



REGIONAL MARINE POLLUTION EMERGENCY
RESPONSE CENTRE FOR THE MEDITERRANEAN SEA
(REMPEC)



# ASSESSMENT OF THE EXISTING SITUATION AND NEEDS OF ALBANIA, CROATIA AND SLOVENIA REGARDING PORT RECEPTION FACILITIES FOR COLLECTING SHIP-GENERATED GARBAGE, BILGE WATER AND OILY WASTES

## ACTIVITY 2

## COLLECTION AND TREATMENT OF OILY BALLAST WATERS FROM TANKERS

# FINAL REPORT

**February 2004**


**ENVIRONMENTAL PROTECTION ENGINEERING S.A.**

The present document and related study have been produced with the financial assistance of the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC).

This study was executed by the Environmental Protection Engineering (E.P.E. ) S.A., Greece, contracted by and under the responsibility of REMPEC. E.P.E. S.A. were also contracted by REMPEC to carry out a parallel study on the collection and treatment of solid and liquid wastes (Activity 1), which is the subject of a separate report.

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# 1. GENERAL

## 1.1 Subject and scope of the Activity 2 of the project

Activity 2 of the project entitled "Port Reception Facilities for Collecting Ship-Generated garbage, bilge water and oily wastes", is concerned with the identification of the required capacities for collection and treatment of oily ballast water from tankers, taking into consideration the type and capacity of existing installations and specific nature of traffic of oil tankers in each country and port and terminal involved.

This Project addresses three Mediterranean beneficiary countries, Contracting Parties to the 1976 Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution, Albania, Croatia and Slovenia and aims at promoting, in accordance with the Annexes I and V of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), the installation of port reception facilities for the collection of ship-generated oily wastes and garbage, as well as identifying the present situation and needs regarding the reception facilities for oily ballast waters in these countries.

It should be noted that although it was attempted to expand the study to other cargo - associated wastes from tankers (tank washings, slops, scale and sludge) because of the drastic reduction of the needs for dirty ballast delivery, the criteria of Regulation 12 of Annex I of MARPOL 73/78 were taken into account to identify those ports that need to provide facilities for dirty ballast from tankers. The following ports and oil terminals are those visited and studied within the framework of Activity 2 of the project:

- Albania: *Durres*
- Croatia: *Omisalj, Ploce, Rijeka, Split and Zadar*
- Slovenia: *Koper*

## 1.2 Definitions

Water ballast taken and discharged from oil tankers, in accordance with the Regulations of Annex I of MARPOL 73/78, is distinguished into clean, segregated and dirty ballast water with respect to its contamination with hydrocarbons and also the shipboard spaces where in principle water ballast is carried.

It was deemed as appropriate to provide definitions for those terms related with the identity of different oily mixtures and residues produced onboard oil tankers, as well as those related with the age, the structural and operational requirements of tankers that influence the volume and kind of the abovementioned mixtures.

The following terms and definitions have been extracted basically from the Regulations and Unified Interpretation of Annex I of MARPOL 73/78.

***Oil*** means petroleum in any form including crude oil, fuel oil, sludge, oil refuse and refined products (other than petrochemicals) including at least those substances listed in the Appendix I to the Annex I of MARPOL 73/78.

***Oily mixture*** means a mixture with oil content.

***Oil tanker*** means a ship constructed or adapted primarily to carry oil in bulk in its cargo spaces and includes combination carriers and any chemical tanker when they carry a cargo or part of cargo of oil in bulk.

***Clean Ballast*** means the ballast in a tank, which since oil was last carried therein, has been so cleaned that effluent there from, if it were discharged from a ship which is stationary into clean calm water on a clear day would not produce visible traces of oil on the surface of the water or on adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

If the ballast is discharged through a type approved Oil Discharge Monitoring and Control System, evidence based on such a system to the effect that the oil content of the effluent did not exceed 15 parts per million shall be determinative that the ballast was clean, notwithstanding the presence of visible traces.

***Segregated ballast*** means the ballast water introduced into a tank which is completely separated from the cargo oil and oil fuel system and which is permanently allocated to the carriage of ballast or cargoes other than oil or noxious substances.

***Mediterranean Sea area*** means the Mediterranean Sea, including the gulfs and seas therein with the boundary between the Mediterranean and the Black Sea constituted by the $41^0$ N parallel and bounded to the west by the straits of Gibraltar at the meridian of $5^0$ 36' W.

***Instantaneous rate of discharge of oil content*** means the rate of discharge of oil in litres per hour at any instant divided by the speed of the ship in knots at the same instant.

***Slop tank*** means a tank specifically designated for the collection of tank drainings, tank washings and other oily mixtures.

***New oil tanker*** means an oil tanker delivered, in practice, after 1/6/1982 or an oil tanker that has undergone a major conversion completed after the above mentioned date.

***Crude oil tanker*** means an oil tanker engaged in the trade of carrying crude oil.

***Product Carrier*** means an oil tanker engaged in the trade of carrying oil other than crude oil.

# 2. REGULATIONS AND RULES

## 2.1 Criteria for discharging oily mixtures from cargo spaces of oil tankers at sea

Regulation 9 of Annex I of MARPOL 73/78 provides requirements with respect to the control of discharges of oily mixtures produced in the cargo and ballast areas of oil tankers.

In principle, this kind of discharge is prohibited within the Mediterranean Sea, as a designated Special Area, except of clean or segregated ballast. In addition, outside Special Areas and at a specific distance from the coastline, oily mixtures from tankers proceeding en route, can be discharged at sea provided that:

(i) the instantaneous rate of discharge of oil content does not exceed 30 litres per nautical mile;

(ii) the total quantity of oil discharged into the sea does not exceed for existing tankers the 1/15,000 of the total quantity of the last cargo from which the residue formed a part, and for new tankers the 1/30,000 of the total quantity of the cargo respectively,

(iii) the tanker has in operation an oil discharge monitoring and control system as well as slop tank/s arrangements as required by the respective Annex I Regulations.

No discharge at sea shall contain chemicals or other substances in quantities or concentrations which are hazardous to the marine environment or similar substances, introduced for the purpose of circumventing the conditions of discharge outlined above. The oily mixtures discharge criteria related with oil tankers engaged in voyages within the Mediterranean Sea and Special Areas in general (that is important for oil tankers engaged in voyages within the adjacent to the Mediterranean Special Areas of Black and Red Sea) or outside them are presented schematically into the next table:

| Sea Areas | | Discharge Criteria |
|---|---|---|
| **Within a Special Area** | | No discharge except Clean or Segregated ballast |
| **Outside a Special Area** | Within 50 n.miles from the nearest coast | No discharge except Clean or Segregated ballast |

| | | |
|---|---|---|
| | More than 50 n. miles from the nearest coast | No discharge except either:<br>(a) of clean or segregated ballast<br>(b) When:<br>(1) the tanker is en route; and<br>(2) the instantaneous rate of discharge of oil does not exceed 30 litres per nautical mile; and<br>(3) the total quantity of oil discharged does not exceed 1/15.000 (for existing tankers) or 1/30.000 (for new tankers) of the total quantity of cargo which was carried on the previous voyage<br>(4) the tanker has in operation an oil discharge monitoring and control system and slop tank arrangements |

## 2.2 Applicable regulations dealing with the provision of Reception Facilities in ports and terminals

The table below summarizes the relevant requirements for the provision of Reception Facilities both for dirty ballast, tank washings from oil tankers as well as for other oily residues and oily mixtures from all ships.

| Regulations of Annex I of MARPOL 73/78 | Summary of the requirements |
|---|---|
| **Regulation 10**<br>***Methods for the prevention of oil pollution from ships while operating in Special Areas*** | *All oil loading terminals and repair ports within a Special Area should be provided with facilities adequate for the reception and treatment of all the dirty ballast and tank washings from oil tankers.* |
| | *All ports and terminals within a Special Area shall be provided with adequate reception facilities for other residues and oily mixtures from ships.*<br>*Reception facilities adequate to meet the needs of the ships using them without causing undue delay should be provided in:*<br>- All ports and terminals in which crude oil is loaded into oil tankers where such tankers have immediately prior to arrival completed a ballast voyage of not more than 72 hours or not more than 1,200 nautical miles |
| **Regulation 12**<br>***Reception Facilities*** | - *All ports and terminals in which oil other than crude oil in bulk is loaded at an average quantity of more than 1,000 metric tons per day*<br>- *All ports having ship repair yards or tank cleaning facilities.*<br>These ports should have sufficient reception facilities to receive all residues and oily mixtures which remain on board for disposal from ships prior to entering such yards or facilities. |

| | |
|---|---|
| **Regulation 12**<br><br>***Reception Facilities*** | In addition reception facilities should be provided in:<br><br>- *All ports and terminals which handle ships provided with the tanks (sludge tanks) required by Regulation 17 of Annex I.*<br><br>All facilities provided to the abovementioned ports and terminals shall be sufficient to receive all residues retained as above from all ships that may reasonably be expected to call at such ports and terminals.<br><br>- *All ports in respect of bilge waters and other residues, which cannot be discharged in accordance with Regulation 9 of Annex I.*<br><br>All facilities provided to these ports and terminals shall be sufficient to receive oily bilge waters and other residues which cannot be discharged in accordance as mentioned above.<br><br>*All loading ports for bulk cargoes in respect of oil residues from combination carriers which cannot be discharged in accordance with Regulation 9 of Annex I.* |

## 2.3 Applicable regulations dealing with Segregated Ballast Tanks and Double Hull arrangements for oil tankers

A summary of the requirements of Annex I, Regulations dealing with the segregated ballast tanks arrangements, as adopted by Resolution MEPC.52(32), before the adoption of the Resolution MEPC.95(46), on 27 April 2001 is illustrated in the next table:

| **Type of oil tanker** | **Deadweight (t.dw.)** | **Time of delivery** | |
|---|---|---|---|
| | | **Before 1/ 6/1982** | **After 1/6/1982** |
| **Crude oil tanker** | < 20.000 | No any relevant requirements | No any relevant requirements but 13 F provides that all oil tankers of 600 t.dw and above delivered after 6/7/1996 should have hull spaces and tanks that can potentially take ballast water |
| **Crude oil tanker** | 20.000 – 40.000 | No any relevant requirements but in practice, due to the effect of Regulation 13G (4), this class of tankers, becomes PL/SBT tankers 25 years after delivery | Every tanker should be provided with segregated ballast tanks |

| | | | |
|---|---|---|---|
| | > 40.000 | They should be provided with SBT, or they can operate with COW in accordance with Regulation 13B (similarly the abovementioned 13 G (4) Regulation applies) | Every tanker should be provided with segregated ballast tanks |
| **Product Carrier** | < 30.000 | No any relevant requirements but in practice, due to the effect of Regulation 13G (4), this class of tankers, become PL/SBT tankers 25 years after delivery | No any relevant requirements but 13 F provides that all oil tankers of 600 t.dw and above delivered after 6/7/1996 should have hull spaces and tanks that can potentially take ballast water |
| | 30.000 – 40.000 | In practice, due to the effect of Regulation 13G (4), this class of tankers, become SBT tankers 25 years after delivery | Every tanker should be provided with segregated ballast tanks |
| | > 40.000 | Alternatively of the provision of segregated ballast tanks, they can operate with dedicated clean ballast tanks in accordance with the requirements of 13 A Regulation (same effect of Regulation 13 G (4)) | Every tanker should be provided with segregated ballast tanks |

On crude oil tankers of 20.000 tons deadweight and above and product carriers of 30.000 tons deadweight and above, the aggregate capacity of wing tanks, double bottom tanks, forepeak tanks, and afterpeak tanks is required to be not less than the capacity of the segregated ballast tanks necessary to meet the requirements of the relevant Regulation 13 of the Annex I of MARPOL 73/78.

In addition wing tanks, or spaces and double bottoms tanks used to meet the requirements of the abovementioned Regulation shall be located as uniformly as practicable along the cargo tank length. Additional segregated ballast capacity provided for reducing longitudinal hull girder bending stress, trim, etc. may be located anywhere within the ship.

In April 2001, during the 46$^{th}$ session of the IMO Marine Environment Protection Committee, amendments to the 13 G Regulation of Annex I, were adopted which entered into force on the 1$^{st}$ September 2002. The impetus for the revision of the abovementioned Regulation was caused by the effects of the serious pollution that the total loss of the 23 year old product tanker

Erika in December 1999 caused, along with other subsequent casualties particularly in European waters.

The new requirements are expected to have a dramatic impact on the world' tanker fleet since the adopted phase out criteria guide a significant number of oil tankers not only those built before 1982 (pre MARPOL tankers) but also new ships out of service.

