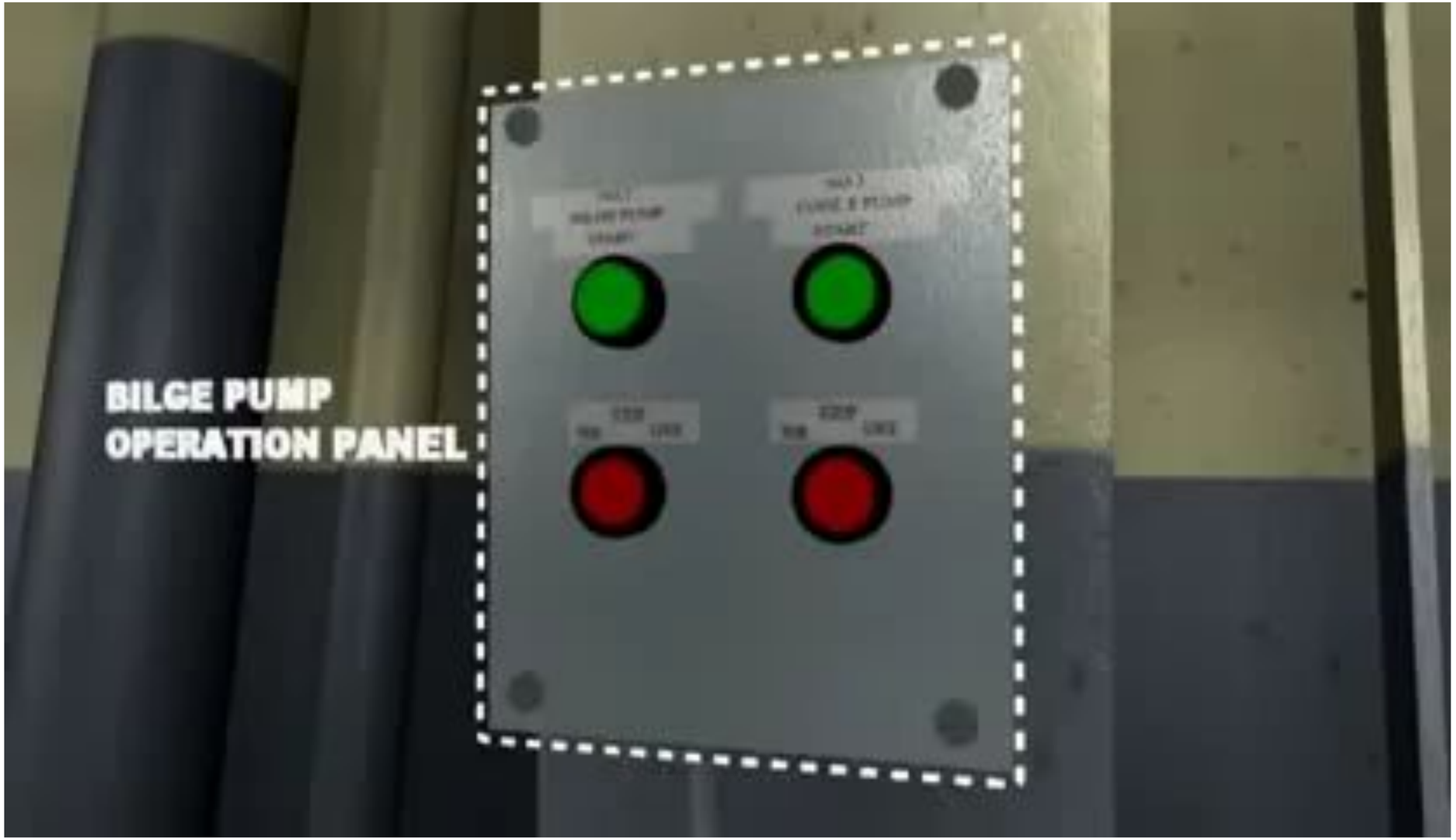
When a new calibrated and certified Measuring cell for the OCM is installed on board by the vessels C/E or Service Engineers, details along with the name of service engineer must be recorded in the ORB (Part-I, Code I) & PMS (Refer to MSOPR-11.3)

Example of how an OWS with absorber works



1. **Rough separation:** An eccentric spiral pump draws the mixture out of the bilge
2. **Fine separation:** A very open porous coalescer causes, due to its oleophilic surface, fine separation of even the smallest oil drops
3. **The OCM** takes samples and controls the use of the absorber
4. **Absorber bypass:** If the OCM detects less than 14ppm the operation is done without the absorber and cleaned water is guided outboards
5. **Operation with absorber:** If the OCM detects more than 14ppm the water passes through the absorber
   - if after the extra cleaning the new measurement < 15ppm, the cleaned water is guided outboards
   - if the OCM shows > 15ppm, the cleaned water is guided back to the bilge water tank

VIDEO PRESENTATION OF OWS



Source : https://www.youtube.com/watch?v=1sQ3hAE6XQs

Certificates Required On Board

DNV·GL

Certificate No:
P-15303

TYPE APPROVAL CERTIFICATE

This is to certify:

That the15 ppm Bilge Water Separator

with type designation(s)
ULTRA-SEP, models: US250, US500, US500C, US500G, US1000, US1000C, US1000G, US2000, US3000, US5000, US 7500 & US10000

Issued to
Compass Water Solutions
Tustin CA, United States

is found to comply with
Det Norske Veritas' Type Approval Programme 771.6 15 ppm Bilge Water Separators

Application :

Installation of the equipment in spaces subject to explosion hazard is not permitted.

Type:	Capacity (m^3/h):
US250	0.25
US500, US500C, US500G	0.50
US1000, US1000C, US1000G	1.00
US2000	2.00
US3000	3.00
US5000	5.00
US7500	7.50
US10000	10.00

This Certificate is valid until **2019-07-07**.
Issued at **Høvik** on **2015-07-08**

DNV GL local station: **Long Beach**

Approval Engineer: **Pål Evang Nundal**

for **DNV GL**
Digitally Signed By: Sæle-Nilsen, Dag
Location: DNV GL Høvik, Norway
Signing Date: 2015-08-03

Dag Sæle-Nilsen
Head of Section

IOPP (International Oil Pollution Prevention) Certificate and Supplement

- Validity for 5 years after the completion of the specific initial inspection
- Intermediate inspection between 2nd and 3rd anniversary date* of the certificate
- Endorsed annually by the Classification Society of the vessel (with a window of ±3 months from anniversary date* of the certificate), after a general inspection of the structure, equipment, systems, fittings, arrangements and material

Calibration of Oil Content Monitor (15 ppm Bilge Alarm): performed by Manufacturer or service engineer authorised by the Manufacturer

Certificate of Type Approval for Oily Water Separator: Issued once by a Recognised Organisation (RO) on behalf of the flag administration

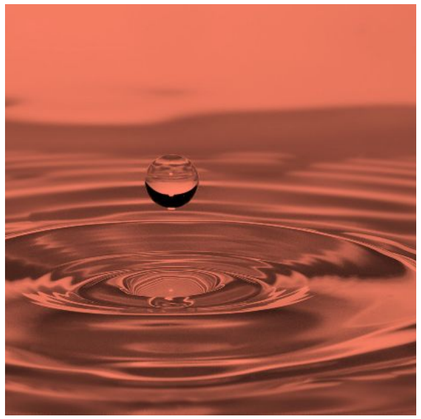
Certificate of Type Approval for Oil Content Monitor (15 ppm Bilge Alarm): Issued once by RO on behalf of the flag administration

*Anniversary date means the day and month of each year which will correspond to the date of expiry of the certificate

Discharge of Oil and Oily Mixtures

Name the conditions that must be satisfied to discharge of oily bilge water to sea:

- The ship is en route
- The oil content is ≤ 15ppm
- The oily mixture is processed through OWS, with alarm arrangements and automatic stopping device when discharge in Special Areas
- The oily mixture does not originate from cargo pump-room bilges on oil tankers
- The oily mixture in case of oil tankers, is not mixed with oil cargo residues



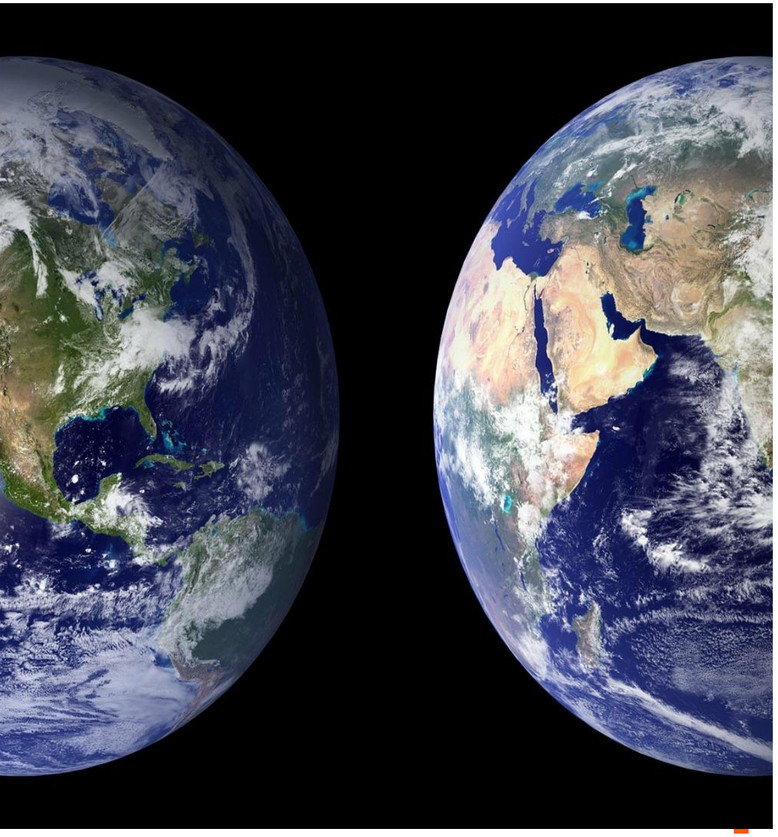
Discharge of Oil and Oily Mixtures

What are the differences between discharging of oily bilge water outside and inside Special Areas?

There are no differences, if the previous conditions are satisfied, with the exemption of the Arctic waters where any discharge of oily mixtures is prohibited

Special Areas under MARPOL Annex I

★ Name as many Special Areas you can



The Mediterranean sea area

The Baltic sea area

The Black sea area

The Red sea area

The Gulf area

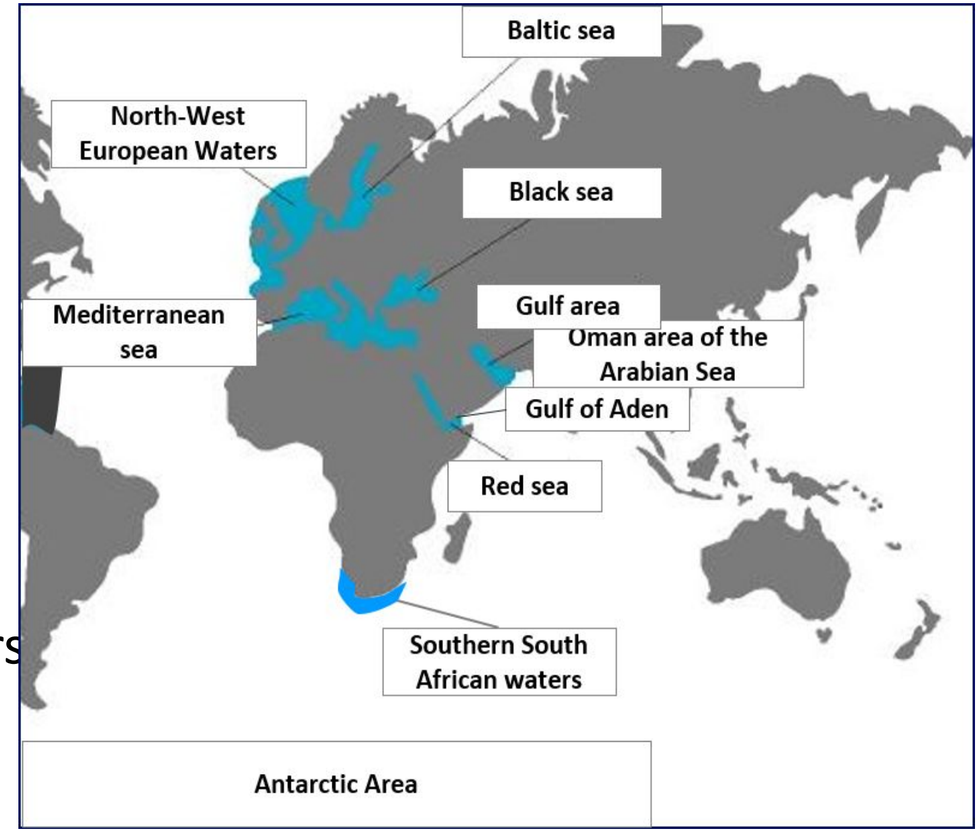
The Gulf of Aden area

The Antarctic area

The North-West European Waters

Oman area of the Arabian Sea

Southern South African Waters



Posting

General Practice for Documents Required to be Posted in the Vicinity of OWS:

- Bilge Piping Diagram
- Operation Instructions of the specific model of OWS
- Emergency shut down procedure of the specific model of OWS
- Areas where discharge is allowed/not allowed
- CFR Poster – for vessels calling US ports
- Calibration of Oil Content Monitor
- Certificate of Type Approval for OWS
- Certificate of Type Approval for OCM

Discussion

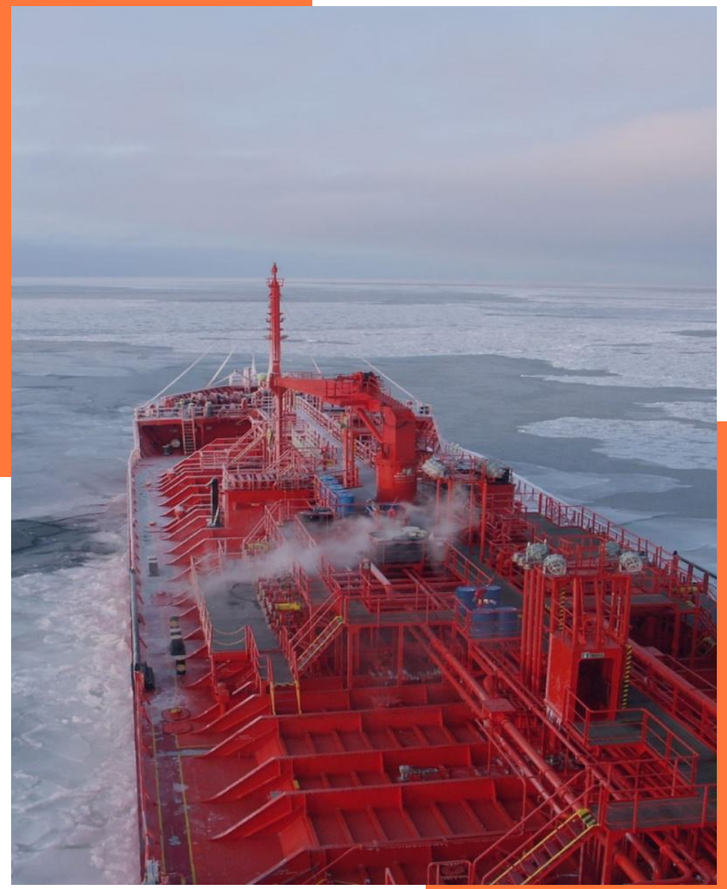
> What should you do in the case that the bilge water tanks are full and the OWS is not working?

Discussion- possible reactions

- Transfer the bilges to other tank(s), approved by the Class, for later disposal or delivery to shore facilities

- Transfer the bilges to Sewage Holding Tank for later delivery to shore facilities

- Transfer the bilges to deck/cargo tank for later disposal (in case of tankers)



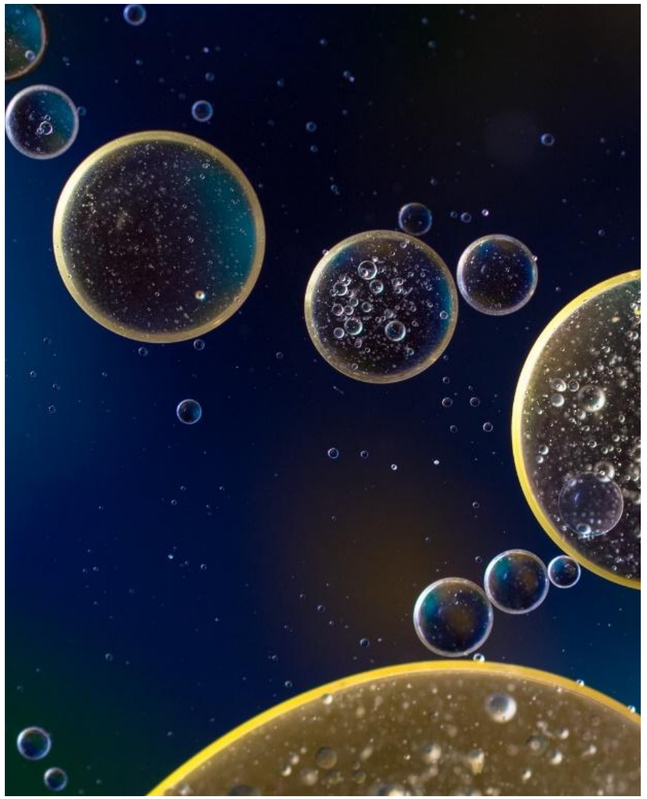
MARPOL ANNEX I

Handling of Oil and Oily Mixtures from Cargo Spaces - Slops

Applicable to Oil Tankers

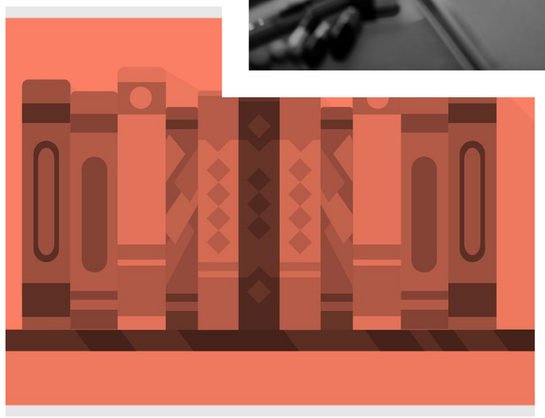
Discharge of Slops

★ Name the conditions that must be satisfied to discharge slops at sea:



- **ODME and control system is operational and in use** and slop tank arrangement is available
- **En route**
- **Distance** from the nearest land **≥ 50 nm**
- **NOT in a special area** (as per MARPOL Annex I)
- **Instantaneous discharge rate** of oil content does not exceed **30 liters per nautical mile**
- **Total quantity of oil discharge** into the sea **< 1/30.000** of the **total quantity** of the particular cargo of which the residue formed a part

Bilge - Sludge - Slop Management Record Keeping



Company's Policy

Rough notes, sounding logs and/or **other documents** used by E/R personnel to record tank soundings and monitor tank levels should be

maintained for at least 3 years

Such notes must be **<u>dated</u>** even if on scrap paper

Violation Consequences

★What do you think that the violations of MARPOL Annex I may result in ?

heavy fines

and / or

imprisonment

Discussion

> Why do you think that we must not pollute the marine environment?

Discussion – Possible answers

Because:

- We destroy the environment
- It is against Company's Environmental Policy and values
- It may result in heavy fines and / or imprisonment
- We have been committed not to do so, when we signed the EC Declaration and in case of non-compliance we may face disciplinary action, including termination of employment, liability for criminal, civil and administrative penalties

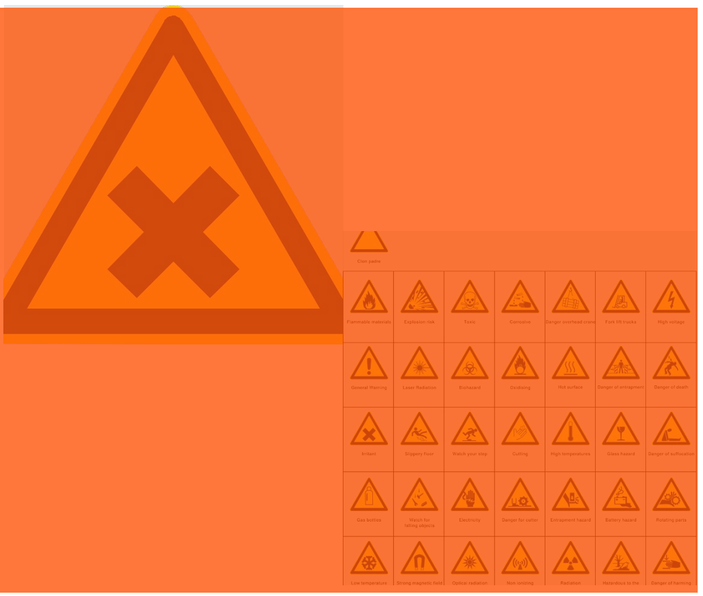
Section 2

MARPOL ANNEX II
Prevention of Pollution by Noxious Liquid Substances in Bulk

Noxious Liquid Substances - NLS

Pollution Category	Category X	Category Y	Category Z	Other Substances
	Major hazard	Hazard	Minor hazard	No harm

..to marine resources and human health



NLS Discharge Provisions

What are the discharge provisions of NLS ?

Discharge provisions

En route	**≥ 7 kn** (for self-propelled ships) **≥ 4 kn** (for not self-propelled ships)
Piping Outlet Location	Underwater (below waterline) Not mandatory for Category Z on ships constructed before 1/1/2007
Nearest land	**≥12 nm** and **water depth ≥25m**

Certificates & Manuals on Board

What Certificates & Manuals are on board the ship to ensure compliance with the requirements of MARPOL Annex II ?

as per IBC Code

International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk

(CoF)

OR

as per MARPOL

International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk

(NLS Certificate)

Procedures & Arrangements Manual

Cargo Record Book

Shipboard Marine Pollution Emergency Plan for Noxious Liquid Substances (SMPEP)

Section 3

MARPOL ANNEX III
Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form

Application

- **Harmful substances**: as identified by International Maritime Dangerous Goods (IMDG) Code
- **Packaged form**: the form of containment specified for harmful substances in the IMDG Code

- Packages shall minimize the hazard to the marine environment
- Packages to be durably marked or labeled to indicate that the harmful substance is in accordance with IMDG Code
- The transport information to be in accordance with IMDG Code and be available
- The vessel to carry a special list, manifest or stowage plan setting forth the harmful substances on board and their location
- Harmful substances to be properly stowed and secured

Section 4

MARPOL ANNEX IV
Prevention of Pollution by Sewage

Sewage Discharge

Sewage refers to:

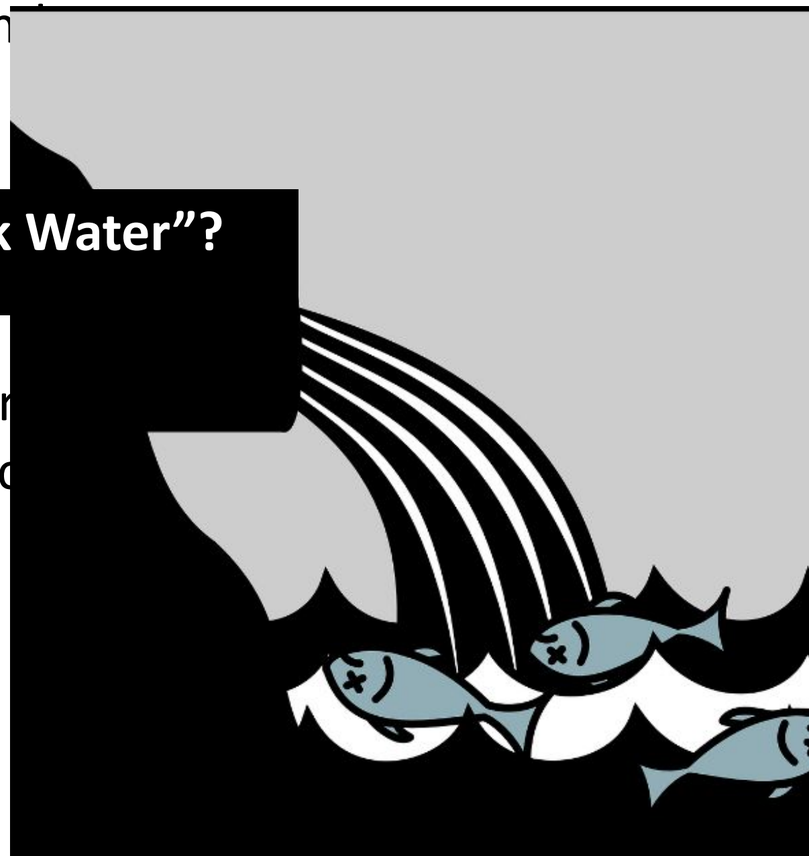
- Drainage and other wastes from any form of toilets and urinals
- Drainage from medical premises (dispensary, sick bay, etc.) via wash basins, wash tubs and scuppers located in such premises
- Drainage from spaces containing living animals
- Other waste waters when mixed with the drainages defined above

What is considered as “Grey Water”?

Drainage from dishwater, shower, laundry, bath an
washbasin drains

What is considered as “Black Water”?

Drainage from toilets, ur
hospitals and animal spac



Sewage Discharge

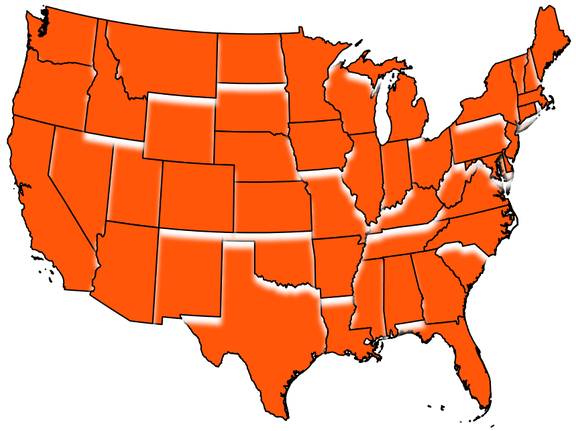
Fill in the gaps (….)

Sewage status	From an approved Sewage Treatment Plant (STP)	Comminuted and disinfected from a holding tank	Not comminuted or disinfected from a holding tank
Distance from the nearest land	**No restrictions**	**≥ 3 nautical miles**	**≥ 12 nautical miles**
Ship's speed	**No restrictions**	**≥ 4 knots**	**≥ 4 knots**
Comments	The effluent shall not produce visible floating solids nor cause discoloration of the surrounding water	Sewage stored in holding tanks shall not be discharged instantaneously but at moderate rate when ship is en route	Sewage stored in holding tanks shall not be discharged instantaneously but at a moderate rate when the ship is en route

Sewage Discharge

According to some **National Requirements**, the discharge of treated sewage is **not allowed when** the ship is in their **ports** or within their **territorial waters**

In this case, National and Local regulations shall be followed, superseding MARPOL Annex IV restrictions



For example, in the United States, specific waters are designated as "no discharge zones" where treated and untreated sewage discharges are prohibited in these areas and vessel discharges are regulated through the Environmental Protection Agency's Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES) Program

For example, China issued the “Discharge standard for water pollutants from ships” that controls the requirements for the discharge of treated sewage

STP Operation and Maintenance

Fill in the gaps (….)

- STP is considered **critical equipment**
  Sufficient spares are to be carried on board
- Testing of **clean effluent** to be carried out **weekly**…..

- **High level alarm sensor** of STP is considered as **critical equipment**…….
- At least **1 spare sensor** must be on board
- High level alarm must be tested **weekly**….

- Sewage spills into bilge tanks must be prevented
- In case STP is designed to overflow to BHT, all existing connections between them must be identified by the C/E and /or Technical Superintendent (TSI) and inform the Environmental Compliance Manager (ECM)

Grey Water Management and Other Ports Specific Requirements

- No existing requirement under MARPOL
- Regulated under Vessel General Permit (VGP) of the United States Environmental Protection Agency
- Vessels with grey water holding tank should discharge the grey water in a distance greater than 1 nautical mile from shore while underway
- Vessels without grey water holding tank should minimize the production of grey water while in waters subject to VGP

Section 5

MARPOL ANNEX V
Prevention of Pollution by Garbage

Garbage Pollution Prevention - Definition

What is considered as garbage?

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

Garbage does not include fresh fish and parts thereof generated as a result of fishing activities undertaken during the voyage

Garbage Management Plans & Garbage Record Keeping

As per MARPOL Annex V Regulation 10

All ships

- 100 GT and Above
- Certified to carry 15 or more persons

→ Shall carry a Garbage Management Plan

All ships

- 400 GT and Above
- Certified to carry 15 or more persons

→ Shall carry a Garbage Record Book

All ships

- 12 meters or more in length overall

→ Must permanently post a Placard for the discharge requirements of Garbage and the possible Penalties for failure to comply

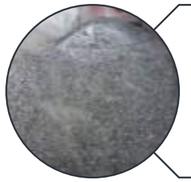
Garbage Categories

Plastics **(A)**

Food Waste **(B)**

Domestic waste **(C)**

Cooking Oil **(D)**



Incinerator ashes **(E)**

According to the Garbage Management Plan, which color corelates to each type of the following garbage category ?