For the purpose of the revised 13 G Regulation, oil tankers are classed into three categories, as follows:

- Category 1 oil tanker means an oil tanker of 20.000 tons deadweight and above carrying crude oil, fuel oil, heavy diesel oil or lubricating oil as cargo, and of 30.000 tons deadweight and above carrying oil other than the above, which does not comply with the requirements for new oil tankers as defined in Regulation 1(26) of Annex I.

- Category 2 oil tanker means an oil tanker of 20.000 tons deadweight and above carrying crude oil, fuel oil, heavy diesel oil or lubricating oil as cargo, and of 30.000 tons deadweight and above carrying oil other than the above, which complies with the requirements for new oil tankers as defined in the Regulation 1(26) of Annex I.

- Category 3 oil tanker means an oil tanker of 5.000 tons deadweight and above but less than the sizes previously mentioned.

**Category 1 oil tankers**

This category of oil tankers represent those, pre Protectively Located - SBT and non double hull oil tankers, which in practice, should be withdrawn by their anniversary date occurring between 2003 and 2007. Every oil tanker falling under this category, shall comply with the requirements of the Regulation 13 F of the Annex I, not later than the anniversary of the date of delivery of the ship in the year according to the following table:

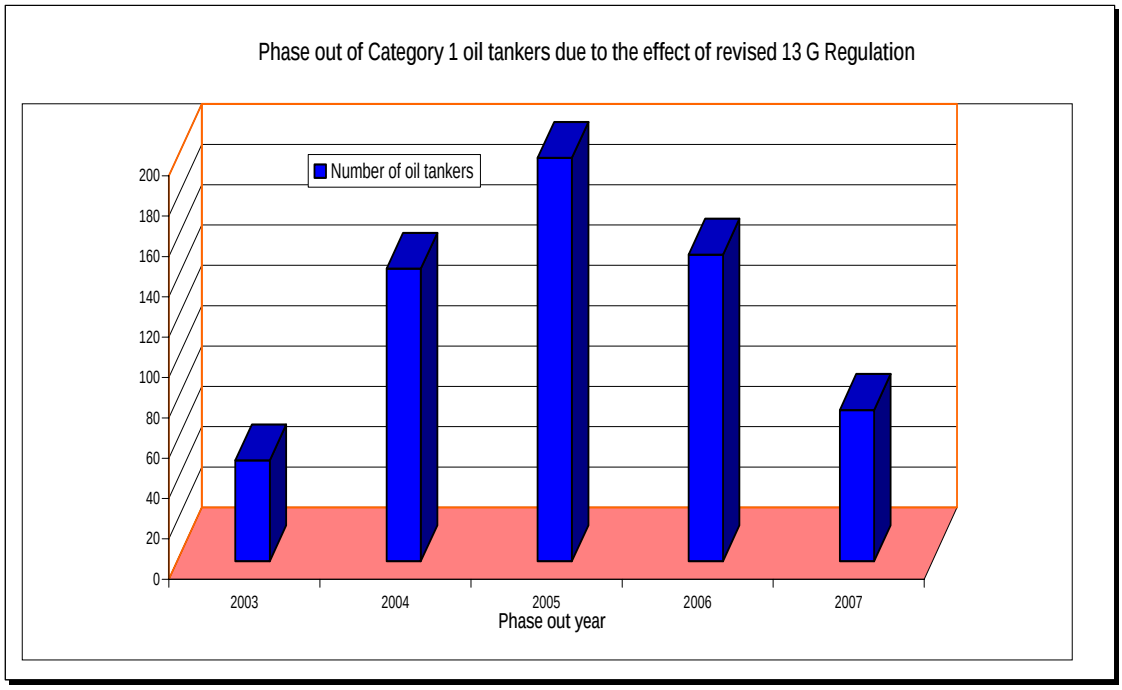
| Category of oil tankers | Phase out Year |
|---|---|
| **Category 1** | 2003 for ships delivered in 1973 or earlier<br>2004 for ships delivered in 1974 and 1975<br>2005* for ships delivered in 1976 and 1977<br>2006* for ships delivered in 1978, 1979 and 1980<br>2007* for ships delivered in 1981 or later |
| | * Subject to compliance with the Condition Assessment Scheme, in accordance with MEPC Resolution 94(46) |

According to an INTERTANKO study, incorporated in an another study titled *"Oil Tanker Outlook, Assessing the impact of the revised IMO MARPOL 13G Phase out"* produced by ABS, it is estimated that about 600 oil tankers falling under the Category 1 representing in total 73 million tons deadweight, will

be phased out between 2003 and 2007, reflecting the combined impact of the remnants of the 1970s VLCC fleet and a large number of pre-MARPOL product tankers.

The obvious impact of the revised 13 G to the non SBT oil tankers is the accelerated schedule of their compliance with the requirements of 13 F, since the option to extent the time period for complying with 13 F up to 30 years after the date of delivery (provided that wing tanks or double bottoms not used for the carriage of oil, covering 30% of the side or the bottom) is lost and thus the 2007 year is determined as a key date where the presence of this size non-SBT tankers is fully eliminated.

The following graph shows the number of Category 1 oil tankers phased out in the period between 2003 and 2007.




**Category 3 oil tankers** (oil tankers of 5.000 t.dw and above but less than 20.000 t.dw)

Taking into account the 13F (2) Regulation, every new oil tanker of 5.000 tons deadweight and above has been provided with the following alternative structural and operational choices to comply with the requirements aimed at the prevention of oil pollution in the event of collision or stranding:

- Segregated ballast tanks and spaces other than oil tanks within the cargo tank length to be arranged as to comply with specific requirements,

- The entire cargo tank length to be protected by ballast tanks or spaces other than cargo and fuel oil tanks (double hull requirements),

- Other methods of design and construction accepted as alternatives including hydrostatic ballast loading that ensure at least the same level of protection against oil pollution in the event of collision or stranding.

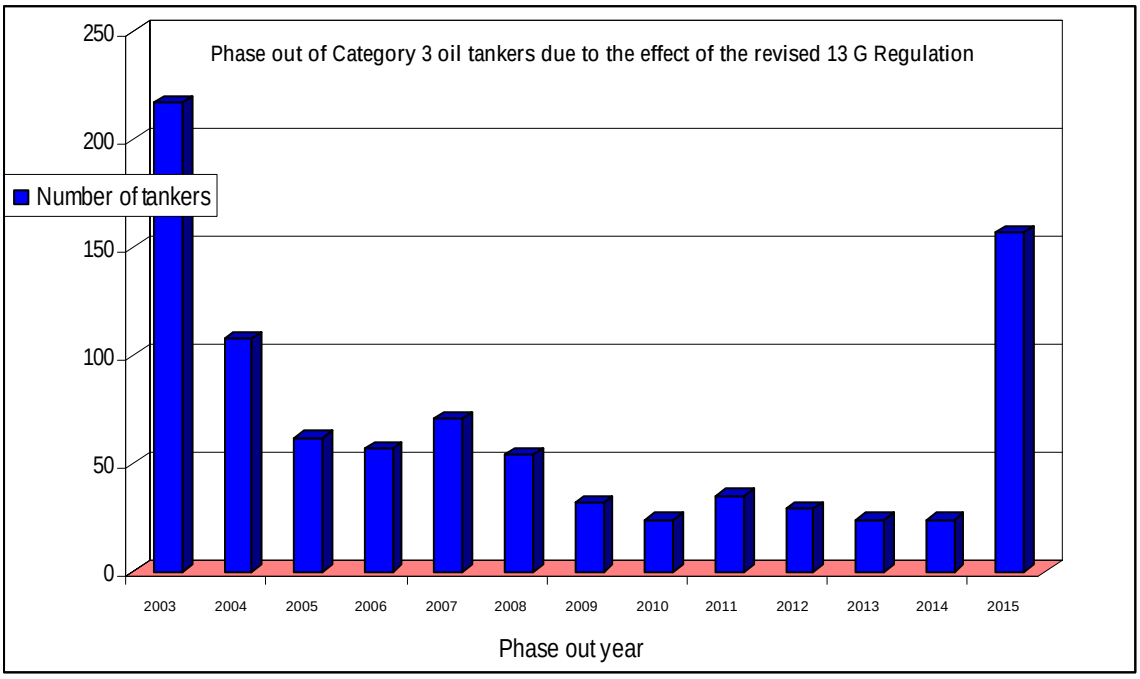
Since through the Resolution MEPC.52(32) adopted on 6 March 1992, the new Regulations 13 F and G entered into force on 6 July 1993, it is concluded that while the new oil tankers more than 5.000 tdw but less than 20.000 tdw, are built and operated with arrangements for segregated ballast tanks, the existing oil tankers of this size should comply due to the effect of the revised 13 G with the abovementioned requirements not later than their 26th anniversary date, effective from 2003 forward.

| Phase out by Anniversary of delivery date in | Year of delivery | Tanker age |
|---|---|---|
| 2003 | earlier than and including 1973 | 30 |
| 2004 | 1974 – 1975 | 30 – 29 |
| 2005 | 1976 – 1977 | 29 – 28 |
| 2006 | 1978 – 1979 | 28 – 27 – 26 |
| 2007 | 1980 – 1981 | 27 – 26 |
| 2008 | 1982 | 26 |
| 2009 | 1983 | 26 |
| 2010 | 1984 | 26 |
| 2011 | 1985 | 26 |
| 2012 | 1986 | 26 |
| 2013 | 1987 | 26 |
| 2014 | 1988 | 26 |
| 2015 | later than and including 1989 | 26 – 19 |

The most important peaks in the abovementioned phase out, coincide with the beginning and end of the whole period when a large number of oil tankers that do not meet the double hull standards will be forced out of service.

In 2003 and 2015 respectively, 217 and 157 of these tankers will have to be withdrawn. The impact of phase out to the small tankers which most of them are product carriers of between 5.000 and 20.000 tons deadweight is considered as significant due to the large number of these tankers.

It can be projected that by 2007 (which was the beginning of the phase out process of the previous 13 G Regulation) 515 oil tankers of this size should be withdrawn.




## 2.4 Dirty ballast and other oily mixtures produced from oil tankers

Activity 2 of the project is concerned with the dirty ballast from tankers, however it was considered as advisable to incorporate in this Report and the work done, tank washings and other oily mixtures and residues produced in areas other than the machinery spaces of tankers for the following two reasons:

1. Due to the already significant decrease of non SBT tankers and the anticipated dramatic decline in the future, the potential quantity of dirty ballast to be received at the oil loading terminals in the Mediterranean Sea Area is expected to be minimized, therefore the next most important - in terms of quantity - oily mixtures are tank washings collected in the nominated slop tanks or other shipboard areas (1.5 - 8 % of tankers deadweight).

2. MARPOL 73/78 Regulations related with the reception facilities in oil terminals and ports, provide in practice, that these facilities should be capable to receive all oily wastes including - apart dirty ballast and tank washings - oily wastes from the machinery spaces of ships. Calculations of dirty ballast and tank washings waste streams for each port and oil terminal, have been made also in this Report for the other two oily wastes streams (oil residues and oily bilge water).

IMO has provided guidelines for estimating the quantities of oily wastes in general, which would be required to be retained on board and discharged to reception facilities within the constraints of the:

- origin of oily wastes or residues;
- ship type and design;
- ship operating route; and
- the various types of ports and terminals required to provide reception facilities to ships.

Dirty ballast water can't be discharged to the sea at oil terminals, while discharge of clean ballast might be carried out provided that local or national regulations allow this operation, usually under control and supervision. The discharge of the bulk of the settled dirty ballast is characterized by a high flow rate, large in quantity but of low oil content. Oil content is typically (during for instance discharge in good weather outside a Special Area) around 30 ppm but higher oil content may be expected if there is substantial ship movement and disturbance of the water - oil interface.

The amount of dirty ballast aboard a tanker on arrival in the appropriate categories will vary from ship to ship and also with weather conditions. Generally, the total ballast weight on average might exceed 30 per cent of deadweight. Invariably, oil tankers arriving with dirty ballast may also have on board tank washings from tank cleaning performed en route which needs to be received ashore in any available reception facilities.

According to CONCAWE (the Oil Companies European Organization for Environment, Health and Safety, October 2000 Review), during studies focused on the emissions control at marine terminals, data from seven terminals indicated that in 1999, the share of involvement of non-SBT tankers in the loading operations of oil, in particular volatile products was less than 20%. Other studies mentioned therein, showed a gradual downward trend in the use of non-SBT tankers from 45 per cent in 1993 to 13 per cent in 1999.

Oily mixtures accumulated in slop tanks (the content of which is not allowed to be discharged within the Mediterranean Sea Area), are produced basically during the following operations:

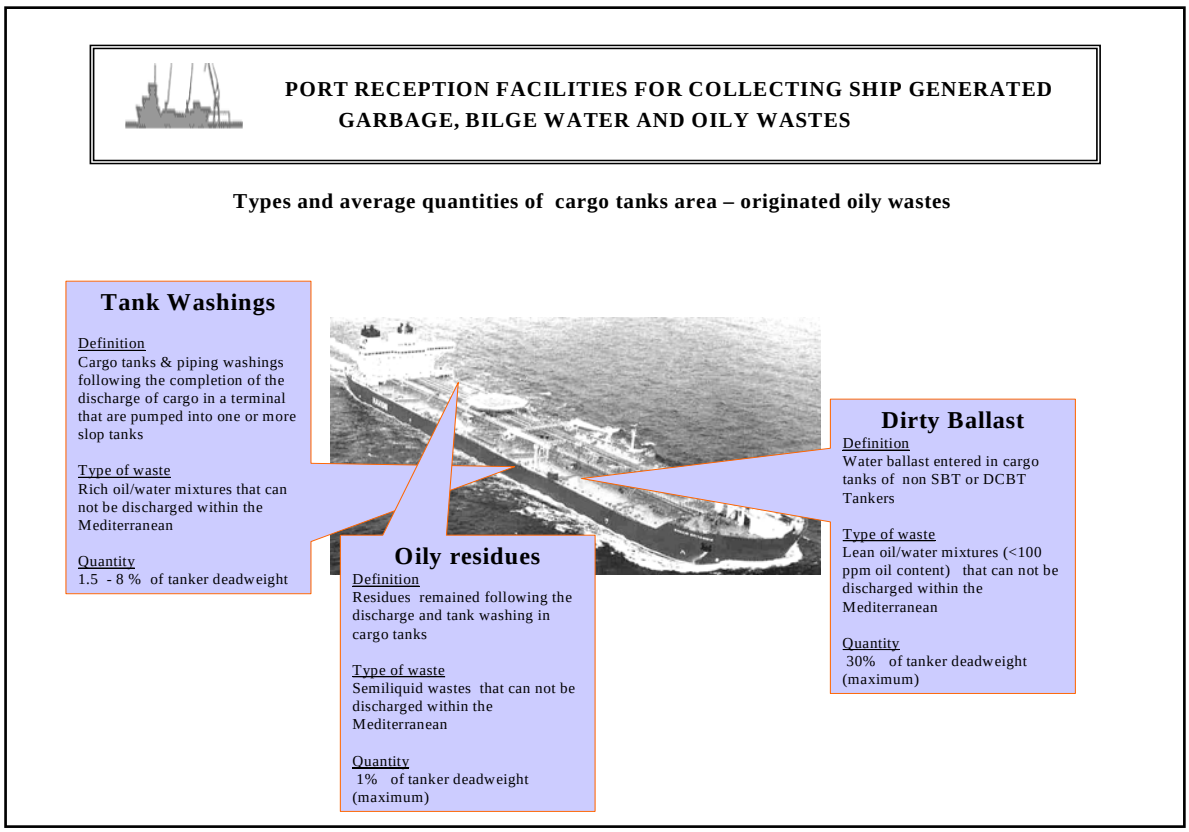
- Washing of cargo tanks in crude oil tankers before loading ballast or in product carriers before changing the type of cargo. Crude oil washing has significantly reduced the amount of water needed for washing of cargo tanks required for clean ballast or not. If crude oil washing is undertaken in all tanks during the cargo discharge immediately prior to entering a ship repairing yard for repairs, the total quantity of slops and sludge for disposal at the tank cleaning berth will be substantially reduced.

- Drainage and stripping of the cargo pumping system, flushing of cargo lines and pumps, stripping of oil residues of dirty ballast to slop tanks. The discharge of the bulk of settled water from a slop tank is characterized by a moderate discharge rate and oil content which could be typically around 150 ppm while the slow discharge (outside Special Areas) of slop tank water as the oil-water interface approaches the tank suction is characterized by very slow discharge rate but usually of a higher oil content, on average 500 ppm which can rise more during the discharge.

The wash water quantity, however, will be small in comparison with the quantity of dirty ballast (probably less than 5 per cent). Retention of oil onboard requirements, provide that adequate means shall be provided for cleaning the cargo tanks and transferring the dirty ballast residues and tank washings from the cargo tanks into slop tank or a combination of slop tanks.

The arrangement of the slop tank or tanks (new oil tankers of 70.000 t.dw and above are provided with at least two tanks) shall have a capacity necessary to retain slops generated by tank washings, oil residues, and dirty ballast residues.

The total capacity of the slop tank/s shall not be less than 3% of the oil carrying capacity of the oil tankers. However, the abovementioned capacity can be reduced up to 1.5 % for oil tankers and 1% for combination carries provided that specific conditions apply accepted by the Flag State Administration of ships. The different oily wastes from the cargo areas of oil tankers are shown schematically below:



While, in general, a tank, the content of which has been discharged to a terminal, should be washed and all contaminated washings should be discharged to a reception facility before the ship leaves the port of discharge for another port, however there are some exceptions from this rule such as:

1. The tanks that are discharged are to be reloaded with the same substance or another substance compatible with the previous one and that the tanker will not be washed or ballasted prior to loading,

2. The tanks that are discharged are neither washed or ballasted at sea if the tanker is about to proceed to another port unless it has been confirmed in writing that a reception facility at that port is available and adequate for the purpose of receiving the residues and solvents necessary for the cleaning operations.

For many of 25 year old and older pre-MARPOL tankers, the most attractive option for meeting the requirements of Regulation 13G is to utilise Hydrostatically Balanced Loading. It's estimated that this kind of option to comply with the requirements of the abovementioned Regulation, was of preference for most of the tankers over 50.000 t.dw. currently operating worldwide.

It should be noted that according to OCIMF (Oil Companies International Forum), the application of the Hydrostatically Balanced Loading process to a tanker engaged in performing multi port operations, requires that tanks covering at least 30% of the side of the length of the cargo section should remain empty until the last loading location or they should be unloaded at the first discharge port.

The result of the condition of a tanker in ballast upon its arrival at a loading oil terminal, is the need for a distribution of ballast in such a way to enable the centre tanks and some of the wing tanks to be loaded first.

Consequently, clean ballast should be loaded to wing tanks, which have a higher percentage of shadow sectors which make them more difficult to clean to enable clean ballast to be hosted into them and due to the greater surface area to tank volume ratio, generation of bigger quantities of oil slops would be produced at the end of tank washing, that should be retained onboard and discharged to a suitable reception facility.

Oil tankers which are not provided with segregated or dedicated ballast tanks, carry dirty ballast water during voyage without cargo, which corresponds to about 25% of the deadweight, however during adverse weather conditions, additional ballast up to 10 - 15% of the deadweight may be required (a 30% of the deadweight factor was considered as a safe margin for the abovementioned cases).

Although uptake of water ballast in cargo tanks of SBT tankers can not be excluded in similar weather and sea state conditions, the respective column in the following table it was intentionally left without any entry.

In the following table, a synopsis of the quantities of dirty ballast, tank washings and other oily residues produced from cargo and ballast operations in oil tankers is illustrated.

**Types and quantities of oily mixtures generated from cargo and ballast operations on oil tankers at oil terminals**

| Type of oil mixtures and residues | Oil contaminated ballast (dirty ballast) | Tank Washings | Oil Residues |
|---|---|---|---|
| | Loading Terminals, Ship-repairing Ports & Tank Cleaning Facilities | Loading Terminals, Ship-repairing Ports & Tank Cleaning Facilities | Loading Terminals, Ship-repairing Ports & Tank Cleaning Facilities |
| Crude oil tankers | 30% of Dwt for non-SBT oil tankers | 1.5 - 8 % of Dwt<br>The minimum quantity is related to tankers performing tank cleaning en route to the terminal and arriving with washings wholly accumulated in the slop tanks | 1 % of Dwt |
| Product Carriers | 30% of Dwt for non-SBT oil tankers | 1.5 - 8 % of Dwt<br>The minimum quantity is related to tankers performing tank cleaning en route to the terminal and arriving with washings wholly accumulated in the slop tanks | 0.5 % of Dwt for black oil products<br>0.1 % of Dwt for white oil products |

# 3. METHODOLOGY

## 3.1 Methodology for estimating the volumes of oily mixtures wastestreams

The methodology used for calculating the volumes of dirty ballast and other relevant oily wastestreams from tankers at the ports and oil terminals of the project involved the following tasks:

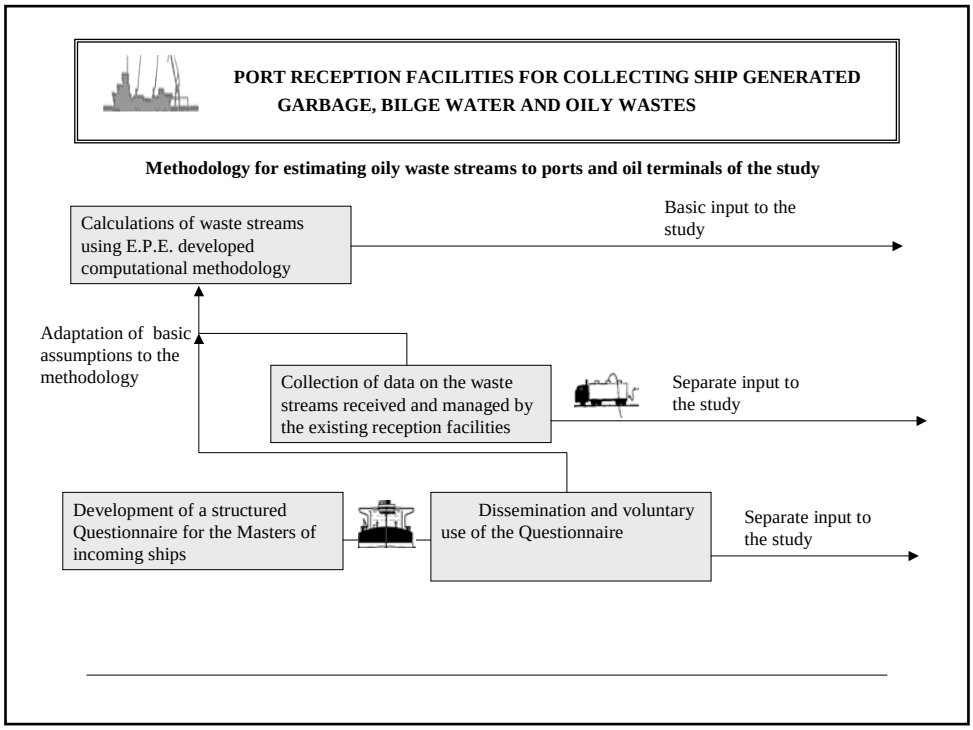
1. Calculation of the volumes of wastestreams by means of a series of formulas, that were developed taking into account:

1a The Guidelines developed by the International Maritime Organization to determine the adequacy of reception facilities for oily wastes from ships, based on the permissible discharge criteria at sea, oil retention onboard requirements and practices, as well as assumptions on waste production onboard ships.

1b Data on terminals specific traffic, collected from the responsible port authorities and/or other maritime-related sources, the berthing infrastructure in relation with the permissible and average sizes of ships, the volume of oil as cargo handled on average, any operational requirements imposed to tankers, etc. Where difficulties were faced with regard to the collection of proper, accurate and detailed data, maximum values were considered to provide safer estimates.

2. Collection of data maintained and provided by the operators of the existing reception facilities with the aim to compare the results taken from the first step and also to adapt better the formulas to the local conditions. In parallel, these data provided a separate input to this Report.