Let’s Fresh up the Segregation Categories of Garbage

Non-recyclable plastics and plastics mixed with non-plastic garbage	“Non-recyclable plastics” (Red)
Incinerator ashes	“Incinerator ashes” (Black)
Food wastes	“Food Waste” (Green)
Rags	Labelled only
Recyclable garbage	
○ Glass	“Glass” (Blue)
○ Cooking oil	Labelled only
○ Aluminum cans	“Aluminum Cans” (Grey)
○ Paper, cardboard, corrugated board	Labelled only
○ Wood	“Wood” (Brown)
○ Metal	“Metal” (Grey)
○ Plastics (including Styrofoam or similar plastic material)	“Plastics” (Yellow)
Hazardous wastes	“Hazardous Waste” (Red)
E-waste	“E-waste” (Red)
Cargo residues (non-HME)	“Cargo residues (non-HME)” (Brown/White Stripes)
Cargo residues (HME)	“Cargo residues (HME)” (Red)

Garbage Categories

- A. Plastics
- B. Food Waste
- C. Domestic waste
- D. Cooking Oil
- E. Incinerator ashes
- F. Operational waste
- G. Animal carcasses
- H. Fishing gear
- I. E-Waste
- J. Cargo residues (non-HME)
- K. Cargo residues (HME)

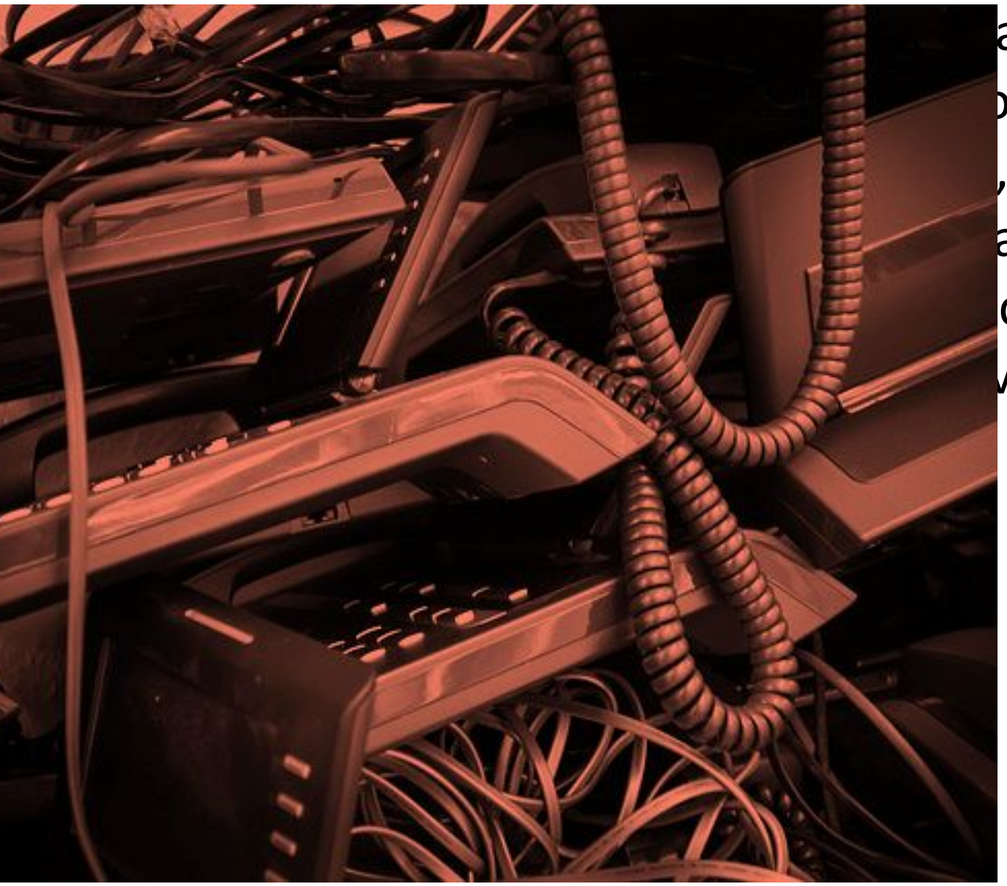
Garbage Categories

What is considered as Operational waste ?

- All solid waste, including slurries from the normal maintenance or operations of the ship, or used for cargo stowage & handling
- Cleaning agents and Additives
- Ash and Clinkers not resulted from garbage incineration
- Hazardous Waste
- Medical Waste
- Oily Rags

Garbage Categories

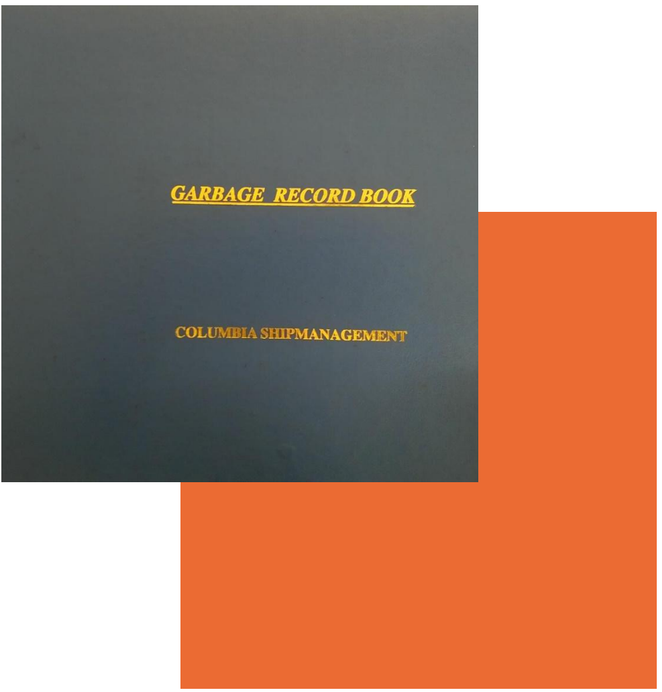
What is considered as E- waste ?



aste is considered all the electrical and electronic equipment
or the normal operation of the ship or in the accommodation
, including all components, sub-assemblies and consumables
are part of the equipment at the time of discarding, with the
ce of material potentially hazardous to human health and/or
vironment

Amendments concerning the Garbage Record Book

From 1st March 2018 the Garbage Record Book has been divided in 2 parts



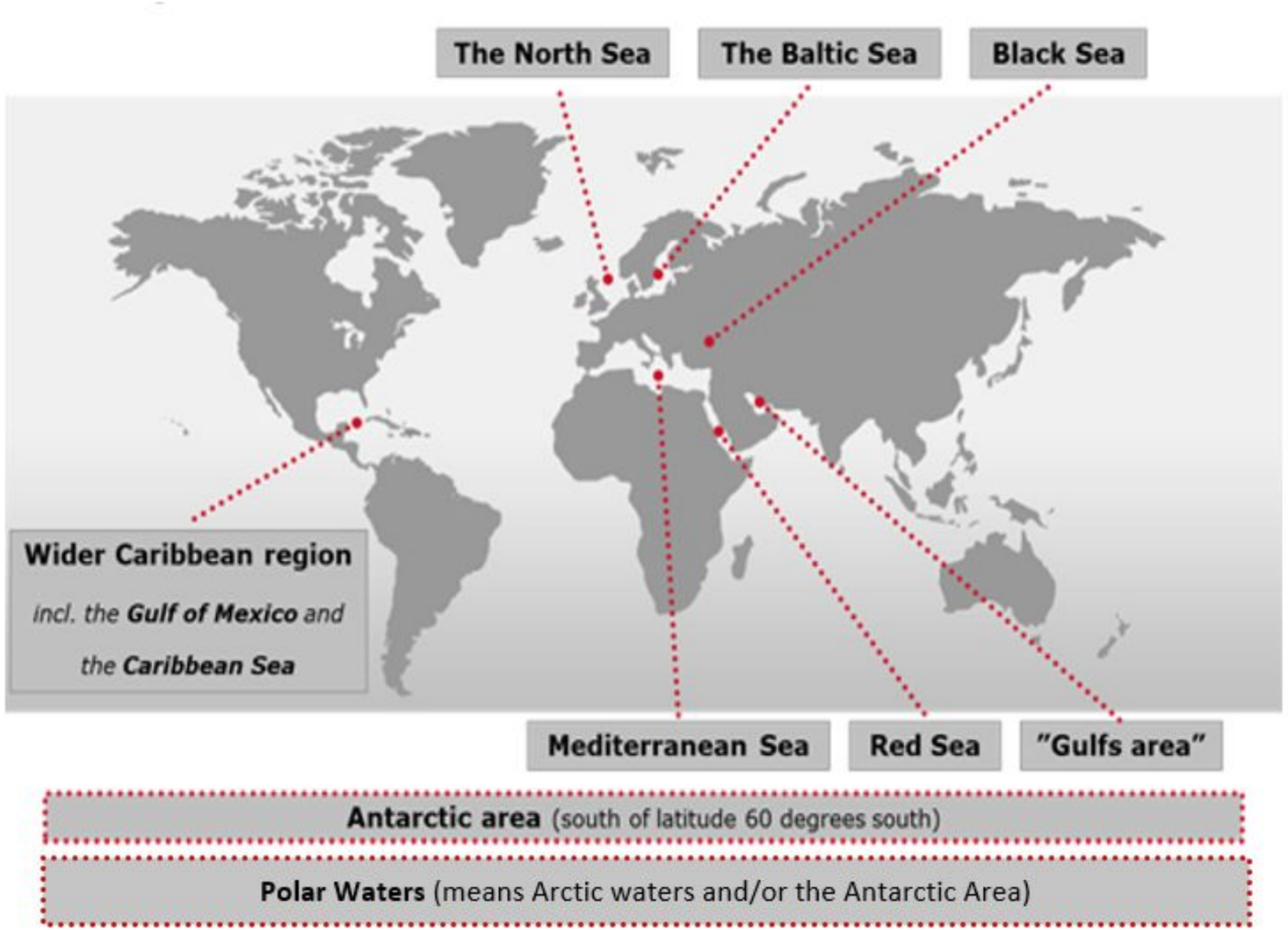
GRB - PART I

- All ships
- For all garbage except cargo residues
- New Category I: e-Waste

GRB - PART II

- Ships that carry solid bulk cargoes
- For all cargo residues
- Category J: Cargo residues (non-HME)
- Category K: Cargo residues (HME)

Special Areas under Annex V: Garbage



Garbage collection drums

- Garbage must be kept in **metal rust free** containers or plastic non-combustible containers **only** inside the accommodation area
- Handles and covers
- Coloured as per Garbage Management Plan and stenciled
- Placed away of refrigerators
- If placed on outer deck: fixed position and **not** in contact with the deck

Discussion

What actions should you take if you notice a crewmember not to comply with the Company's Garbage Management Plan policy ?

Discussion – Possible actions

- Stop the crewmember in case an environmental breach is imminent
- Inform the crewmember about the Company’s Garbage Management Plan policy
- Inform the Master
- Report the incident through the Open Reporting System
- Inform the crewmember about the consequences of the violations of MARPOL Annex V

Section 6

MARPOL ANNEX VI
Prevention of Air Pollution

NOx Emissions

★ Which vessels have to comply with the NOx regulation ?

- All vessels with diesel engines installed onboard on or after 1/1/2000 with power output more than 130kw have to comply with the NOx regulation
- This regulation applies also on older engines, installed onboard prior to 1/1/2000 but which undergo a conversion of engine systems & components that affect the engines NOx emissions, or increase the engine MCR more than 10% after this date
- Requirements **do not apply** to engines installed on board and used solely in case of an emergency (i.e. **emergency generator, lifeboat engines**, etc.)
- Ozone production from NOx pollutants: Oxygen atoms freed from nitrogen dioxide by the action of sunlight attack oxygen molecules to make ozone. Nitric oxide can combine with ozone to reform nitrogen dioxide, and the cycle repeats

Reduction of NOx emissions

Engine Certification and Survey Requirements

- **Engine Technical File**
  Contains the identification of all originally installed components & settings which affect NOx emissions

- **Engine International Air Pollution Prevention Certificate**
  Is a statement of compliance supplemented by the Engine Technical File

- **Air Pollution Prevention Certificate**
  It remains valid only if the Engine compliance with NOx regulation is validated at every IAPP survey
  Issued by the Administration for a period not more than 5 years

Reduction of NOx emissions

Engine International Air Pollution Prevention Certificate Sample

ENGINE INTERNATIONAL AIR POLLUTION PREVENTION CERTIFICATE

Issued under the provisions of the Protocol of 1997, as amended by resolution MEPC.176(58) in 2008, to amend the
INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973,
as modified by the Protocol of 1978 related thereto (hereinafter referred to as "the Convention")

under the authority of the Government of the

REPUBLIC OF MALTA

by

GERMANISCHER LLOYD

Engine Manufacturer	Model Number	Serial Number	Test Cycle	Rated Power (kW) and Speed (rpm)	Engine Approval Number
STX Corporation	**9L28/32H**	**SB9L28-3354**	**D2**	**1890 720**	**54172-12 HH**

THIS IS TO CERTIFY:

1. That the above-mentioned marine diesel engine has been surveyed for pre-certification in accordance with the requirements of the Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines 2008 made mandatory by Annex VI of the Convention; and

2. That the pre-certification survey shows that the engine, its components, adjustable features, and technical file, prior to the engine's installation and/or service on board a ship, fully comply with the applicable regulation 13 of Annex VI of the Convention.

This certificate is valid for the life of the engine, subject to surveys in accordance with regulation 5 of Annex VI of the Convention, installed in ships under the authority of this Government.

Issued at **Hamburg** the **2nd** day of **November, 2012**

GL

Germanischer Lloyd

Markus Osterkamp

i.A. Carmen Petersen

2 PARTICULARS OF THE TECHNICAL FILE

The technical file, as required by chapter 2 of the NOx Technical Code 2008, is an essential part of the EIAPP Certificate and must always accompany an engine throughout its life and always be available on board a ship.

2.1	Technical file identification/approval number	**21326-04 HH**
2.2	Technical file approval date	**2004-03-15**

3 SPECIFICATIONS FOR THE ON-BOARD NOX VERIFICATION PROCEDURES FOR THE ENGINE PARAMETER SURVEY

The specifications for the on board NOx verification procedures, as required by chapter 6 of the NOx Technical Code 2008, are an essential part of the EIAPP Certificate and must always accompany an engine through its life and always be available on board a ship.