3. A structured questionnaire based on the IMO relevant Guidelines was developed to be disseminated on a voluntary basis, to a number of oil tankers with the aim to capture as much as possible information for their actual needs. It should be noted that a number of factors effected to have a limited input from this task including those related with the specialized and demanding operation of oil tankers in particular at offshore mooring systems, the limited time spent at the terminals, etc. The methodology outlined before is presented schematically below:




The basic formulas used, before any adaptations as explained earlier, in estimating the different oily wastestreams are provided below:

$$\mathbf{D_b = \frac{0.3 \times N_t}{365} \times D_m} \text{ (tons)}$$

$D_b$ = Reduced daily quantity of dirty ballast (tons)

$N_t$ = Average annual number of oil tankers calling at the terminal

$D_m$ = Maximum permissible deadweight of non-SBT oil tankers at the terminal (tons)

$$\mathbf{T_w = \frac{C_t \times N_t}{365} \times D_m \text{ (tons)}}$$

where

$T_w$ = Reduced daily quantity of tank washings (tons)

$N_t$ = Average annual number of oil tankers calling at the terminal

$D_m$ = Maximum permissible deadweight of oil tankers at the terminal (tons)

$C_t$ = Tank washings Coefficient factor varying from 0.015 – 0.08

$$O_w = \frac{C_r \times N_t}{365} \times D_m \text{ (tons)}$$

where

$O_w$ = Reduced daily quantity of oily liquid residues (tons)

$N_t$ = Average annual number of oil tankers calling at the terminal

$D_m$ = Maximum permissible deadweight of oil tankers at the tank cleaning facility or ship - repairing port (tons)

$C_r$ = Oily residues Coefficient factor varying from 0.001 – 0.01

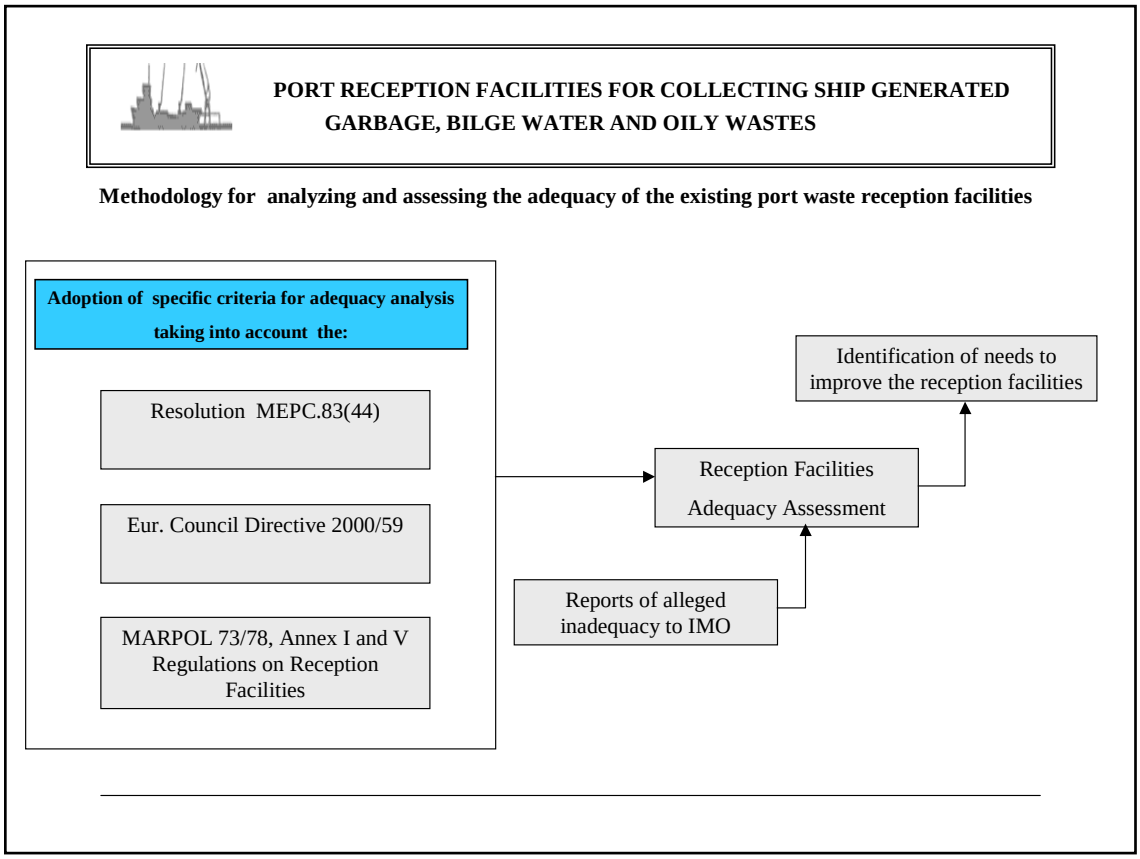
## 3.2 Methodology for analysing and assessing the adequacy of existing reception facilities

Criteria for assessing the adequacy of the capacity and the whole operation of the existing port waste reception facilities were adopted for audit purposes, taking into account the IMO relevant Guidelines provided with the Resolution MEPC.83(44), the requirements of the European Council Directive 2000/59/EC, and the provisions of those MARPOL 73/78 Regulations of Annex I and V that deal with the establishment and operation of port reception facilities within Special Areas.

As explained later, the Sample Assessment Procedure annexed in the abovementioned Resolution was adapted for use during the port surveys and data collection phases, taking also into account the preceding preparatory work.

Recent documentation on the reports of alleged inadequacy provided to IMO by Flag States was requested by the Organization in reviewing and capturing information regarding the ports of the project to enable the further assessment of the adequacy of the existing reception facilities.

The methodology used is presented schematically below:




Resolution MEPC.83(44), provides Guidelines for ensuring the Adequacy of Port Waste Reception Facilities, with the aim:

- to assist Member States in planning and providing adequate port waste reception facilities and,

- to encourage them to develop environmentally appropriate methods of disposing ship – generated waste ashore.

These Guidelines which complement the IMO Comprehensive Manual on Port Reception Facilities, provide information relating to the on-going management of existing facilities but also for the planning and establishment of new facilities.

The Guidelines have incorporated an Assessment Form as an Appendix (Sample Assessment Procedure for Ports - Management/Strategy for waste reception facilities at ports, marinas, and boats harbours), the use of which is encouraged by the responsible State Authorities, independent bodies or assessors. The procedure provides an example of a detailed audit that might be conducted by a consultant, offering a systematic check list of questions designed to obtain information with respect to existing port waste reception facilities, the level of waste collection service provided to port users, the level

of environmentally sound waste handling, valorisation and final disposal practices and methods, etc.

It was deemed as advisable to use in a properly adapted way for the scope of the project, the abovementioned assessment procedure, as an integral element of both the collection of data process as well as of the site surveys at the areas of the ports and oil terminals of the project.

Since, the operation of fixed ship-generated waste reception facilities or more flexible collection and management schemes in the port area is not isolated from the rest of the port infrastructure and the services provided by the ports authorities and operators, many of the Sample Assessment items were incorporated among other things within the two port - specific questionnaires No. 2 (Questionnaire for Oil Terminals involved in the Project) and No. 3 (Questionnaire for Ports involved in the Project) which represent the basic means for collecting input for most of the needs of the project.

- **Criteria for assessing the adequacy of the existing reception facilities**

Two major sets of criteria were identified as more suitable and at the same time critical to assess the adequacy of the existing reception facilities, one dealing with the ship-port interface and a second dealing with the protection of the environment from the secondary wastes or potential pollution produced by the waste collection, treatment and disposal processes.

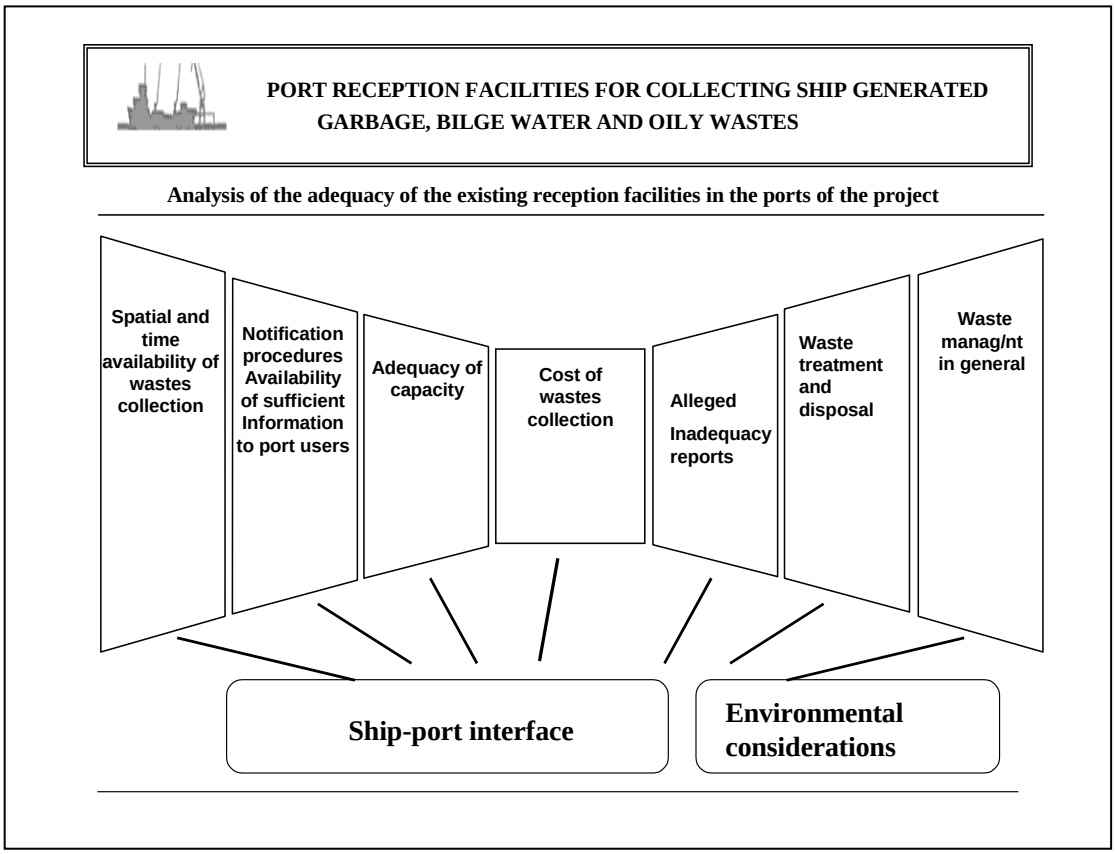
The first set provides a series of criteria emphasizing on the operational needs of ships normally calling at the ports and terminal of the project. There is no doubt that a port to become successful and adequate in providing reception facilities for ship-generated waste, should have regard to the operational needs of its users supplying all the appropriate means to collect and further manage the different types and volumes of wastes from ships normally engaged in operation at its terminals or wider area such as designated anchorages, etc. In parallel, the operation and the management of the existing facilities should not provide any disincentives for incoming ships to use them.

The second set of criteria concentrates on environmental and technical considerations regarding the way that waste collected is managed and finally disposed of, including procedures enabling the wastes' traceability, procedures for complying with national or other standards related with the discharge of effluent water, etc.

The second series of criteria used to enable the assessment of the adequacy of the existing reception facilities, supplements the first one related with the provision of sufficient services to shipping, by attempting to identify whether or not the waste management after the collection in the port or the terminal area is environmentally sound.

Whenever, during the missions in the beneficiary countries or during the information collection process, details of the local or wider waste management strategy and relevant requirements were known, it was almost always feasible to result in safe conclusions on that.

The criteria used to assess the adequacy of the existing reception facilities are, schematically, presented in the following diagram:




- **Spatial and time availability of wastes collection**

This criterion can apply to both dock side port areas as well as to jetties, SPMs or other type of berthing or mooring systems provided in a port or an oil terminal, simply determining the availability of reception facilities in terms of the nominal berthing sites and the immediacy of wastes collection upon the request of a ship to deliver its wastes or residues.

A dirty or clean ballast reception line provided, ideally, at each one of the buoys of a terminal where de-ballasting can normally take place in parallel to the loading of crude oil or oil products represents an example of adequate availability of reception facilities.

In commercial and multipurpose ports this availability can be achieved when almost every nominal berthing place can operate as a site where reception of oily wastes or garbage can take place by either navigable or land-based mobile means. It's important for ships that wish to deliver wastes to an

existing reception facility, that the collection process does not entail any undue delays forcing the ships to change berthing site or in general to spend time beyond the time of their port operation since it is unlikely that a ship would enter a port solely to deliver wastes.

- **Notification procedures – Availability of sufficient information**

Those that provide collection of ship-generated wastes in the ports areas, require, in principle, advance notification of the intention to use the existing facilities, in particular, when a number of qualified and licensed, privately operating, waste contractors provide some or all of the port's waste collection services. Providing advance notification of the type and quantity of wastes onboard for delivery to a reception facility should minimise the risk of undue delay to ships. The importance of prior notification has been already acknowledged in the relevant legislation of the European Communities, resulting in the development and use of a uniform system by the Masters of ships bound for a port located in the Eur. Community.

Prior notification in the form of a standard message (incorporated as Annex II of the 2000/59/EC Directive) should be provided to the port authority or other entity designated to receive this information. It was witnessed during the missions in the ports of the project, that several port authorities have adopted some kind of notification both to provide and receive information from ships with respect to the potential receipt of wastes from them. In any case, it is considered as essential for the Masters of ships that call to a port, to receive information well in advance on the availability or reception facilities, any perhaps operational or waste transfer requirements, fees incurred, etc.

- **Adequacy of collection capacity**

The initial reception capacity which represents the volume of liquid or solid waste that can be received from a ship without causing undue delay, is of predominant importance for ships wishing to deliver their wastes at a port. While the type and characteristics of ship-generated waste determine in principle which treatment method should be applied, the type and volume of wastes expected to receive at a port determine the capacity of the reception facility. Since, the inflow of ship-generated waste is not constant, the abovementioned capacity, in particular for fixed reception facilities reflects the volume of holding tanks or buffering and equalization tanks in which massive oily wastes such as dirty ballast or tank washings are collected before treatment. The holding capacity of these tanks is determined by the average or peak inflows and also the capacity of the subsequent treatment process.

In respect of ship-generated garbage, the collection capacity invariably should match the volumes requested to be delivered and also the segregated kinds of solid wastes as a result of the daily garbage management practices

onboard ships or of the port requirements for hygiene or sorting and recycling purposes. In the same criterion, it is also taken into consideration the interface between the ship and the reception facility to permit a timely delivery of wastes.

- **Cost of waste collection service**

One of the demanding financial aspects of the establishment and operation of reception facilities for collecting ship-generated waste, is the ships' charging system and in general the operational cost. Two principles dominate the basis on which a charging system is built and operates, the selection and use of which requires due consideration of several, mainly local factors.

The first one is the "polluter pays" principle which implies that, those produce the wastes should pay for their reception, treatment and disposal and the second one is the "shared costs" that implies that all costs are covered by governmental financing and other contributions which clearly does not represent a cost recovery scheme. In line with "the polluter pays" principle, the new European Community legislation on port reception facilities, requires the establishment of a fair, transparent and reasonable cost recovery system through which fees collected from ships would be able to cover the cost of the port reception facilities including the treatment and disposal of wastes.

To ensure that the cost recovery systems do not provide any incentives for ships to discharge illegally their waste at sea polluting the marine and coastal environment, three basic rules are adopted to apply to all ocean-going ships calling at a port in the area of a Member State jurisdiction, which are as follows:

| **Fees for ship-generated waste**<br>*(in accordance with Article 8 of the 2000/59/EC Directive)* |
|---|
| ▪ All ships calling at a port of a Member State shall contribute significantly to the costs of reception facilities including the treatment and the disposal of waste received, irrespective of the actual use of the facilities. Arrangements to this effect, may include incorporation of the fee in the port dues or a separate standard waste fee. The fees, may be differentiated with respect to factors such as the category, type, size of the incoming ships, etc.<br><br>▪ The part of the costs which is not covered by the abovementioned fee, if any, shall be covered on the basis of the types and quantities of ship-generated waste actually delivered by the ships.<br><br>▪ Fees may be reduced if the ship's environmental management, design, equipment and operation are such that the Master of the ship can demonstrate that it produces reduced quantities of ship-generated waste. |

In the adequacy assessment procedure, it was not intended to assess or comment on the current charging system at the ports of the project, since numerous, local factors (economic, social, administrative, etc.) should be taken into account to determine whether or not fees collected by ships are reasonable and effective for the level and adequacy of the service provided.

However, in every case where completed questionnaires from ships were collected with the assistance of Port Authorities and analysed, the judgement of their Masters with respect to the sensibility of the fees was only taken into account to provide an input to the assessment.

- **Reports of alleged inadequacy of reception facilities**

The International Maritime Organization has established a reporting system for alleged inadequacies and observed lack of adequate reception facilities under the provisions of MARPOL 73/78. All Parties to MARPOL 73/78, apart from their obligations to communicate to the International Maritime Organization a list of the existing reception facilities in their ports and territories able to collect wastes from ships as defined in the Annexes I and II (in accordance with the Article 11(1)(d) of the Convention), are also recommended to notify the Organization for subsequent transmission to the Parties concerned, of all cases where facilities are alleged to be inadequate.

The format currently used by Flag States for reporting alleged inadequacies of port reception facilities is provided in the MEPC/Circ.349 that revised the previous MEPC/Circ.318. In practice, Flag States are encouraged to distribute the abovementioned format to ships, recommending to Masters to use it to report to their Administration, and preferably to the Authorities of the Port State. Flag States are required to notify IMO of any case where facilities were alleged to be inadequate. It should be pointed out that the response rate of IMO Member states is apparently quite low.

In accordance with the above-mentioned procedure, information on reports concerning inadequacy of reception facilities in the area of the project, was requested and collected by IMO, for the period of the last three years.

- **Serious operational restrictions**

Under this criterion, an effort was made to identify and assess serious operational restrictions (other than those related with the initial reception capacity of the facilities) that could influence the waste collection service provided to ships that normally call at a port. The disposal of oil residues containing for instance lead compounds which can be found in some refined oil products or concentrations of tank cleaning chemicals, entails an advanced treatment which is not always available at the existing reception facilities.

- **Port – based waste treatment**

The collection predominantly, and any subsequent waste management activity in a port area should be carried out in such a way as to prevent pollution of the environment and enhance its protection from secondary pollutants produced during the waste storage and pre-treatment phases that can take place in the port area before the transportation and final disposal of wastes.

The operation of a port facility for collecting oily wastes or garbage from ships should ensure that, in particular, the pre-treatment, or even disposal should be carried out in accordance with any applicable local, national or regional requirements. For the candidate countries to join the Eur. Union, the coherent European Community legislative framework dealing with the disposal of waste oils, the management of hazardous waste and non-hazardous waste, provides already those requirements, standards and recommended options that the treatment, recovery or disposal of ship-generated waste and cargo residues should meet.

As expected, oily wastes reception in most of the ports and oil terminals of the project, was combined with storage, primary separation and treatment aimed to remove oil from water to produce a water effluent that could be discharged at sea provided that any applicable discharge standards are met. At the same time, the second objective of the port passed treatment was the recovery of oil for recycling or re-use. Appropriate technologies or sequences of water effluent treatment steps, can, invariably, ensure the preferable compliance with local or national regulations since discharge of oily wastes into surface waters or in general uncontrolled discharge is prohibited in every country of the project.

While, reception facilities for ship-generated garbage act as a link between the incoming ships to a port and the final disposal sites of the nearby area, oily wastes collection at on-shore facilities and in navigable means such as barges, is combined with storage and primary treatment. What was really assessed to indicate the adequacy of the treatment of oily wastes in a port, was the efficiency of the method and the infrastructure used in relation to the identity of the type of oily wastes collected and processed.

It is widely known that oil derived liquid wastes such clean or dirty ballast, washings from tanks where crude oil or oil products carried, oily bilge water, sludge mainly produced from fuel and lubricating oils purification, used lubricants, etc. make particularly demanding the collection and treatment process since the above mentioned types of oily wastes may include numerous chemical compounds and may have different physical and chemical properties.

Generally speaking, only free oil in oily water mixtures can be removed through simple buoyancy separation techniques while it has been demonstrated that mechanically (produced by mechanical shear forces during mixing or pumping) or chemically emulsified oil (produced due to chemical bonding from the use of surfactants or cleaning agents) needs further treatment.

- **Waste final disposal and valorisation**

Since, disposal of wastes collected from ships is an integral component of the entire waste management system applied in a port or a wider area, the identification and assessment of the existing uses of recovered oil and separated garbage able to be recycled, along with their final disposal, were

the objectives set upon the incorporation of this criterion to the assessment process.

Recovered oil can be used with or without blending with regular fuel oils (provided that its quality meets specific criteria related with the intended use) as supplementary fuel for either the land-based industry or shipping. Certainly, this perspective depends on the local industrial needs including also the operational needs of the combined reception-treatment facilities themselves.

The co-existence of treatment facilities with bunkering stations in the port areas, makes possible the blending of recovered oil with standard types of marine fuels and therefore the supply of a recovered oil based fuel oil, provided that it's accepted from an environmental point of view (absence of hazardous substances the combustion of which could result in harmful air emissions, etc.) and also from a operational safety point of view (e.g. production of potentially corrosive mixtures and sub-products during the combustion process that could cause significant failure at the ships engines and fuel distribution systems). It's worth mentioning that a trend is appearing, initiated by national standardization bodies (e.g. ASTM) to provide standard compositional specifications for recycled oils that are intended to be used as fuel oils.

The fact that modern ships are provided with tanks for retaining used lubricating oils segregated from other oily wastes holding tanks, enables the separate collection and regeneration of used lubricating oils that have gone through their intended use cycle, in areas where local or central infrastructure exists for waste oils re-refining to produce mineral based oils with similar characteristics as the original base oils. Additionally, other requirements are provided with respect to the authorization of those disposing waste oils, the operation of treatment plants, etc. A look at the waste oils management in the European Union countries, demonstrates that 75% of the waste oils generated are collected (including waste oils collected in ports from marine sources), with 50% (of the generated volume) to be used in combustion with energy recovery and the 25% in regeneration processes *(European Topic Centre on Waste and Material Flows, E.E.A., 2002).* In respect of garbage collected from ships, it was endeavoured to identify and assess the disposal route in relation with the available locally recycling options and controlled land-filling facilities since the disposal of garbage is strongly associated with the municipal domestic collection, transportation and disposal systems. The option that dominates the final disposal of the non-hazardous ship-generated garbage in the ports of the project is land-filling in the nearby area around the port.

- **Waste management in general**

Under this last criterion, a number of issues that compose an environmentally sound waste management were attempted to be identified and assessed jointly or on a separate basis, including at least:

- Permit requirements for those that collect, transport, treat and dispose of ship-generated waste collected in ports,

- Procedures for performing surveys of the waste collection providers that operate in the port area,

- Procedures for record-keeping requests from ships to deliver wastes at the port, quantities and types of wastes received and handled,

- Procedures for enabling the traceability of wastes collected from the area of their reception to their final disposal site.

The Directive 2000/59/EC places emphasis on the continuous improvement of the adequacy of facilities by up-to-date waste reception and handling plans in consultation with all relevant parties in particular the port users. In addition, it is recommended that the procedures carried out for the reception, collection, storage, treatment and disposal should conform in all respects to an environmental management scheme suitable for the progressive reduction of the environmental impact of waste handling activities.

# 4. ANALYSIS OF RESULTS

## 4.1 ALBANIA

### A. Introduction

Maritime traffic in Albania is served by a port system that basically comprises the ports of Durres, Vlore, Shengjin and Saranda. Undergoing a revision towards its adaptation to a new economic pattern, the port sector is under the authority of the Transport Directorate of the Ministry of Transport, engaged in almost every aspect of port activities from infrastructure building and maintenance, port management, handling of cargoes, etc. The port of Durres located 40 kms far from the capital town of Tirana handles around 85% of the country's international traffic, while the second port of the country, Vlore, located 90 kms south of Tirana represents a developing port with important fishing activities. The type of the ports involved in the project in relation to the operation of oil terminals is provided in the following table. It should be noted that although none of them, according to MARPOL 73/78 respective criteria, need to receive in normal conditions, dirty ballast, the oil terminals in Durres that present the higher cargo throughput are discussed here:

| **Port** | **Port** | | **Oil Terminal** | | | | |
|---|---|---|---|---|---|---|---|
| | Commercial Port | Port with major ship - repairing and/or tank cleaning facilities | Crude oil | | Oil Products | | Other facilities |
| | | | Loading terminal | Unloading terminal | Loading terminal | Unloading terminal | |
| Durres | ✔ | | | | | ✔ | |
| Shengjin | ✔ | | | | | ✔ | |
| Vlore | ✔ | | | | | ✔ | |
| Saranda | ✔ | | | | | ✔ Not in use | |

The oil and gas sector in the country is administratively headed by the abovementioned Ministry of Industry and supervised from the Ministry of Economy, while the National Petroleum Corporation is the responsible, government entity for hydrocarbons' licensing activities.

Three, separate companies are in charge of petroleum production (Albpetrol Ltd), of handling services and of refining and marketing (Armo).

From the data collected during the mission in the country, it was concluded that only the port of Durres and its associated oil terminals present interest to be studied in terms of the needs of the incoming oil tankers to deliver dirty ballast and other cargo – originated wastes.