3.1	Engine parameter check method:	
3.1.1	Identification/approval number	**21326-04 HH**
3.1.2	Approval date	**2004-03-15**
3.2	Direct measurement and monitoring method:	
3.2.1	Identification/approval number	-
3.2.2	Approval date	-

Alternatively the simplified measurement method in accordance with 6.3 of the NOx Technical Code 2008 may be utilized.

Issued at **Hamburg** the **2nd** day of **November, 2012**

GL

Germanischer Lloyd

Markus Osterkamp

i.A. Carmen Petersen

Notes:
1 This Record and its attachments shall be permanently attached to the EIAPP Certificate. The EIAPP Certificate shall accompany the engine throughout its life and shall be available on board the ship at all times.
2 The Record shall be at least in English, French or Spanish. If an official language of the issuing country is also used, this shall prevail in case of a dispute or discrepancy.
3 Unless otherwise stated, regulations mentioned in this Record refer to regulations of Annex VI of the Convention and the requirements for an engine's technical file and means of verifications refer to mandatory requirements from the NOx Technical Code 2008.

SUPPLEMENT TO ENGINE INTERNATIONAL AIR POLLUTION PREVENTION CERTIFICATE

RECORD OF CONSTRUCTION, TECHNICAL FILE, AND MEANS OF VERIFICATION

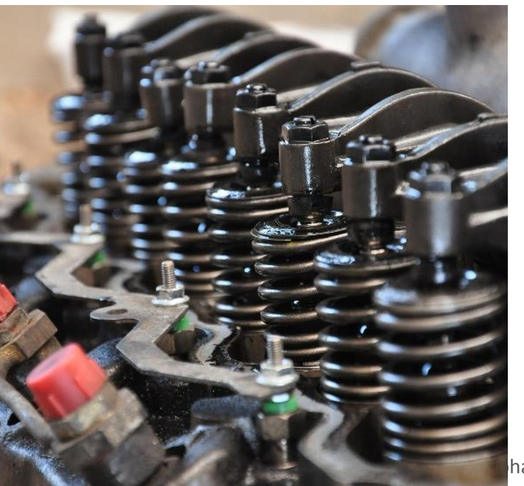
1 PARTICULARS OF THE ENGINE

1.1	Name and address of manufacturer	**STX Corporation** **80, Seongsan-Dong, Changwon** **Kyungsangnam-Do, Korea**
1.2	Place of engine build	**STX Corporation, Changwon**
1.3	Date of engine build	**2003**
1.4	Place of pre-certification survey	**STX Corporation, Changwon**
1.5	Date of pre-certification survey	**2003**
1.6	Engine type and model number	**9L28/32H**
1.7	Engine serial number	**SB9L28-3354**
1.8	If applicable, the engine is a parent engine ☐ or a member engine ☑ of the following engine family ☐ engine group ☑	**L28/32H-720rpm** As approved with GL approval no. **11493-00 HH**
1.9	Individual engine or engine family / engine group details:	
1.9.1	Approval reference	**54172-12 HH**
1.9.2	Rated power (kW) and rated speed (rpm) values or ranges	**1890 kW at 720 rpm**
1.9.3	Test cycle(s)	**D2**
1.9.4	Parent engine(s) test fuel oil specification	**ISO-F-DMC**
1.9.5	Applicable NOx emission limit (g/kWh), regulation 13.3	**12.1**
1.9.6	Parent engine(s) emission value (g/kWh)	**10.7**

Reduction of NOx emissions

What do the Class surveyors check, to ensure engine's compliance with NOx regulation ?

- The EIAPP certificate of each engine
- Whether the Engine NOx emission affecting components, as detailed in the Technical File, are maintained in good condition
- Whether the components replacement complies with the Technical File requirements and recorded in the "Record Book of Engine Parameters''
- If the engine settings affecting NOx emissions are maintained within the limits detailed in the Technical File and any adjustments are recorded in the "Record Book of Engine Parameters''
- Inspect of engine components included in the Technical File as per the "Onboard Verification Procedure'' attached to the Technical File

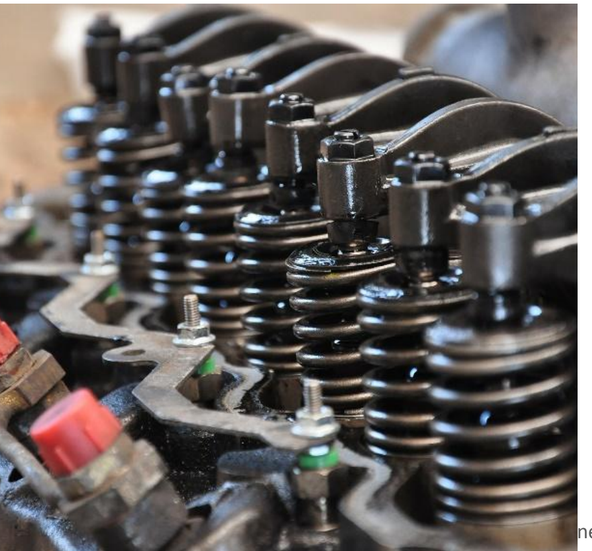


Reduction of NOx emissions

Engine Certification and Survey Requirements

Since the “Engine Parameter Check’’ is an indirect method, the following additional documents should become available to the surveyor:

- Engine logbook parameter records (mainly exhaust gas temperatures, but also fuel, lube oil, cooling water and charge air temperatures and pressures)
- Records/diagrams of compression and combustion pressures



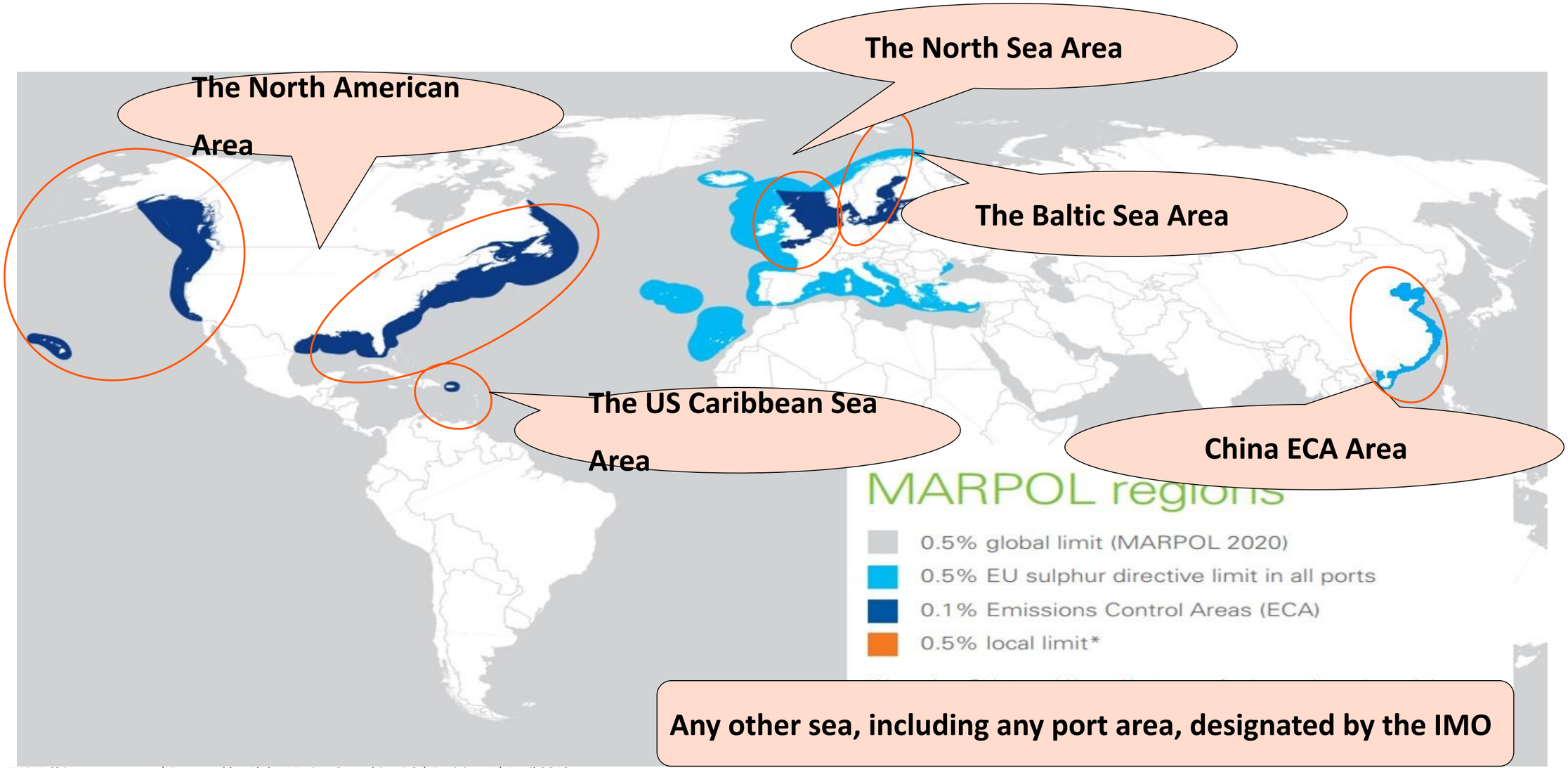
Maintaining the engines according to NOx regulations

What should the C/E do to ensure that the engines are maintained according to the NOx regulations ?

- Check that the operational parameters are logged and are within the maker's specified limits
- Use suitable components and their ID numbers are recorded in the "Record Book of Engine Parameters'', whenever a replacement of components is carried out
- Make sure that whenever adjustments are carried out to engine settings, these are within the specified range and recorded in the "Record Book of Engine Parameters"
- The engine's Technical File and the EIAPP must always be onboard and maintained in an condition

SOx Emission Control Areas

★ Name as many SOx Emission Control Areas you can:



Any other sea, including any port area, designated by the IMO

Maximum Permitted Sulphur Content of Fuel

Enforcement date	Sulphur limit (% m/m)	Grade	Operating area	Reference
Already in force	**3.50**	All grades	Global limit (since 01/01/2012)	Revised MARPOL Annex VI adopted by Res. MEPC. 176(58)
	0.10	MGO	For MGO supplied in EU territory and waters (since 01/01/2008)	Directive 1999/32/EC as amended by Regulation 1882/2003 and Directive 2005/33
	0.10	All grades	European & Turkish inland waterways and when berthed at EU & Turkish ports	Directive 1999/32/EC as amended by Regulation 1882/2003 and Directive 2005/33 & Turkish Maritime Regulations applicable since 01/01/2012
	0.10	All grades	North America ECA, US Caribbean ECA, Baltic ECA, North Sea ECA & English Channel	Revised MARPOL Annex VI adopted by Res. MEPC. 176(58)
	0.10	MGO (DMA) MDO (DMB)	California waters and 24 NM of the California baseline (since 01/01/2014)	CARB Marine Notice (mandatory use of either MGO or MDO with the set maximum sulphur limit to main propulsion diesel engines, auxiliary diesel engines and boilers. HFO is not allowed to be used)
	0.50	All grades	Vessels entering all Chinese ECA Ports must use fuel containing 0.5% sulphur or less	China's Ministry of Transport emission control areas scheme
1 January 2020	**0.50**	All grades	Global limit	Revised MARPOL Annex VI adopted by Res. MEPC. 176(58)

Reduction of SOx emissions

BP Europa SE - BP Nederland
d'Arcyweg 76
3198 NA Europoort-Rotterdam
Office Tel.: +31 (0) 181 259 858
Operations Tel +31 (0) 181 259982
Operations Fax: +31 (0) 181 259 982
License number NL00740005110

Bunker Delivery Note

For delivery of mineral oils and lubes
on board of sea going vessels

bp BP Marine

Receipt No. 1206,1974

Part 2 of 4

Vessel Name	IMO No.	Shipment/Parcel No.
MAINE TRADER	9292151	BS3114
Customer Name	Date Delivery Completed- DD-MM-YY	
	15-10-2018	
Stock Location	Delivery Port	
STR	ANTWERP DEURGANCKDOK Q1700	

Delivery Method EX Wharf [ ] Barge [X] Road [ ]

Delivery Log	Alongside Date DD-MM-YY	Alongside Time (24 HR)	Commenced Date DD-MM-YY	Commenced Time (24HR)	Completed Time (24HR)	Left Barge Date DD-MM-YY	Left Barge Time (24HR)
	15-10-2018	10:40	15-10-2018	12:00	17:10	15-10-2018	17:40

	Product Name	GN-Code	Volume Delivered		Unit of Meas	Delivered Temp C	Density @ 15°C ISO 3675	Invoice Qty Metric Tons	Sulphur % ISO 8754	Viscosity @ 40°C/50°C ISO 3104	Water % V/V ISO 3733	Flashpoint ISO 2719
			Gross Qty	Net Qty								
1	RMD80	27101962 T1		845.795	L 15	40	946,8	800,799	0,0944	31,83	< 0,5	>60°C
2					L 15						< 0,5	>60°C
3					L 15						< 0,5	>60°C
4					L 15						< 0,5	>60°C

Sample Seal Numbers: We acknowledge receipt of the above product and confirm that samples were taken, sealed and numbered as follows:

	Marpol Sample	Ships retained Sample	BP retained sample1	BP retained sample2	Sample for Surveyour	Sample for ships analysis
1	A1115721	A1115740	A1115547	A1115488		
2						
3						
4						

Remarks and/or Extra Charges

Ship's Stamp

MV MAINE TRADER Chief Engineer VALETTA

I. MATVEEV

Signature of Masters / Chief Engineer

Receiving Vessel's Flag

MALTA

Next Port of Call

LE HAVRE

Barge Name	Registration nr.
VOLANTE	02331723

Has the bunkerverklaring (tax documentation) been completed & signed ?

Yes [X] No [ ]

The fuel oil supplied is in conformity with regulations 14.1 or14.4 and regulation 18.3 of Marpol Annex VI

Barge Captain
Mts "Volante"
Euro NO. 0233 1/ 23

K. VEDDER

Signature and barge stamp of Supplier's Representative

Printed by Port Traveling Software

- Ensure that vessels operations will fully comply with the MARPOL Annex VI requirements regarding SOx emissions, both inside and outside SOx Emission Control Areas (ECAs)
- The fuel oil received and consumed must satisfy the Annex VI maximum Sulphur content limit
- The C/E should ensure this by verifying that the Sulphur content is written on the Bunker Delivery Note **(**BDN), and that it is not above the limit stated

Useful Links with Articles About Monitoring Compliance with IMO 2020 Sulphur Global Fuel Cap Regulation

http:/www.seatrade-maritime.com/news/europe/denmark-to-deploy-sniffer-drone-to-help-enforce-sulphur-cap-regulation.html

http://sulphur2020.online/blog/norway-orders-more-drones-to-enforce-sulfur-regs/

https://www.ukpandi.com/fileadmin/uploads/uk-pi/Documents/Legal_sources/Sulphur_Emissions2.pdf

General Practice for Change-over Procedures

What is the General Practice for Change-over Procedures ?

- Start enough time prior to entering the ECA, to ensure that upon crossing the ECA border the fuel oil system of the M/E and/or D/G has been fully flushed with the low sulphur fuel
- The less the segregation of the 2 fuel oil systems between the tanks the greater will be the time interval required for the change over
- The time required for fully flushing the fuel system depends upon several parameters, which are mentioned below:
  - The existence of separate service and settling tanks
  - The volume of the service and settling tank, in case these are common for the two fuel types
  - The existence of separate purifiers, heaters, etc. for the two fuel types
  - Requirements for gradual adjustments of the F.O. temperature and viscosity, if applicable

General Practice for Change-over Procedures

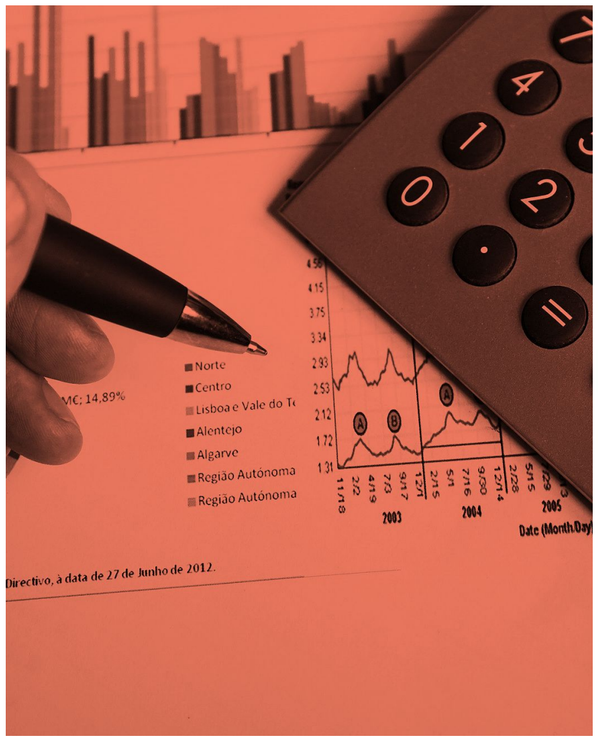
Where is the Company’s Change-over Procedure From High Sulphur Fuel Oil to Low Sulphur Fuel Oil described in details ?

In the MSOPR-02.2 - Changeover From HSFO to LSFO

Change-over procedure calculation

What tool is available on board to calculate the Fuel Oil Change – Over procedure ?

The MSOF-2.2 FOBAS Change-Over Calculator



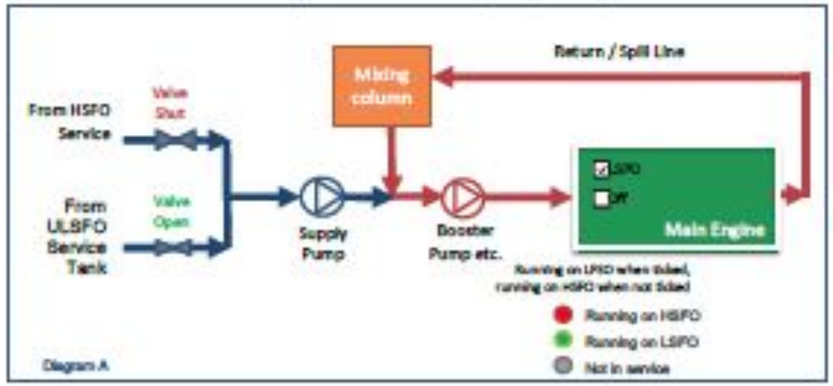
Lloyd's Register

Working together for a safer world

FOBAS Change-Over Calculator (Service System - Main Engine)

Version 6.1

Calculations are based on the assumption that the following setup is being used



At start of change over:			
Rate of fuel consumption (engines)		4.00	t/hr
Service system - fuel oil quantity (as marked in red on diagram opposite - includes all in-line components; booster pump, heater shell, filter plus return / spill line and mixing volume)		2.30	t
HSFO sulphur content:		2.10	% m/m
LSFO sulphur content:	ULSFO	0.037	% m/m
Required sulphur content at engine inlet (i.e. ECA-SOx limit):			
Please select from drop down menu or directly enter required value		0.50	% m/m
Change-over time to achieve required fuel oil sulphur value at engine inlet:		0.80	hr

Notes:

Minimum value for service system (incl. mixing tank): 0.1 tonne

Maximum calculated change over time: 200 hrs

Change over time given in increments of 0.10 hrs (6 minutes) and has a minimum changeover time of 0.30 hours (18 minutes)

Service system - fuel oil quantity (t): Sum of internal volumes of component units and pipes (litres) x fuel oil density (kg/l) / 1000

Volume of 1 metre tube / piping: Bore 10 cm - 8 litres, 15 cm - 18 litres, 20 cm - 31 litres, 30 cm - 71 litres

SHIP IMPLEMENTATION PLAN

- The Ship Implementation Plan (SIP) is outlining how the ship may prepare in order to comply with the required Sulphur content limit of 0.50% by 1st of January 2020

- Every vessel in the CSM fleet would receive a SIP with a record of actions to be taken by the vessel in order to be compliant by the applicable date

- The ship implementation plan for may cover items such as:
  - Risk assessment and mitigation plan
  - Fuel oil system modifications and tank cleaning
  - Fuel oil capacity and segregation capability
  - Procurement of compliant fuel
  - Fuel oil changeover plan
  - Documentation and reporting

Control of Volatile Organic Compounds (VOCs)

Vessels carrying crude oil and trading in terminals at which VOCs' emissions are to be regulated must be provided with a Volatile Organic Compounds Management Plan

Control of Vapour Emissions

Vessels undergoing closed operations in terminals, at which vapour emissions are to be controlled, must be provided with:

- A *Vapour Emission Control System (VECS),* approved by the Administration
- A *Vapour Emission Control Manual*, which covers all necessary procedures, including crew training requirements

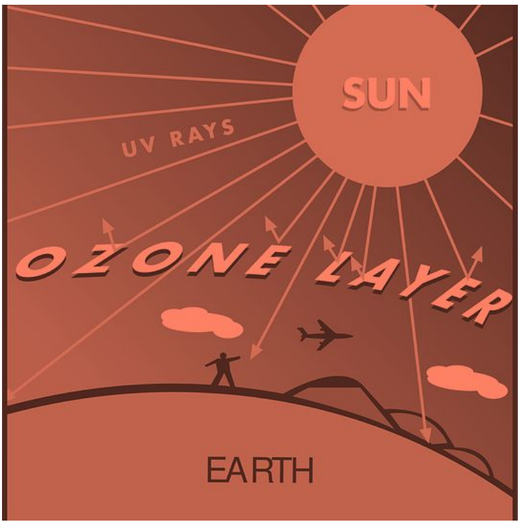
Control of Incineration Emissions

Incineration of the following substances is prohibited

- Cargo residues of crude oil and oil like substance cargoes, chemical cargoes included in Chapter 17 of the IBC Code
- Polychlorinated biphenyls (PCBs), which are mainly liquid substances used as coolants and lubricators in electrical apparatus like transformers
- Garbage when containing more than traces of heavy metal
- Refined petroleum products containing halogen compounds
- Polyvinyl Chlorides (PVCs) unless the Incinerator is IMO type approved for burning these substances
- Cargo residues of harmful substances (IMDG code) and NLS

Special rules on incineration under domestic law may apply in some ports and in some special areas prohibiting the use of incinerators (Ref GMP section 03.1)

Ozone Depleting Substances



- Chlorofluorocarbons (CFC)
- Halon
- Carbon tetrachloride, Methyl chloroform
- Hydrobromofluorocarbons (HBFCs)
- Hydrochlorofluorocarbons (HCFCS) (R22, R141b)
- Methyl Bromide
- Bromochloromethane (BCM)

Control of Shipboard Refrigerants Emissions

What measures are taken onboard the ship to control refrigerants emissions ?

- Recover and reuse refrigerants by using a recovery unit, together with an empty gas bottle which is supplied to all vessels
- Maintain recovery units in good working order at all times
- Order required spares via the Technical Superintendent
- Register any detected loss of gas in the Refrigerant Record Book
- Repair any leaks and record the loss of gas
- Plan and execute the maintenance of the Air Conditioning and refrigerating plants in accordance with the manufacturer’s instructions and as described in the PMS

Section 7

SEEMP
Ship Energy Efficiency Management Plan

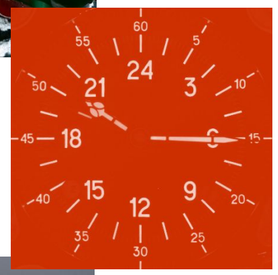
SEEMP Part I – Applicability

According to MARPOL Annex VI Chapter 4 Regulations 19 & 22:

- Old SEEMP = **SEEMP Part I**
- All vessels > **400** GT
- SEEMP Part I does not require approval
- Each vessel shall keep onboard a ship-specific SEEMP, to be verified by attending Class surveyor, as part of International Ship Energy Efficiency Certificate (IEEC) issuance

SEEMP Part I

Name as many best practices for fuel-efficient operation of ships as you can mentioned in Resolution MEPC.282(70)



- Improved voyage planning
- Weather routing
- Just in time
- Speed optimization
- Optimized shaft power
- Optimized ship handling
- Optimum trim
- Optimum ballast
- Optimum propeller and propeller inflow considerations
- Optimum use of rudder and heading control systems (autopilots)
- Hull maintenance
- Propulsion system
- Propulsion system maintenance
- Waste heat recovery
- Improved fleet management
- Improved cargo handling
- Energy management
- Fuel Type
- Age and operational service life of a ship
- Trade and sailing area

SEEMP Part II - Applicability

According to MARPOL Annex VI Chapter 4 Regulations 19 & 22A:

- New SEEMP = **SEEMP Part II**……..
- All vessels > **5.000**….GT
- SEEMP Part II should have been submitted for approval by 31 December 2018 (for existing vessels)
- The Administration or RO ensures that SEEMP Part II complies with Regulation 22A and confirmation of compliance to be provided to & retained onboard the ship

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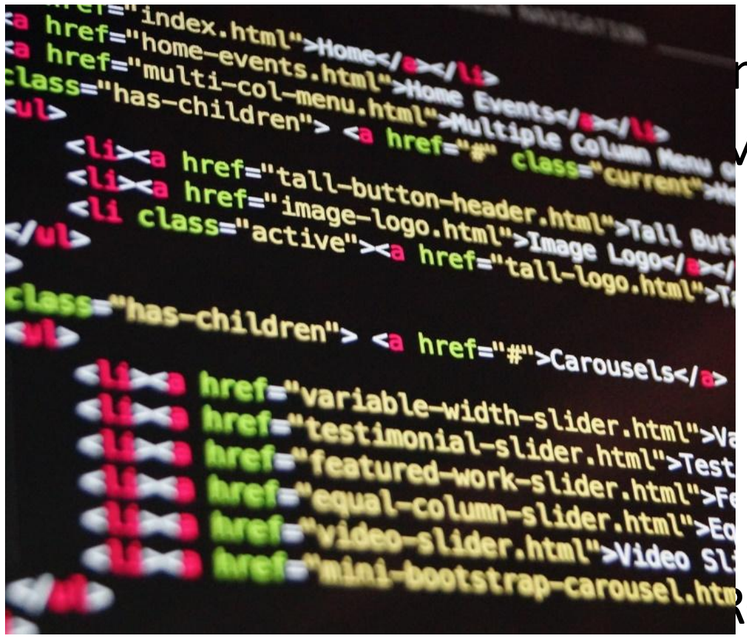
SEEMP Part II
Fuel Oil Consumption Data Collection Plan



ntroduction (Emission Factors, etc.)

Methodology

- Fuel Consumption
- Conversion factor C*F*
- Distance Travelled
- Hours Underway
- Data Quality

eporting

- Standardized Data Reporting Format

Company-specific

As per
RESOLUTION MEPC.282(70)

Energy Efficiency Operational Indicator (EEOI)

The EEOI is an approach to assess the efficiency of a ship with respect to CO_2 emissions

In its most simple form the Energy Efficiency Operational Indicator is defined as the ratio of mass of CO_2 emitted per unit of transport work

EEOI = Environmental Cost ÷ Benefit to Society

Energy Efficiency Operational Indicator = M CO_2 / (transport work)

$$\mathrm{EEOI} = \frac{\sum_j FC_j \times C_{Fj}}{m_{cargo} \times D}$$

Measured as grams CO_2 / (tonne x nautical mile)

C_F is a non-dimensional conversion factor based on carbon content

j is the number of voyages

D is the distance in nautical miles

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Energy Efficiency Operational Indicator (EEOI)

★ Fill in the EEOI formula to calculate EEOI of the below example

VOYAGE No.	MDO / MGO (tonnes)	HFO (tonnes)	LFO (tonnes)	Cargo (m_{cargo}) (tonnes)	Distance (D) (nautical miles)	(m_{cargo} x D) (tonnes x nautical miles)
1	2	450	30	150,000	5,100	765,000,000
2	5	440	50	0	5,000	
3	3	670	30	142,000	6,500	923,000,000
TOTAL	10	1,560	110		$\Sigma(m_{cargo}$ xD)	1,688,000,000