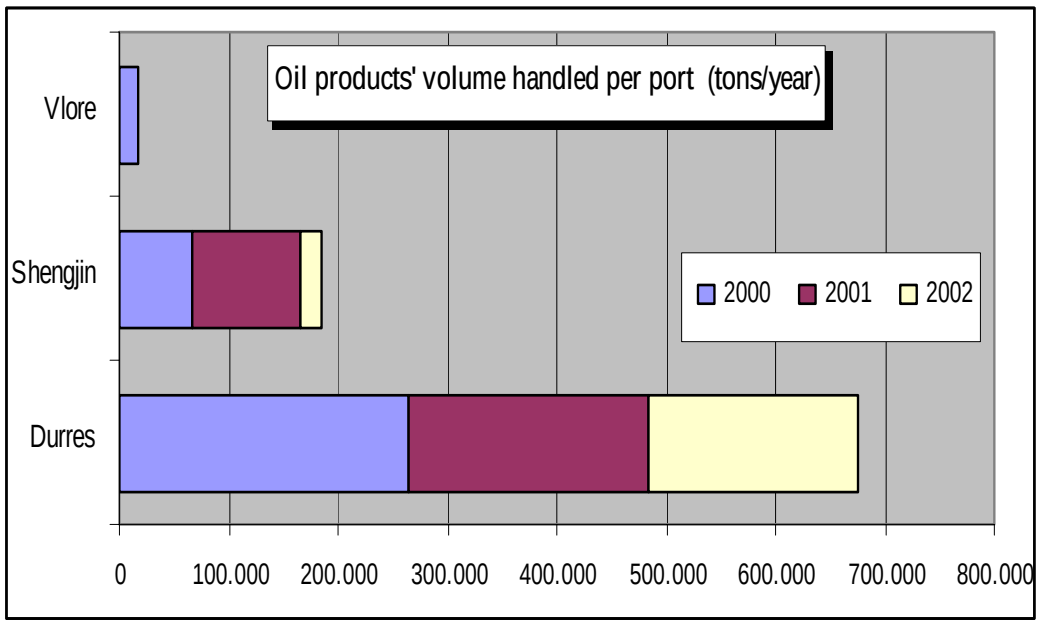
The volume of oil products handled in the ports of Vlore and Shengjin is limited with respect to the minimum volumes of oil identified by Annex I of MARPOL 73/78, as critical for a port or a terminal to provide reception facilities for dirty ballast and other oily wastes from tankers.

It is worth mentioning that reception facilities adequate to meet the needs of the ships using them without causing undue delay should be provided in:

- all ports and terminals in which crude oil is loaded into oil tankers where such tankers have immediately prior to arrival completed a ballast voyage of not more than 72 hours or not more than 1,200 nautical miles, and in,

- all ports and terminals in which oil other than crude oil in bulk is loaded at an average quantity of more than 1,000 metric tons per day.

Since there is no handling (loading or discharge) of crude oil, the average volumes of oil products handled in the ports of Durres, Vlore and Shengjin is illustrated below:




Albania, is not a Signatory Party to the International Convention MARPOL 73/78, however, it has recently taken steps forward to improve the provision of port reception facilities and prevention of ship-generated marine pollution through the adoption of the National Law 8905. It should be noted that in accordance with information provided by the Ministry of Transport and Communications as well as by the Ministry of Environment, the ratification of MARPOL 73/78 by Albania is expected to take place

in the course of 2004, as a result of a strong political will and consensus among the different, responsible parties.

These Annexes of MARPOL 73/78 that contain certain requirements for its Signatory Parties to provide reception facilities are illustrated below:

| MARPOL 73/78 Annex | Kind of pollutant | Entry into force internationally | Status of ratification in Albania | Requirement for provision of Reception Facilities according to MARPOL 73/78 |
|---|---|---|---|---|
| I | ***Oil*** | ✔ | X | ✔ |
| II | Noxious Liquid Substances carried in bulk | ✔ | X | ✔ |
| III | Harmful substances in packaged form | ✔ | X | X |
| IV | Sewage | ✔ | X | ✔ |
| V | Garbage | ✔ | X | ✔ |
| VI | Air emmissions | X | X | ✔ |

While MARPOL 73/78 related Regulations cover a wide spectrum of requirements for ocean-going ships but also for ports and terminals that operate under the jurisdiction of a Party to the Convention, it should be noted that Albania through its effort to regulate the operation of ships in its ports towards the prevention of marine pollution, it has suceeded to have a satisfactory framework for the establishment of reception facilities, in particular, for garbage at almost all ports. The private sector has been improving progressively its services by complying with the necessary technical and operational standards.

The National Law 8905 on the "*Protection of the Marine Environment from Pollutio and Damage",* promulgated on 6-6-2002, aims at the protection of the marine environment of the Republic of Albania from pollution caused in general from human activities at shore or at sea including navigation and transport.

Oil tankers should call at the ports and the oil terminals of the country only with clean ballast while any kind of discharge of hydrocarbons and other harmful substances is prohibited. Important roles for controlling the duties of ships, are given to the Environmental Inspectorate, the Harbour Master Office and other, governmental Authorities. Delivery of garbage or waste oils is becoming compulsory for ships that enter the ports of the country in accordance with the Article 12 of the Law, providing the mandate to the Harbour Master to verify the condition of the incoming ships regarding their holding tanks for waste oils and storage capacity for garbage.

Regulation 740/4 adopted on the 28/6/1999 on the "*Protection of Port maritime areas from solid residues, hazardous substances and hydrocarbons'* pollution", prescribes those materials or substances prohibited to be discharged at sea, deals with how ships will deliver garbage, sewage and oil residues to the authorized companies that provide wastes collection in the ports and determines the requirements that these companies should meet to obtain an appropriate license to operate.

Specifically, Article 4 of the abovementioned Regulation specifies that the best available technology should be provided for collecting and processing garbage including incineration as a method of disposal in land based or navigable means and facililities.

The Law 8094 (21-03-1996) on the "*Public Waste Disposal",* deals with the role, conditions and duties of the Municipalities of the country to collect, manage and dispose of, solid wastes generated ashore from urban or other areas.

In addition, the 2000, Law on the Organization and Functioning of Local Government obliges villages and municipalities to be involved in waste management (collection, transport, treatment and disposal) at local level.

The 2002, "*Law on Environmental Protection*", contains several provisions on the waste management defining its basic objectives and obligations. Physical and legal persons are obliged to employ processes and techniques that pose no risk to human health, water, air, soil, plants and animals. Special attention is given to the import, transport and handling of hazardous substances including wastes in consistency with the 1993 Law on Environmental Protection which had defined as hazardous waste in accordance to the EU Council Directive 91/689/EEC and also the Basel Convention. Further, in 2003 a number of relevant, legal instruments were approved, supplementing and enhancing the existing framework (Law on the Environmental Management of Solid Wastes, Law on the Environmental Treatment of Used Waters, Law on the Environmental Impact Assessment and Decision of Council of Ministers on the Rules and Procedures for Waste Importing for the purposes of Recycling and Processing).

It should be noted that several authorities are involved in waste management and basically, the Ministry of Environment, the Ministry of Industry and Energy, the municipalities and the private sector, which is particularly active in the ports of the country.

## B. Analysis of Durres-based oil terminals

| A. General Information | |
|---|---|
| **Port** | Durres |
| **Terminal Operators** | Global Petroleum, Mamidoil, Kastrati and Evroil |

| B. Type and operation of the port |
|---|

The oil related activities in the port of Durres take place exclusively in the zone of the Durres Port Fuel Handling and Storage Facility where four oil products storage and distribution companies operate their own facilities, as follows: Global Petroleum, operating in the northeast part of the zone, provides 12.000 cub. meters storage capacity for mainly diesel and gasoline allocated in five cone and floating roof tanks filled from the fuel pier in the port area via two pipelines 8" and 6" which are left with ballast water from ships when empty of cargo. The facility serves only oil products receiving purposes, which are discharged to road tankers for further distribution. It should be noted that a 200 cub. meters capacity tank is provided for retaining clean ballast water.


*Fig.1 Global Petroleum tank farm*

Mamidoil, operating in the southwest part of the zone, provides 12.150 cub. meters storage capacity for similar white products and kerosene in its tank farm and also a 45 cub. meters capacity fixed roof tank for clean ballast holding purposes.


*Fig.2 Mamidoil tank farm*

Kastrati, basically provides 6.000 cub. meters capacity in a two, cone roof tanks.

*Fig.3 Kastrati tank farm*

Evroil located on the northwest part of the zone, provides 8.000 cub. meters storage capacity in its tank farm.



*Fig.4 Evroil tank farm*

All the above facilities, use the same loading pier located 300 meters from the foot of the east breakwater, each one having its own ship connecting hose and pipeline header at the end of the pier. In parallel, each one of the facilities use a common pipeline alignment between the pier and their tank farms and containment basins. On average 265.000 tons of oil products are discharged annually in the port, the total traffic of which and its associated handling of goods is illustrated below:

| Year | Total number of ships | Containerised cargo throughput *(TEUs)* | Oil products throughput *(met. Tonnes)* | Bulk liquids other than oil throughput *(met.Tonnes)* | Solid bulk and general cargo throughput *(met. Tonnes)* |
|---|---|---|---|---|---|
| 2002 | 1.098 | 1.024 | 265.000 | 11.000 | 1.556.000 |
| 2001 | 1.089 | 81 | 219.000 | 2.000 | 1.400.000 |
| 2000 | 1.142 | 354 | 192.000 | - | 1.419.940 |

Since all of the above-described facilities operate as white oil products receiving stations, there is no need for the incoming oil tankers to deliver dirty ballast, tank washings or slops retained onboard apart from only exceptionally cases.

It should be noted that the two separate piping of Global Petroleum, the single line of Mamidoil and also of Evroil is filled with clean water ballast from ships when they are not engaged in loading operations.

All oil shipments are preceded and followed by a piping pig to maintain their qualities and isolate them from the ballast water. The 200 and 45 cub. meters respectively, tanks of the two first facilities, designated to receive clean ballast can also retain drainage and leakages from the tank farm and its containment basin.

*Fig.5 Drainage treatment facility and oil storage area of Gl. Petroleum*

Global Petroleum separates the mixtures formed by clean ballast and drainage through an underground API separator provided to treat any contaminated water prior to release and following testing that verifies the suitability for discharge.

In Mamidoil facility, clean ballast and drainage are collected to the tank mentioned above, to be separated in an aboveground oil water separator, tested for subsequent discharge provided that a permissible oil level is achieved.

## C. Existing reception facilities for oily wastes

Collection of oily wastes from almost all ships calling at the port of Durres including those that discharge oil products at the petroleum zone of the port, is carried out by the privately operating companies Pastrimi Detar Durres sh.p.k (P.D.D.) and Joni sh.p.k. which provide barges and road, vacuum tankers for ships at anchor before docking and ships pierside.

The treatment facility operated by P.P.D. sh.p.k consists of a 20 tons/day, two phase treatment process involving heating to enable the oil water separation and an air induced phase to optimize oil recovery and water effluent treatment.

*Fig.6 Oil treatment facility in Porto Romano*

The treatment facility of Joni sh.p.k. consists of a three phase process able to accomplish a 500liters/hour treatment rate. It should be noted that in 2002, it was reported that 22 ships actually delivered oily wastes to the available reception facilities.

*Fig.7 Oil storage farms, treatment facility and greenhouse heated from recovered oil*

## C. Conclusions & Recommendations

As explained in the beginning, the oil terminals in Durres do not need to receive dirty ballast due to their oil receiving mode of operation. Detailed discussion and results for the adequacy of the existing reception facilities for oily wastes from the machinery spaces of ships, in Durres and the other three ports of Albania has been incorporated in the Report produced for the Activity 1 of this project. A rough summary, basically related with the management of oily wastes in general and the existing legislative framework, is presented here.

Albania is not a Party to the International Convention MARPOL 73/78. By ratifying and implementing MARPOL 73/78 and its mandatory Annexes I and II, Albania will offer the opportunity to the ocean-going ships to perform operational discharges at sea according to the Convention permissible criteria, thus preventing cases, where due to the prohibition of any discharge at sea, shipboard holding tanks are brought to their completeness levels, negotiating illicit discharges where facilities are not available.

The existing, privately operated, reception facilities for oily wastes in the port of Durres are providing a good service to ships, meeting sufficiently their needs in terms of capacity, service quality and fees charged. Both two companies employ land based and navigable means enabling collection of oily wastes from ships berthed quayside and at anchor. The available collection scheme provided by the two companies in combination with the procedures followed by the Authority of the port in respect of the requested prior notice from ships, service monitoring, etc. has succeeded to encourage a high percentage of ships to deliver their wastes at the port.

The concern should be shifted, in the subsequent management of oily wastes in the treatment facilities and in particular the future use of oil recovered, the sludge produced from the mild process techniques and the water effluent.

The International Convention MARPOL 73/78 and its related Annexes including those of Annex I and V, do not provide details for the disposal of ship-generated wastes to reception facilities, therefore the proper handling and management of them remains to be achieved in compliance with the local rules and legislation.

Bilge water and sludge produced in the machinery spaces of ships represent a kind of liquid waste, usually heavily contaminated with fuel and lighter oils, pollutants such as inorganic salts, metals, sea water, etc. Similarly regardless of the hydrocarbons' concentration, oil contaminated ballast and tank washings may contain pollutants such as residues from crude oil, fuel oils and other oil products carried as cargo on oil tankers. Taking into account the IMO recommended practices for new buildings, waste oils such as used or exhausted mineral – based lubricating oils, which have become unfit for use, could be contained in separate tanks from those where sludge or drainage is stored.

It should be noted that oily wastewater mixtures in general and waste mineral oils are distinguished for the purposes of the:

a) Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Waste and their Disposal, where in Annex I (Categories of hazardous wastes), the following categories are given:

Y8 Waste Mineral oils unfit for their originally intended use

Y9 Waste ois/water, hydrocarbons/water mixtures, emulsions

- Protocol for the Prevention of the Mediterranean Sea against Pollution from Land Based Sources and Activities, where in Annex I, C, the following categories of substances are given:

6. Used lubricating oils

10. Crude oils and hydrocarbons of petroleum origin

Two items that were considered to be essential for identifying the favourable level of treatment were as follows:

a) Discharge of effluent water from port-based reception and treatment facilities

Discharges of effluent water produced during treatment of oily wastes can be considered as point source, industrial discharges, the authorization and control of which can be dealt with, in the framework of the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and certainly in accordance with any national or local existing regulations.

Unless wastewater reclamation is to take place, the basic, recommended principle that must be taken into account, is that the resultant effluent water should be subjected to such a treatment that discharges directly at sea or into an existing sewage network have the prescribed concentration limits for petroleum hydrocarbons but also for other pollutants that are likely to be present.

b) Treatment and final disposal of oily wastes

Generally, oily wastes can be recovered and recycled, either directly in the case of high oil content wastes or after some form of separation and concentration from high aqueous content wastes such as dirty ballast. While certain types of oily wastes such as waste mineral oils in particular, can be subjected to regeneration processes which give products of comparable quality to the original base material, a large volume of oily wastes is used for its energy potential as a secondary or substitute fuel.

# 4.2 CROATIA

## A. Introduction

Maritime transport plays an important role in the international trade and development of Croatia, promoting and supporting local industry and tourism and enhancing the role of the country as an integral link of the energy and products' supplying system to the european and world markets.

As stabilization in the wider region is progressively achieved, recovery of maritime transport, exports and cargo throughputs similarly has been taking place, while at the same time numerous plans and feasibility studies, related either with the transport of crude oil by sea or the integration of the commercial ports to the pan-european land - based routes demonstrate the potential for further development of the port sector.

Croatia aims at attaining full European Union membership, working already successfully on the fields of the protection of the environment and maritime transport, which are strongly related with the objectives of this project.

Being already a member of international organizations and a signatory Party to the International Convention MARPOL 73/78, it was witnessed by the Consultant during the mission in the country, the high professionalism and dedication of the port Authorities, the coherent legislative framework and the satisfactory provision of reception facilities for ship-generated waste in the ports and terminals that were studied.

The private sector that provides services to both shipping and ports with regard to ship-generated waste collection and management is well established, being transformed to a high standards operating sector in particular to Croatian ports open to international traffic.

In this report, the Krk based, dedicated oil terminal of Omisalj as well as the ports of Rijeka, Ploce, Split and Zadar which currently present oil related activities are discussed.

An attempt was made out to examine the future needs of oil tankers that are expected to call at the Omisalj terminal, following the beginning of its operation as a crude oil discharging facility, and also to assess those needs related with the two oil terminals in Ploce.

Basically, for the ports of Rijeka – Bakar, Split and Zadar the existing, adequate facilities for collecting occasionally dirty ballast and tank washings are reflected.

The abovementioned ports are indicated in the following table:

| Ports involved in the project | Port | | Oil Terminal | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Crude oil | | Oil Products | | Fuel Oil fired power plant | Other facility |
| | Commercial Port | Port with major ship - repairing and/or tank cleaning facilities | Loading terminal | Unloading terminal | Loading terminal | Unloading terminal | | |
| Omisalj | | | √ *1 | √ | | √ | | |
| Rijeka | √ | | | √ *2 | √ | √ | | |
| Ploce | √ | | | | √ | √ | | |
| Split | √ | | | | √ | √ | | |
| Zadar | √ | | | | √ | √ | | |

*[1] It indicates the future operation of the Omisalj terminal as a crude oil discharging facility to oil tankers*

*[2] It indicates the operation of the Bakar based oil refinery which is supplied with crude oil through the Omisalj terminal and not from crude oil tankers directly.*

## B. Legislative framework dealing with the provision of port reception facilities and waste management

Croatia is a signatory Party to the international Convention of MARPOL 73/78 and its I to V Annexes dealing with the prevention of ship-generated pollution from oil, noxious liquid substances, sewage and garbage as illustrated below.

| MARPOL 73/78 Annex | Kind of pollutant | Entry into force internationally | Status of ratification in Croatia | Requirement for provision of Reception Facilities according to MARPOL 73/78 |
|---|---|---|---|---|
| I | ***Oil*** | √ | √ | √ |

| | | | | |
|---|---|---|---|---|
| II | Noxious Liquid Substances carried in bulk | √ | √ | √ |
| III | Harmful substances in packaged form | √ | √ | x |
| IV | Sewage | √ | √ | √ |
| V | Garbage | √ | √ | √ |
| VI | Air emissions | x | x | √ |

The government of Croatia has adopted a number of regulations and other instruments which deal with the provision of port reception facilities including waste management, which are as follows:

- Law on Environmental Protection ("Official Gazette",No.82/94 and 128/99),
- Maritime Law ("Official Gazette",No.17/94 74/94,and 43/96),
- Sea Port Law ("Official Gazette" No.108/95, 6/96, 97/00),
- By law on handling dangerous substances, loading and unloading dangerous substances, bulk cargo and other cargoes in ports ("Official Gazzette"No.108/95),
- By law on waste categories ("Official Gazette", No 27/96).

Discharge at sea of oily water mixtures from the machinery spaces of ships and garbage might be carried out in the jurisdictional, navigable marine waters of the country in compliance with the respective criteria of MARPOL 73/78.

Port Authorities are responsible to organize and provide reception facilities for ship-generated wastes. According to Sea Port Law No. 108/95, 6 (96 & 97/2000), basically all ports open for international traffic are required to provide reception facilities and namely those of Rijeka, Zadar, Split and Ploce.

Sea Ports Law lays down criteria for classifying the ports of the country , it delineates the activities and the basis that they can be provided in the port area, the obligations of the respective port Authorities, port tariff, issues related with the construction of ports infrastructure and superstructure, etc.

With respect to the classification of ports in terms of their purpose of operation, these are divided into ports open to public traffic (ports which can be used by any physical or legal person) and to special ports which are those serving the specific purpose of a company formed under the Business Corporation Act of the Republic of Croatia, other legal or physical person such as an industrial port, shipyard, etc., or a state body.

In terms of the size and the importance for the country, ports open to public traffic are divided into:

1. ports of particular (international) economic interest for the country,
2. county ports
3. local ports

Similarly, a special port can be a port with national significance or significant to counties. Activities in ports open to public traffic include mooring and unmooring of ships, loading, discharge and transhipment of commodities, embarkation and disembarkation of passengers, other commercial operations. Reception of ship-generated waste can be considered as a potential activity strongly related with the pollution prevention which can be performed on the basis of concessions granted to companies following a public tender called for by the port authority.

It should be noted that the Sea Port Law provides for the development, adoption and use of:

- basic technological and technical requirements which a company carrying out a particular port activity should meet including conditions in respect of professional qualifications of its employees, financial status,
- procedures, criteria and time limits relative to the issuance and revoking of a concession, determination of the amount of concession fee, etc.

Companies engaged in performing port activities in ports open to public traffic are being under an effective and systematic control by the Port Authorities which at least twice a year examine the annual operating schedule of those companies, while at the beginning of each year, any new needs related with the provision of port services are identified to proceed with the necessary granting of concessions.

The Authority of a port open to public traffic is a non-making profit organization in charge of the administration, construction and utilization of the port in a number of operations which include also the provision of services of common interest for the port users.

Assuming that the collection of ship generated waste in a port area constitutes a port service or operation, its physical (excluding any administrative work) work can be carried out:

- either by the port authority itself by establishing one or more companies (this is valid for activities such as fire-fighting and fire-protection of the port area, dangerous cargoes handling, etc.) shares or contributions of which can be offered for sale in the amount of up to 49% of the basic capital of the company), or

- by privately owned and operated companies on the basis of concessions granted to this effect.

Ships calling to the ports of the country are required to deliver garbage and cargo associated waste. Waste produced from the operation of ships are collected by the designated reception facilities following a request in advance from ships. It should be noted that in certain ports, contracts between the operators of these facilities and local shipping companies have been in place, optimizing the collection rates.

The Ministry of Environmental Protection and Physical Planning and the Ministry of Maritime Affairs, Transport and Communication are the responsible authorities of the country for the planning, control and implementation of the waste management strategy in ports. The Ministry of Environmental Protection and Physical Planning is engaged in developing and proposing legal acts dealing with waste management stemming either from national obligations against international or regional treaties but also from national and local needs, in controlling transboundary waste transport, in cooperating with other national, county and local authorities, institutions and international organizations, etc.

For those waste products listed or designated in the LBS Protocol to the Barcelona Convention and also in the Law on Waste (O.G. 34/95), a management strategy has been adopted emphasizing on issues such as treatment or disposal targets, technical standards for collection, transport, treatment, etc. The legal instruments that provide this agreed strategy are the following:

Law on Waste (O.G. 34/95) is the main legal act which establishes the rights, obligations and responsibilities of legal and physical persons, local self-government and administration units in waste management. The Law provides conditions for performing waste management duties, generally dealing with issues of separate collection and storage of waste, packaging waste, transport of industrial waste, record-keeping, hazardous waste and its storage, transport and record-keeping, locations for construction of waste storage, treatment and disposal facilities, import, export and transit of waste, financing of waste management as well as supervision activities and penalty provisions.

By-Law on Requirements for Handling Hazardous Waste (O.G. 32/98) determines technical and technological equipment of the facilities used for storage, treatment and disposal of hazardous waste as well as necessary qualifications for handling of hazardous waste.

Rule Book on Waste Management Requirements (O.G. 123/97) determines the specifications of the equipment used for storage and treatment of wastes, of waste landfills, technical conditions for construction, manner of operation, closing of the waste landfill, time period for improvement for existing waste landfills and specialised equipment for performing waste management, etc.

Rule Book on Waste Types (O.G. 27/96) prescribes waste types in accordance with their characteristics and origin, ways of handling of certain wastes, ways of delivering data about waste handling, testing of chemical and physical characteristics of hazardous waste, waste sampling, content and appearance of documentation as well as penalty provisions.

Rule Book on Container Waste Management (O.G. 53/96) provides for the way and conditions that this kind of waste should be collected and managed including labelling and disposal activities.

Law on Hazardous Waste Transport (O.G. 97/93) regulates the transport of hazardous wastes while the Rule Book of Hazardous Waste Road Transport (O.G. 54/95) regulates the road transport of hazardous waste, encompassing hazardous waste preliminary treatment for transport, preparation of vehicles for hazardous waste transport, transport documentation, special security measures in case of accident and supervision, etc.

The collection, pre-treatment in the port area, treatment, transport and disposal of oily wastes from ships is addressed by the legislative framework formed basically by the Law on Waste, Law on Hazardous Waste Transport, the Maritime Code (O.G. 17/94, 74/94, 43/96), By Law on handling dangerous substances, loading and unloading of dangerous substances, bulk cargo and other cargoes (O.G. 108/95) as well as the Contingency Plan for marine pollution in cases of Emergency (O.G. 8/97).

Oily wastes from shipping sources are considered and classified as hazardous wastes.

An effective licensing and supervision scheme for those collecting, treating and disposing of oily wastes, based on certain criteria including the following has been in place.

- Technical capability (means, equipment and personnel), to handle the anticipated types and volumes of waste oils delivered at port,
- Compliance of the equipment used with the relevant technical requirements,
- Approval of the environmental terms,
- Working experience and competence,
- Proper treatment, valorization and disposal methods

It should be noted that a Pilot Project titled *"Development of economic instruments regarding collection, transport, treatment and disposal of used oils and oily waters from ships in the Adriatic region/Pilot project for Kvarner Bay"* is under progress. Its main objective is to set up an organized and adequate system of collection, transport, treatment and discharge of used oils and oily waste from ships entering the ports and to identify an optimum way for implementing acceptable economic instruments to this effect. This Pilot project is coordinated by the Ministry of Environmental Protection and Physical Planning within the framework of UNEP/MAP Strategic Action Programme for the Mediterranean.