C_F for HFO : 3.1144

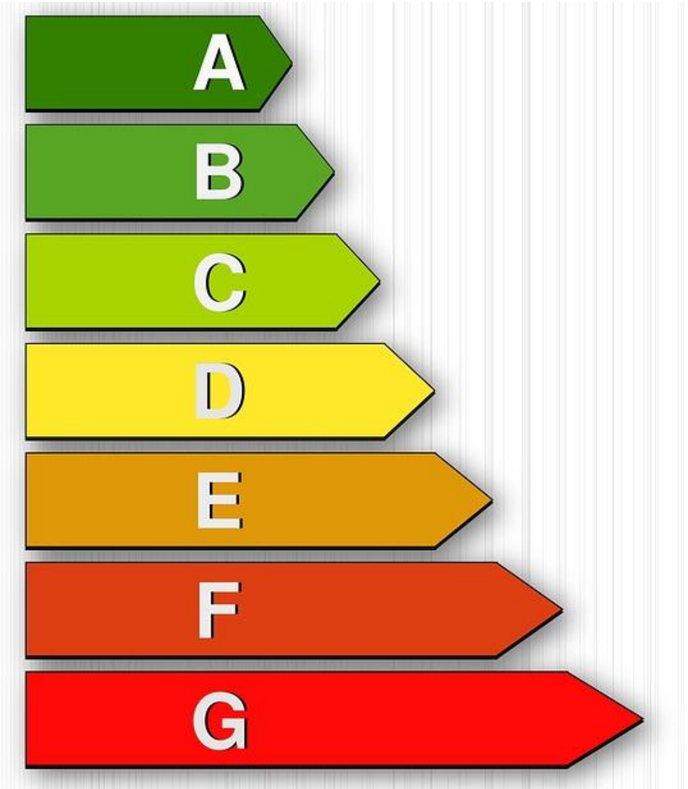
C_F for LFO : 3.151

C_F for MDO/MGO : 3.206

$$EEOI = \frac{1560\times3.1144+110\times3.151+10\times3.206}{(5100\times150000)+(5000\times0)+(6500\times142000)} = 3.1025$$

Energy Efficiency Design Index

- EEDI is the theoretical indicator for vessel's Energy Efficiency
- Building contract placed on/after 1 January 2013
- In the absence of contract, keel laid after 1 July 2013 or the delivery of which is on/after 1 July 2015
- NOT applicable to vessels sailing entirely within flag state waters
- The EEDI sets CO_2 emissions reference and is calculated once for each vessel. It is a reference value for the energy efficiency indicating **how many grams of CO_2 a vessel emits for the transportation of 1 tonne of cargo over a distance of one nautical mile**
- The EEDI dimension is given as: ***gr* CO_2 ÷ *(*tonnes x nautical miles)**

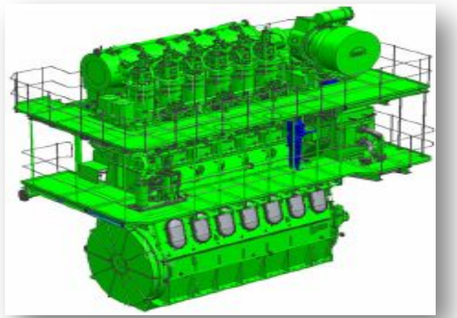


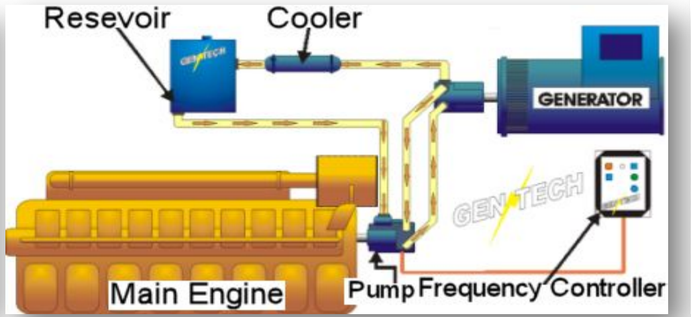
CO_2 emissions – EEDI Key Components

What Machinery may be Key Component of the EEDI Equation ?

$$\frac{\left(\prod_{j=1}^{M} f_j\right)\left(\sum_{i=1}^{nME} P_{ME(i)} \cdot C_{FME(i)} \cdot SFC_{ME(i)}\right) + \left(P_{AE} \cdot C_{FAE} \cdot SFC_{AE}\right) + \left[\left(\prod_{j=1}^{M} f_j \cdot \sum_{i=1}^{nPTI} P_{PTI(i)} - \sum_{i=1}^{neff} f_{eff(i)} \cdot P_{AEeff(i)}\right) \cdot C_{FAE} \cdot SFC_{AE}\right] - \left(\sum_{i=1}^{neff} f_{eff(i)} \cdot P_{eff(i)} \cdot C_{FME} \cdot SFC_{ME}\right)}{f_i \cdot Capacity \cdot V_{ref} \cdot f_W}$$

Main engine(s)	Aux. engine(s)	Energy saving technology for auxiliary power	Energy saving technology for main power





Section 8

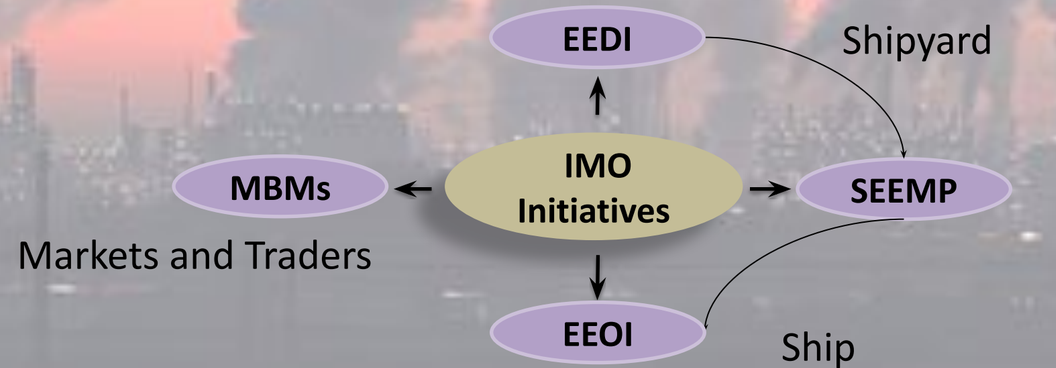
EU MRV - IMO DCS

CO_2 Emissions

Carbon Dioxide (CO2)

- **An inevitable product when we get energy from burning the carbon in fuel**
- **Responsible for global warming and climate change**
- **Directly proportional to the amount of energy released and disproportional to the energy conversion efficiency**

Increased Energy efficiency ⟷ **Less CO2 emissions**



EEDI: Energy Efficiency Design Index
SEEMP: Ship Energy Efficiency Management Plan
EEOI: Energy Efficiency Operation Indicator
MBMs: Market-Based Measures

EEDI & SEEMP **mandatory**
EEOI **voluntary**
MBMs **under discussion**

What does EU MRV stand for and what is it scope?

EU MRV stands for European Union Monitoring, Reporting and Verification

Its scope is to promote the reduction of greenhouse gases emissions from ships by collecting and analyzing emission data related to the shipping industry

What does IMO DCS stand for and what is it scope?

IMO DCS stands for IMO Data Collection System

Its scope is to promote the reduction of greenhouse gases emissions from ships by collecting and analyzing emission data related to the shipping industry

- The EU scheme has focus on CO2 emissions from shipping activities to, from and within the EU area
- The IMO scheme covers emissions from shipping globally
- The EU MRV is expected to align with IMO DCS in the near future; however, it will continue to monitor CO2 emissions only from, to and between EU ports

EU MRV

IMO DCS

EU MRV	IMO DCS
Reporting only for **voyages to / from EU ports**	Reporting for **all voyages**
Monitoring commenced on **1 Jan 2018**	Monitoring commenced on **1 Jan 2019**
Ship-specific **Monitoring Plan** developed	Ship-specific **SEEMP Part II** developed
Monitoring Plan assessed by **Verifier** (incl. non-Class)	SEEMP Part II to be reviewed by **RO** (on behalf of the Flag)
Public Data (EMSA)	Anonymized Data (IMO)
Reporting (e.g. Actual Cargo, Consumption at Berth)	Reporting (e.g. DWT, Voyage Consumption)

EU MRV	IMO DCS
Actual Cargo Carried over each voyage	**Summer DWT** (as per approved T&S Booklet)
Consumption **at Berth**	N/A
Only voyages that **start** within a year are reported	**Weighted average** for year-end voyages
Energy efficiency metrics (e.g. gr CO_2 / tonnes x nautical miles)	N/A
Time spent at sea, **excluding anchorage**	Hours underway
Specific guidance provided (best practices, etc.)	**Open to interpretation** / Administration guidelines

For all vessels >5000 GT:

- Include **all voyages to and from an EU port and EFTA ports (Norway and Iceland)**
- Include **all bunkers consumed**
- **Avoid any data gaps**
- **Reduce uncertainty** – choose from the following methods:
  - Bunker Delivery Notes and periodic stock takes of fuel
  - Tank Sounding
  - Flow Meters
  - Direct Emission Measurements

Which ships fall under the scope of the EU MRV – IMO DCS regulations?

The EU MRV is applicable for ships more than 5,000 GT

Which voyages are to be reported for EU-MRV?

According to the EU MRV regulation voyages from berth-to-berth. This includes sailing with a pilot and / or anchoring while waiting for port entrance

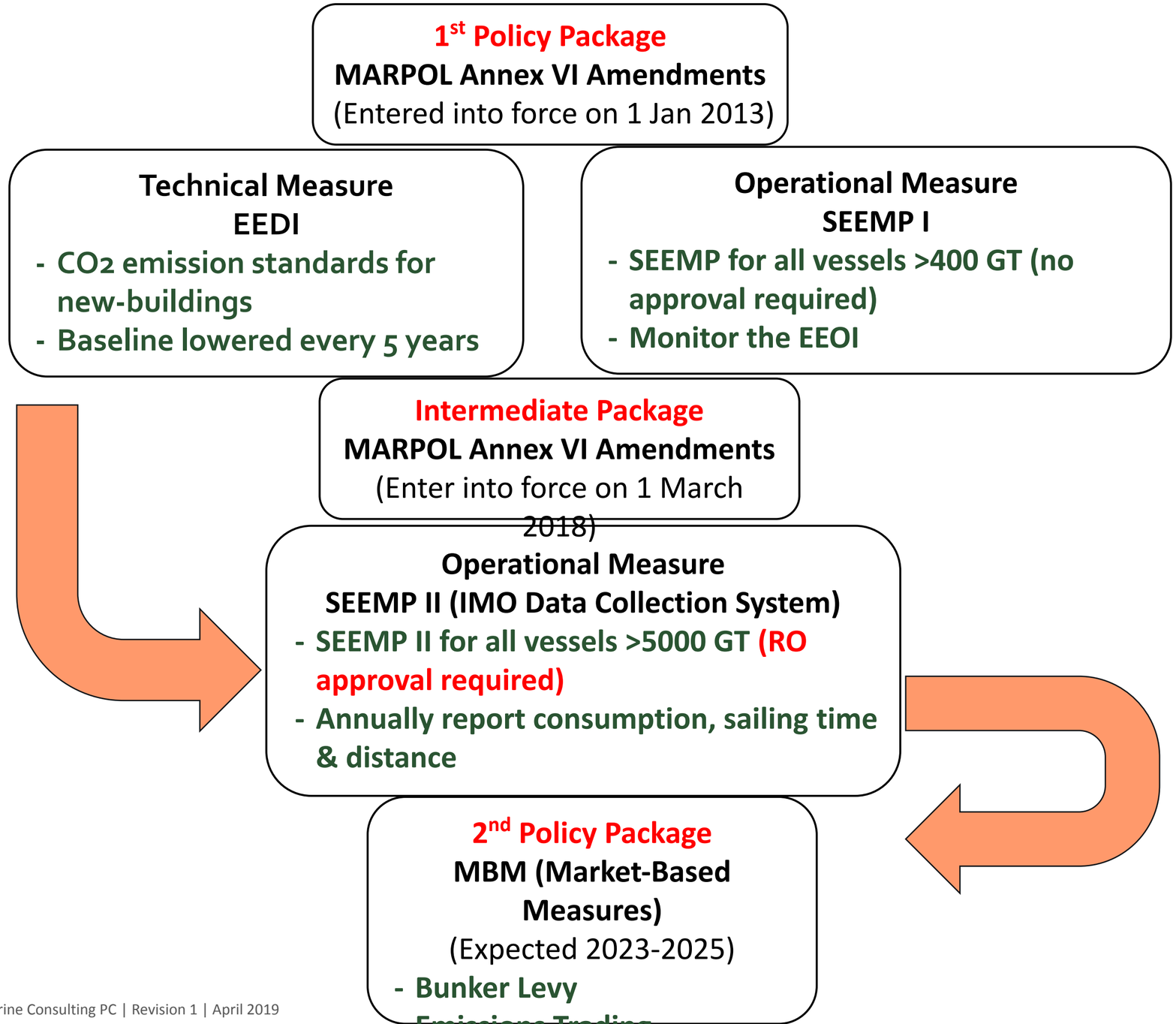
Which voyages must be reported for EU-MRV?

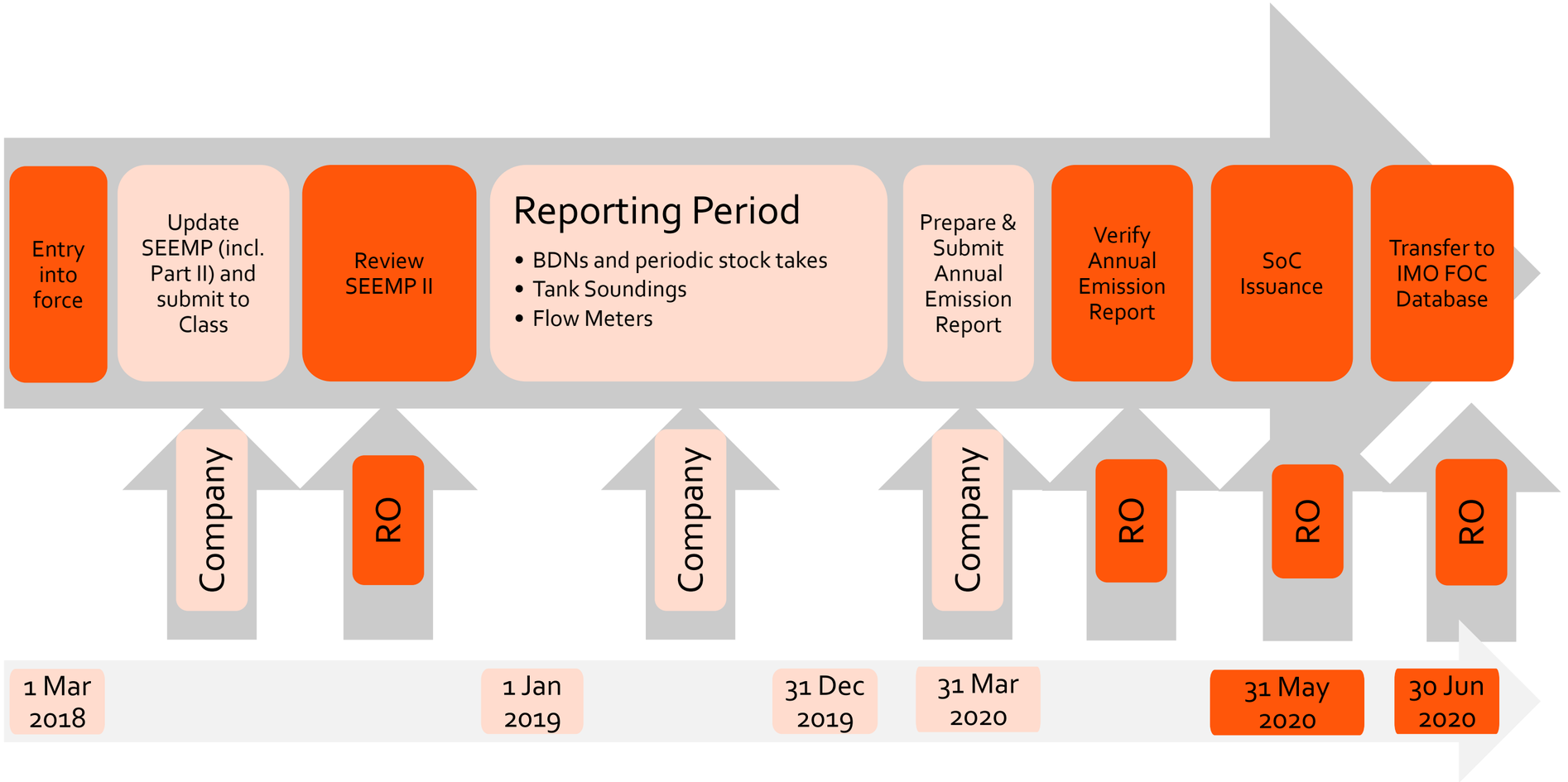
The voyages that least one of the ports of call will be located in an EU territory

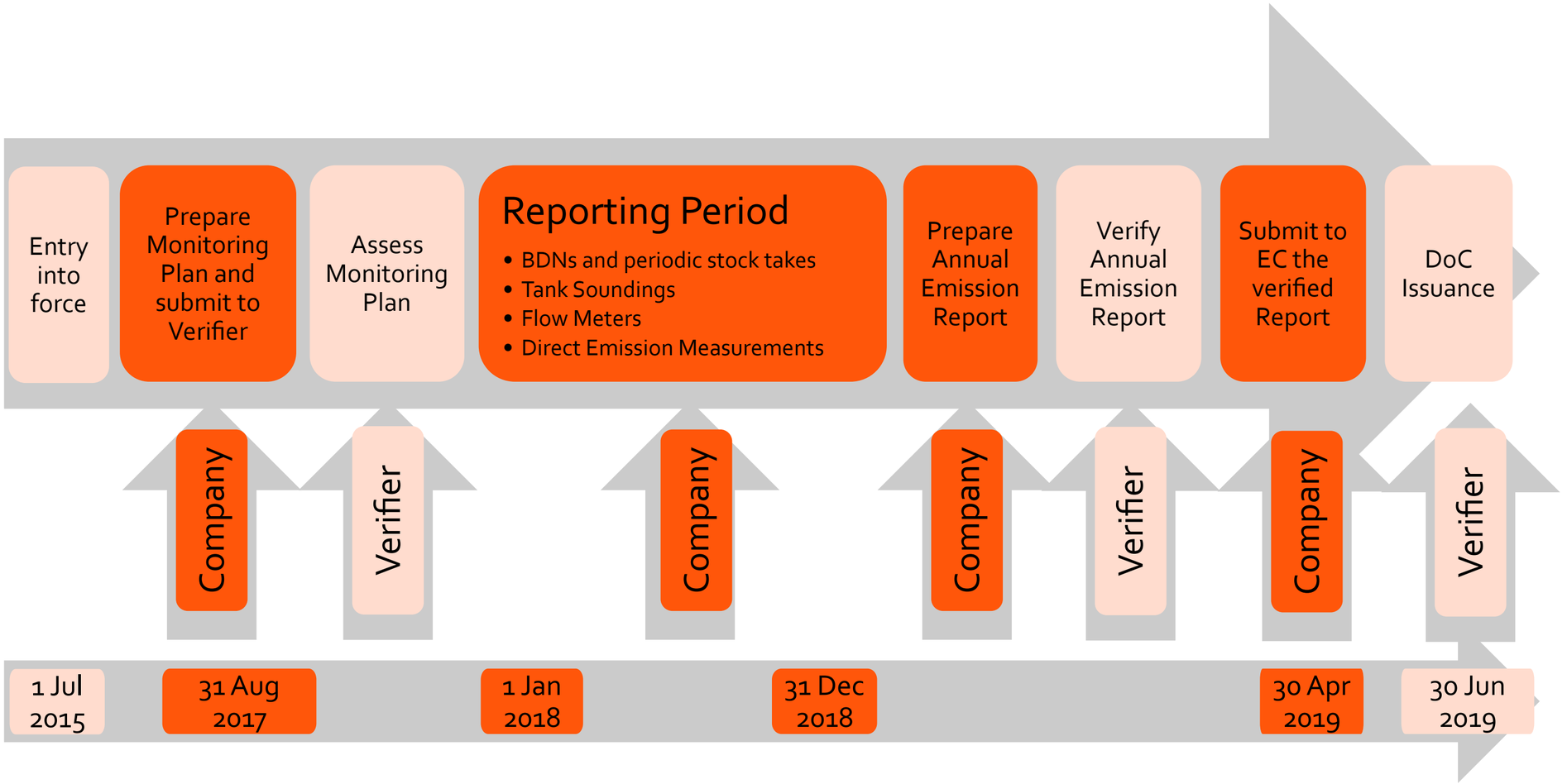
Who is responsible for EU MRV compliance?

The ship company is responsible for compliance with the EU MRV

All relevant data is to be monitored on a voyage basis and then aggregated annually







Section 9

Vessel General Permit 2013 (VGP)

VGP Application

VGP Applies to:

- All vessels subject to NPDES except those less than 24 meters in length and recreational crafts
- Non-recreational vessels less than 79 feet
- Vessels greater than 79 feet in length
- Non military vessels greater than 79 feet
- Commercial fishing vessels

To which waters is the VGP applied ?

- The permit is applicable to US inland waters and the 3 nautical miles territorial sea
- All navigable waters of the Great Lakes under the US jurisdiction are also included

Discharges - subject to VGP

Name as many discharge types eligible for coverage under the VGP

- Deck washdown and runoff and above waterline hull cleaning
- Bilgewater
- Ballast Water
- Anti-Fouling Hull Coatings/Hull Coating Leachate
- Aqueous Film Forming Foam
- Boiler Economizer Blowdown
- Cathodic Protection
- Chain Locker Effluent
- Oil to Sea Interfaces
- Distillation and Reverse Osmosis Brine
- Elevator Pit Effluent
- Firemain Systems
- Freshwater Layup
- Gas Turbine Wash Water
- Graywater
- Motor Gasoline and Compensating Discharge
- Non Oily Machinery Wastewater
- Refrigeration and Air Conditioning Condensate
- Seawater Cooling Overboard Discharge
- Seawater Piping Biofouling Prevention
- Boat Engine Wet Exhaust
- Sonar Dome Discharge
- Underwater Ship Husbandry and Hull Fouling Coatings
- Well Deck Discharges
- Graywater mixed with Sewage
- Exhaust Gas Scrubber Washwater Discharge
- Fish Hold Effluent

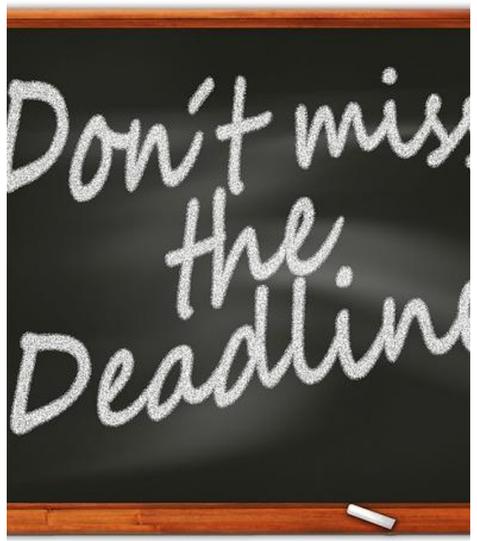
Discharges - subject to VGP

Name as many discharge types not subject to VGP as you can

- Sewage
- Used or spent oil
- Rubbish, Trash, Garbage or Other Materials
- Photo-processing effluent
- Effluents from dry cleaning operations
- Medical waste and related materials
- Noxious liquid substance residues
- Tetrachloroethylene (Perchloroethylene) and Trichloroethylene (TCE) Degreasers
- Discharges Currently or Previously Covered by an another NPDES Permit

Deadlines for submitting a NOI

Fill in the gaps (….)



Category of vessels	NOI Deadline	Discharge Authorization date
New vessel	For e-NOIs: **7…. days prior** discharging For Paper NOIs: **30…. days prior** discharging	For e-NOIs: **7…. days after** submission For Paper NOIs: **30…. days after** submission
New owner or operator of a vessel – transfer of ownership and/or operation of a vessel whose discharges are authorized under the permit	By date of transfer of ownership or operation	Date of transfer or date EPA receives the NOI whichever is later

Inspections

The USCG is permitted to inspect the VGP on behalf of the EPA

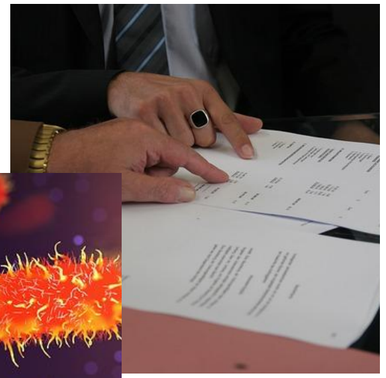
- Summary of inspection focus areas and questions:
  - ✔ Are the vessel Master and senior crew aware of the V
  - ✔ Has the vessel submitted a NOI?
  - ✔ Are records of routine visual inspections maintained?
  - ✔ Are records of annual inspections maintained?
  - ✔ Are records of VGP dry dock inspection available?
  - ✔ Documentation of Corrective Action Assessments
  - ✔ Ballast Water Management Plans
  - ✔ Ballast Water Record Book
  - ✔ Bilge water Discharges

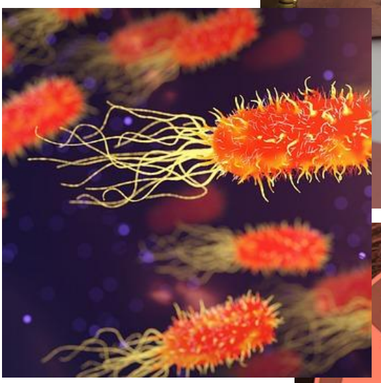
Section 10

Ballast Water Management (BWM)

The IMO Ballast Water Management Convention

What is the aim of the Ballast Water Management Convention ?





- To minimize the transfer of invasive aquatic species between ecosystems
- To minimize the transfer of bacteria harmful to human health

BALLAST WATER TREATMENT

What is the aim of the Ballast Water Treatment ?

The aim of the Ballast Water Treatment is to actively remove, kill and /or inactivate organisms prior to discharge. Ballast water treatment is different from the older process of ballast water exchange, which involved completely flushing the ballast water tanks during voyages in open water with sufficient water depth and distance from shore

What is called Ballast Water Management System ?

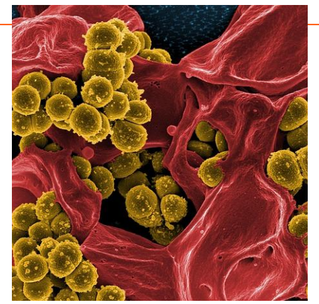
Any system which processes ballast water to kill, render harmless or remove organisms. The BWMS includes all ballast water treatment equipment and all associated control and monitoring equipment

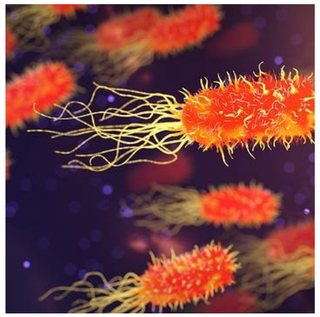
Dealing with ballast water

Regulation D-1 : Exchange Standard

- 95% Exchange
- 200 nautical miles & 200 meters deep;

  or
- 50 nautical miles & 200 meters deep
- Methods
  - ✔ Sequential
  - ✔ Flow through
  - ✔ Dilution





Regulation D-2 : Treatment Standard

- Organisms > 50 microns

  < 10 organisms per m^3
- Organisms => 10 microns < 50 microns

  < 10 organisms per ml
- Vibrio cholerae

  < 1 cfu per 100 ml
- Escherichia coli

  < 250 cfu per 100 ml
- Intestinal enterococci

  < 100 cfu per 100 ml

Ballast Water Treatment System

In the following link you may watch a small film about the D-1 and D-2 regulations :

https://www.youtube.com/watch?time_continue=28&v=aVqzYB5LqYk

COLUMBIA Shipmanagement provides to the seafarers
CBT for BWM and also e-Learning with type-specific training

Requirements for Ballast Water Treatment

The IMO implementation schedule for BWTS requires the ship to install a type approved system no later than the first IOPP renewal survey after entry into force of the convention

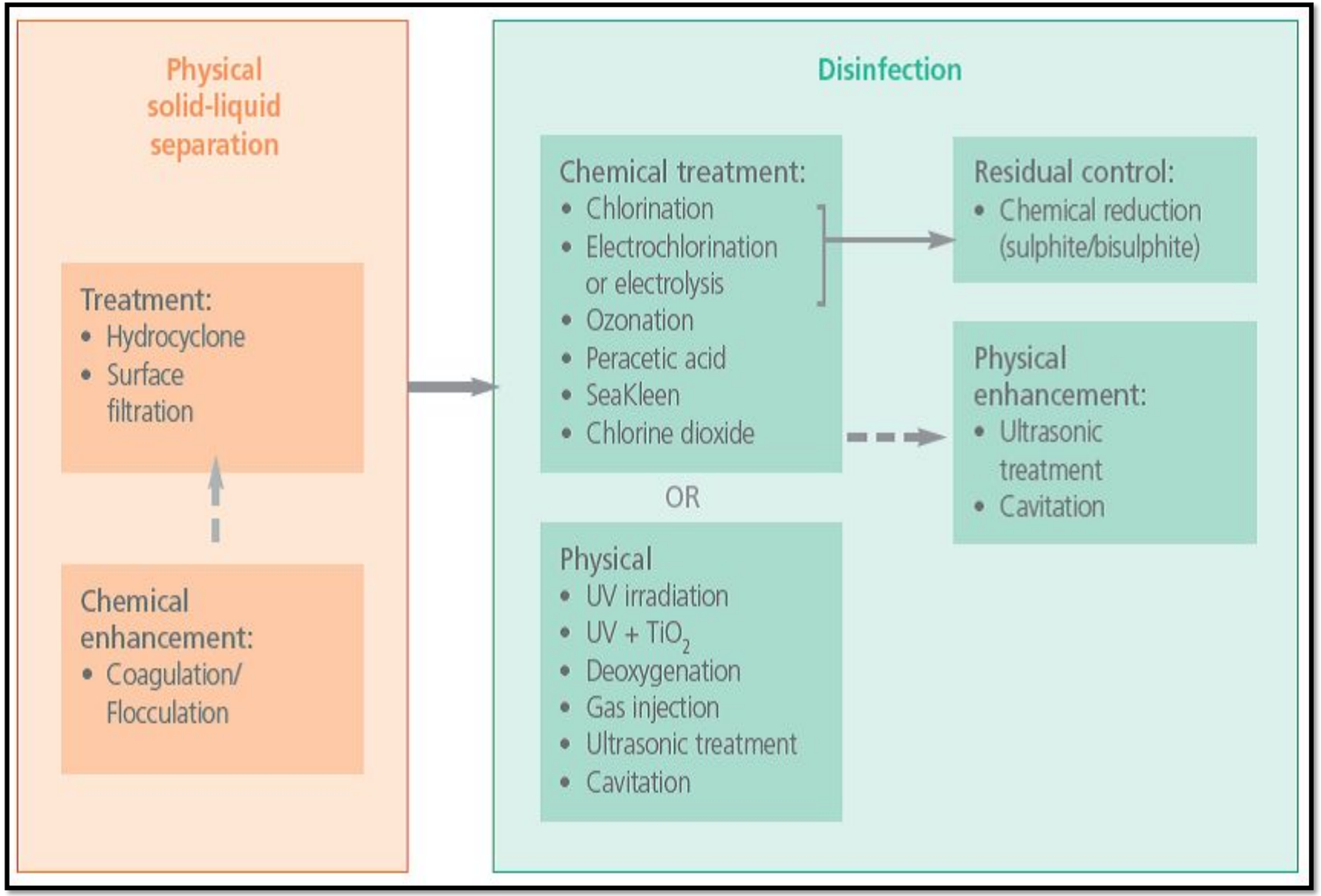
If

This survey is completed on or after 8 September 2019

Or

A renewal IOPP survey is completed on or after 8 September 2014 but prior to 8 September 2017

Available Ballast Water Treatment Systems



Ballast Water Management Plan

What are the main characteristics of a Ballast Water Management Plan ?

- Approval Mandatory (For D-1 and D-2 Standard)
- Ship-specific
- Can combine both exchange and treatment systems
- Simple
- Must be Available Onboard

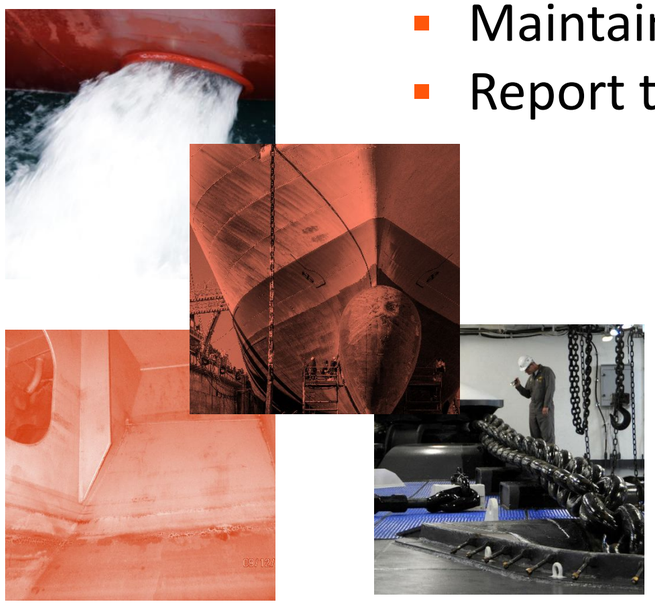
What kind of records is required to be kept regarding the Ballast Water Management Plan ?

- Ballast Water Reporting Form
- Ballast Water Handling Log
- diment removal and Flush
- llast Exchange Notification Form
- ining Record
- tional Reporting Forms

USCG Ballast Water Management Requirements

The US Ballast Water regulations require all ships to:

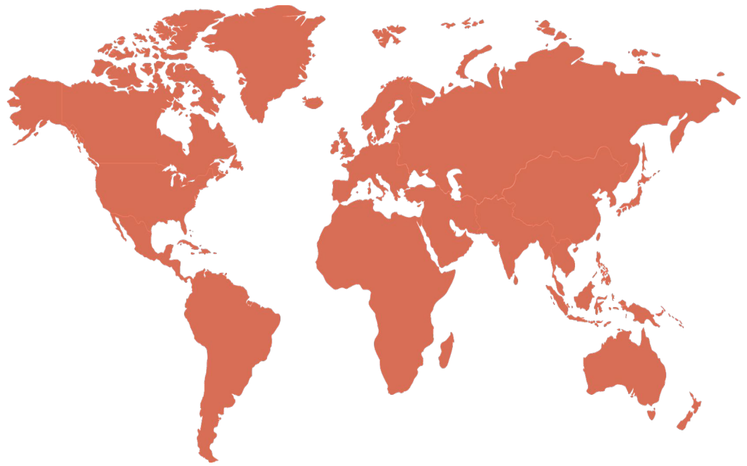
- Clean ballast tanks to remove sediments
- Rinse anchors and chains when retrieved
- Remove fouling from the hull, piping and tanks on a regular basis
- Maintain a BW management plan that includes procedures for fouling and sediment removal, as well as ballast water management (plan need not be approved)
- Maintain records of ballast and fouling management
- Report to be submitted 24 hours before arrival



Comparison Between IMO & USCG
Ballast Water Treatment Type Approval Procedures

IMO

BWM Convention requires a Type Approval certificate by the Administration or that the particular flag State acknowledge another Administration's Type Approval certificate in writing (ref Reg. D-3 and G8 6.3-6.5)

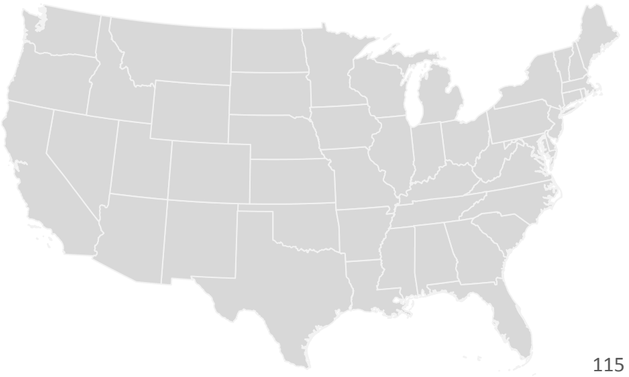


USCG

USCG requires a Type Approval certificate, issued by USCG in accordance with 46 CFR 162.060

BWTS with IMO Type Approval certificate can after a review process by USCG be listed as Alternate Management System

An Alternate Management System system can be used 5 years from the date vessel is required to have a BWTS installed



Section 11

Biofouling Management Plan (BFMP)

What is the Biofouling Management Plan ?

The **BFMP** provides effective procedures and practical guidance to the vessel’s crew on biofouling management measures in order to minimize the risk of transferring invasive aquatic species from ships' biofouling

The ship should implement management practices, including the use of anti-fouling systems and other operational management practices to reduce the development of biofouling. The intent of such practices is to keep the ship’s submerged surfaces and internal seawater cooling systems as free of biofouling as practical

Information in BFMP

The BFMP management plan should be ship-specific and included in the ship's operational documentation. The plan should address the following:

- Relevant parts of CSM BFMP Guidelines (Appendix I)
- Details of the anti-fouling systems and operational practices or treatments used, including those for niche areas
- Hull locations susceptible to biofouling, schedule of planned inspections, repairs, maintenance and renewal of anti-fouling systems
- Details of the recommended operating conditions suitable for the chosen anti-fouling systems and operational practices
- Details relevant for the safety of the crew, including details on the anti-fouling system(s) used
- Details of the documentation required to verify any treatments recorded in the Biofouling Record Book

The Biofouling Management Officer

Who is the Biofouling Management Officer and what are his responsibilities ?

The Chief Engineer is the designated Biofouling Management Officer

He is responsible for:

- Ensuring implementation of the Biofouling Management Plan
- Maintaining the Biofouling Record Book
- Conducting of training for Biofouling Management and Treatment Procedures

The Biofouling Management Officer shall be supported by other offices and crew to ensure proper collection of data in compliance with the BFMP

Types of Anti-fouling coatings

How many types of Anti- fouling coatings exist and how do they work ?

- Biocidal coatings that release chemicals such as copper compounds or other pesticides that aim to deter biofouling organisms
- Biocide-free coatings that do not depend on chemicals or pesticides for their anti-fouling properties, but instead rely on their physical nature

Name as many niche areas on the ship that may accumulate biofouling

- Propeller thrusters and propulsion units
- Sea chests
- Rudder stock and hinge
- Stabilizer fin apertures
- Rope guards, stern tube seals and propeller shafts
- Cathodic protection anodes
- Anchor chain and chain lockers
- Free flood spaces inherent to the ships' design
- Sea chest and thruster tunnel grates
- Echo sounders and velocity probes
- Overboard discharge outlets and sea inlets
- Areas prone to anti-fouling coating system damage or grounding

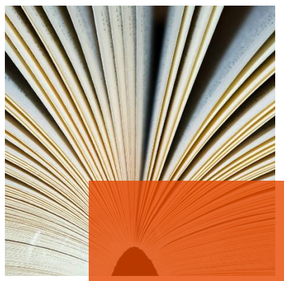
In-water inspection, cleaning and maintenance

- In-water inspections to be undertaken periodically augmented by specific inspections to address any situations of elevated risk
- In-water cleaning can be an important part of biofouling management and introduces different degrees of environmental risk, depending on the nature of biofouling, the amount of anti-fouling coating system residue released and the biocidal content of the anti-fouling coating system
- Any maintenance or repair activities should take care not to impede future in-service cleaning and / or maintenance
- Regular polishing of uncoated propellers to maintain operational efficiency will also minimize macrofouling accumulation

Information required in Biofouling Record Book

- Details of the anti-fouling systems and operational practices used, where and when installed, areas of the ship coated, its maintenance and its operation
- Dates and location of dry-dockings / slippings and any measures taken to remove biofouling or to renew or repair the anti-fouling system
- The date and location of in-water inspections, the results of that inspection and any corrective action taken to deal with observed biofouling
- The dates and details of inspection and maintenance of internal seawater cooling systems, the results of these inspections, and any corrective action taken to deal with observed biofouling and any reported blockages
- Details of when the ship has been operating outside its normal operating profile including any details of when the ship was laid-up or inactive for extended periods of time

Information required in Biofouling Record Book



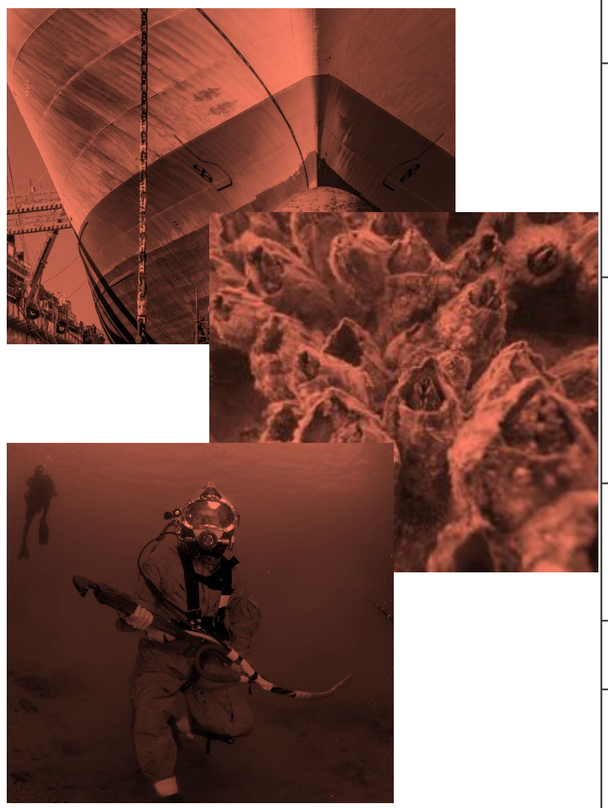
Cases that require to be recorded in the Biofouling Record Book include:

- Every dry-docking
- When the hull area, fittings, niches and voids below the waterline have been cleaned by divers
- When the internal seawater cooling systems have been inspected / cleaned or treated
- For ships with a MGPS fitted, Record of operation and maintenance and any instances when the system was not operating in accordance with the BFMP
- Periods of time when the ship was laid up / inactive for an extended period of time
- Periods of time when ship operating outside its normal operating profile
- Details of official inspection or review of ship biofouling risk
- Any additional observations and general remarks

Record of Biofouling Management Actions

SAMPLE OF BIOFOULING RECORD BOOK ENTRIES

HULL INSPECTION



Date	Item (number)	Record of management actions	Signature of officers in charge
20 Feb 2019	2.a	On 20 Feb 2019 at Kalamata anchorage hull bottom survey was carried out by divers. Reason: Class intermediate survey	(Master)
	2.b	Bulbous bow, vertical sides, flat bottom, bilge keels, sea chests and gratings, rope guard, propeller, rudder were inspected	(Master)
	2.c	The hull and propeller were found free from marine growth	(Master)
	2.d	None	(Master)
	2.e	Diver's report and digital colour photos taken and are included in the relevant CD	(Master)
	2.f	Master …….name …….	

Useful Links with Videos About MARPOL Violations

- https://www.maritime-executive.com/article/greek-shipping-company-fined-for-oil-pollution-charges
- https://www.youtube.com/watch?v=ZLwmFprGSUI
- https://vimeo.com/311063622

Useful Links with Articles About MARPOL Violations

- https://www.maritime-executive.com/article/greek-shipping-company-pleads-guilty-to-oil-pollution-charges
- https://www.maritime-executive.com/article/greek-shipping-company-pleads-guilty-to-oil-pollution-charges
- https://www.maritime-executive.com/article/greek-shipping-company-fined-for-oil-pollution-charges
- https://safety4sea.com/damico-to-pay-4-million-for-pollution-from-its-vessel/
- https://gcaptain.com/columbia-shipmanagement-fined/
- http://www.nepia.com/insights/industry-news/record-penalty-for-us-marpol-violation/

Thank you for your attention

Any questions?

For any concerns please contact:
training@csmcy.com