## A. General Information

| | |
|---|---|
| – **Port** | Ploce |
| – **Port Authority** | Port Authority of Ploce |
| - **Oil Terminal Operators** | Energopetrol d. d., & L.P.T. |

## B. Type and operation of the port and oil terminals

The natural port of Ploce is located at $43^0$ 42' N, $17^0$ 26' E in a bay, three kilometers from the mouth of the river Neretva. The port provides specialized terminals for bulk dry and liquid cargoes and other packaged cargoes able to accommodate vessels up to 220 meters LOA and 10.50 meters draft offering also good railway connections to north (Ploce to Warsaw), to northeast (Ploce – Bucharest) and northwest (Ploce – Vienna).

In the 2001- 2003 long term development plan of the port, the buiiding of a new container terminal has been given particular emphasis and support, stemming from the perspectives that appear upon the construction of the pan european road (Pan European Transport Corridor V) from Budapest – Osijek, Sarajevo and Ploce which is expected to provide to the port an additional traffic importance within the combined transport with all Danube countries and also with south areas of Italy. It should be noted that the currently available maximum throughput of the port for handling containers is about 20.000 TEUs. The port consists of the following dedicated terminals:

- A 705 meters long and 9.2 meters deep, general cargo terminal where basically foodstuffs, cotton, tobacco and finished or semi finished products are handled.

- A 510 meters long and 10.5 meters deep bulk freight terminal which normally accommodates coal, iron ore, cast iron and scrap iron carriers.

- A 20.000 tons capacity hydrated alumina silo and a loose load terminal where wheat, corn, soya and other cargoes are handled, reloaded and packed.

- Two oil terminals in the Vlaska channel, operated by Energopetrol and L.P.T. respectively.

The Energopetrol d. d. operated oil terminal provides a jetty, 12 meters deep and a 102.000 tons capacity tank farm for storing fuel oil, white oil products, as well as other petrochemical products. On average, it normally receives 3.000 tons of oil products from one tanker on a weekly basis. The maximum size of tankers that can be accommodated at the jetty is 30.000 tons deadweight with a maximum draft 9.0 meters.

The products handled, the storage and the discharging throughput capacities of the terminal are provided in the following table:

| **Product** | **Available storage capacity** ($m^3$) | **Nominal cargo handling throughput** (tons/hour) |
|---|---|---|
| Fuel Oil | 40.000 | 1.000 |
| Petrol and other white products | 20.000 | 350 |
| Sodium Hydroxide (NaOH) | 17.000 | 400 |
| Petrochemicals | 15.000 | 250 |

It should be noted that the terminal is almost exclusively engaged in oil and other products receiving activities, thus eliminating the need for receiving dirty ballast from mainly non SBT tankers. However, it was attempted to estimate the potential waste streams from the oil handling operations based on the scenario of mandatory delivery of the entire volume of cargo or engine - room associated oily wastes retained onboard. The latter has a value in case of any potential change of the existing traffic pattern of the terminal and its strong relation with the INA operated refinery in Rijeka.

Terminal: Energopetrol
Port: Ploce

- Estimates of ship-generated oily wastes and residues that could be received at the port/

| ***Oily wastes*** | Dirty ballast | Tank washings - | Oily bilge water | Oil residues (sludge) and other waste oils |
|---|---|---|---|---|
| Reduced daily volume ($m^3$/day) | - | 6.4 | 0.8 | 0.4 |
| Average annual volume ($m^3$/year) | - | 2,340.0 | 300.0 | 150.0 |
| Maximum volume to be received per ship/arrival ($m^3$) | - | 300.0 | 15.0 | 30.0 |

Luka Ploce Trgovina, Liquid Products Terminal (L.P.T.) operates also in Vlaska channel which consists of a double hull barge 150 meters LOA, 25.72 meters moulded breadth and 14.1 meters depth equipped with a sophisticated, external, starboard skid - placed piping system through which loading and unloading of a variety of oil products destined mainly for the local market is enabled.

## C. Existing reception facilities and recommendations

Since the establishment of the Energopetrol terminal, a separate 4", 5 bar maximum working pressure, 500 meters long line has been provided to collect tank washings from the incoming tankers for subsequent storage in a 400 cub. meters, open - roof cement tank. Oily wastes pumped from the storage tank are treated at an open oil water interceptor coupled with its associated tank for separated oil and sludge collection arrangements.

The existing holding and buffer tank as well as the oil water interceptor constitute an old technology as a primary stage treatment for tank washings or other mixtures produced from tanker operations (including also oily water mixtures from the machinery spaces), basically due to the escape of light hydrocabrons in the atmosphere which are likely to endanger those engaged in monitoring the process, skimming the oil, operating the pumps, etc.

While the today's operation of the terminal is related with products' receiving activities, the provision of a closed steel tank instead of the existing one and the replacement of the existing interceptor with another - probably demulsifying separation unit - coupled with sludge treatment facilities are deemed as necessary. A rehabilitation of the existing waste oil reception and treatment facility is recommended.

A new, steel, fixed rood tank, at least of 550 cub. meters is proposed to built to provide storage and initial settling of oily wastes and tank washings from oil tankers. A new waste water treatment facility consisting of an, in series, industrial type mechanical separator, a chemical treatment plant able to offer a quality of effluent water in consistency with the permissible outflow criteria at the channel or at any other natural receiving system and finally arrangements for treating sludge produced during the whole process as well as from the tank farm routine cleaning.

With respect to L.P.T. operated floating storage terminal, it was reported that four tanks of a 800 cub. meters capacity are provided for receiving slops. It should be noted that the facility is a modern one, automatically controlled which has taken all the necessary measures to prevent pollution at sea. Since no discharge at sea is allowed, slops and other drainage retained onboard are pumped out to a quey-side sump and subsequently to tank vehicles operated by the local, waste oils management companies.

| **Port** | **Type of Facility** | | | **Oily wastes received from the facility** | | | | | | | | | | | | **Operational restrictions on the use of the facility** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fixed | Land based Mobile | Navigable Mobile | Dirty ballast water | | Tank washings | | Chemicals contaminated oily mixtures | | Scale and sludge from tanker cleaning | | Oily bilge water from machinery spaces | | Oily residues from machinery spaces *(sludge)* | | |
| | | | | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | |
| Ploce, Vlaska channel | √ | | | 400 **(1)**<br>800 **(2)** | | 400 **(1)**<br>800 **(2)** | | - | - | * | - | 400 **(1)**<br>800 **(2)** | | 400 **(1)**<br>800 **(2)** | | No chemicals contaminated wastes can be received |

| **Reception facility Operators** | **Description of the facility** | **Method of treatment of oily wastes** | **Charging system** | **Other remarks** |
|---|---|---|---|---|
| **ENERGOPETROL d.d (1)**<br><br>**L.P.T. (2)** | Both two terminal operators provide reception and treatment facilities for any occasional needs of incoming tankers to discharge dirty ballast, tank washings and other oily residues. Discharge to Energopetrol d.d. facility is carried out through a 4", 5 bar (MWP) and 500 long piping from its jetty in Vlaska channel. | Mechanical settling and separation only, No secondary treatment of waste water. | No available information | |

## A. General Information

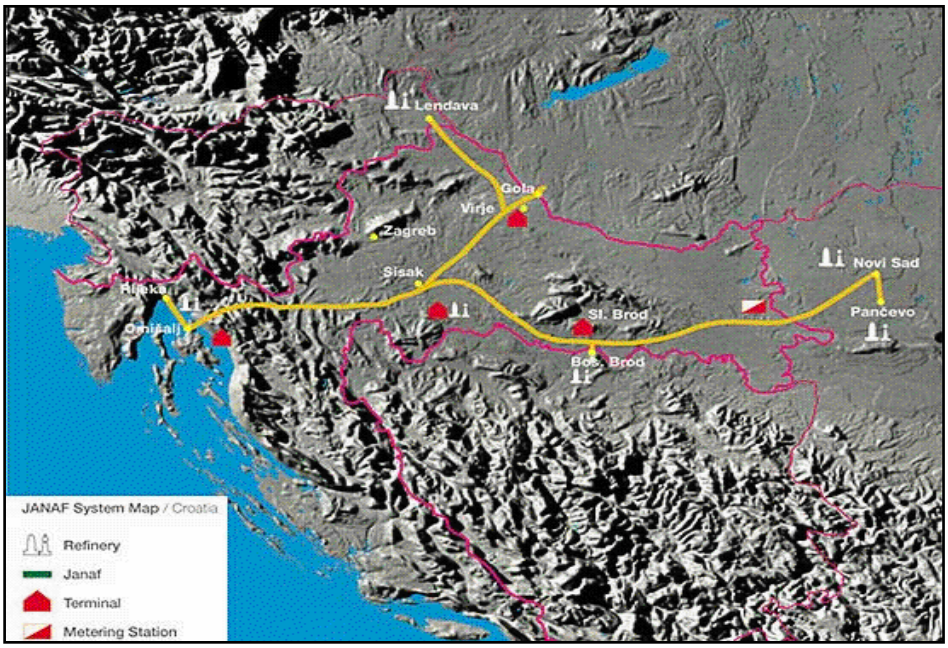
| | | |
|---|---|---|
| – | **Port** | Omisalj |
| - | **Oil Terminal Operator** | JANAF plc. |

## B. Type and operation of the oil terminal

The JANAF d.d. operated oil terminal is located on the northern side of the island of Krk of Croatia, in a well protected area within the Bay of Omisalj. It is an integral component of the entire JANAF system which constitutes an extremely important transport system for crude oil to local and foreign refineries in Eastern and Central Europe, as it is connected to the Druzba pipeline via the Adria pipeline supplying a number of refineries in Croatia (Rijeka and Sisak), Hungary, Slovakia and Czech Republic.

The whole system is currently consisting of:

- the crude oil terminal in Omisalj on the island of Krk,
- a 759 kms long piping which link Omisalj - Sisak, Sisak – Virje – Gola (Croatian – Hungarian border), Virje – Lendava, Sisak – Slavonski Brod – Sotin – Novi Sad – Pancevo, and
- a 7.2 kms long piping, basically submarine between Omisalj and INA operated oil refinery in Rijeka.




It should be noted that two, extremely significant energy projects can drastically change the crude oil receiving mode of operation of the Omisalj terminal to a discharging one. Firstly, through the materialization of the Druzba Adria project, 5 million tons annually (to progressively become 10 and 15 million tons per year) of crude oil from the Russian Federation will be exported

from the Omisalj terminal. It is reported that all necessary procedural prerequisities are met (following the signing of a number of agreements among all interested parties) and at the time being, the technical and commercial issues are studied to provide the final reverse flow operational scheme.

In addition, through the materialization of the South East European Pipeline, crude oil from the Caspian region is intended to be transported from the oil producing countries in the Caspian basin to the ports of Black Sea, then through matirime transport to the east Romanian coast and finally through the established infrastructure of JANAF system to the european and world markets.

Coming to the oil terminal in Omisalj, two deep water jetties (30 meters depth) can without any restriction accommodate any size of tanker. At each berth, there are 4 loading/discharging arms dedicated for crude oil that provide a flow capacity of 5,000 $m^3$ each, in total 20,000 $m^3$ per berth. Only SBT tankers are acceptable in the terminal to conduct loading – discharging operations.

The available, storage capacity for crude oil is 760.000 $m^3$ as follows:

| **Number of tanks** | **Nominal storage capacity** ($m^3$) |
|---|---|
| 4 | 40.000 |
| 5 | 72.000 |
| 3 | 80.000 |
| Total 12 | 760.000 |

The terminal also provides 60.000 $m^3$ storage capacity for oil products discharged currently for internal distribution purposes.

Crude oil storage tanks on the terminal

Only SBT tankers or tankers with clean ballast are allowed to berth in the terminal, the number of which in the last three years period is presented in the following table:

| Year | **S.B.T./D.C.B.T. tankers** | | |
|---|---|---|---|
| | Number of ships | Average deadweight (t.dw) | Maximum deadweight (t.dw) |
| 2002 | 57 | 95.000 | 164.000 |
| 2001 | 55 | 92.000 | 155.212 |
| 2000 | 45 | 96.000 | 152.399 |

| **Type of oil** | **Annual cargo throughput** (metric tonnes per year) |
|---|---|
| Crude oil | 5 .000.000 |
| Gas Oil | 200.000 |
| Gasoline 95 | 100.000 |

## C. Reception facilities for oily wastes from ships & Conclusions

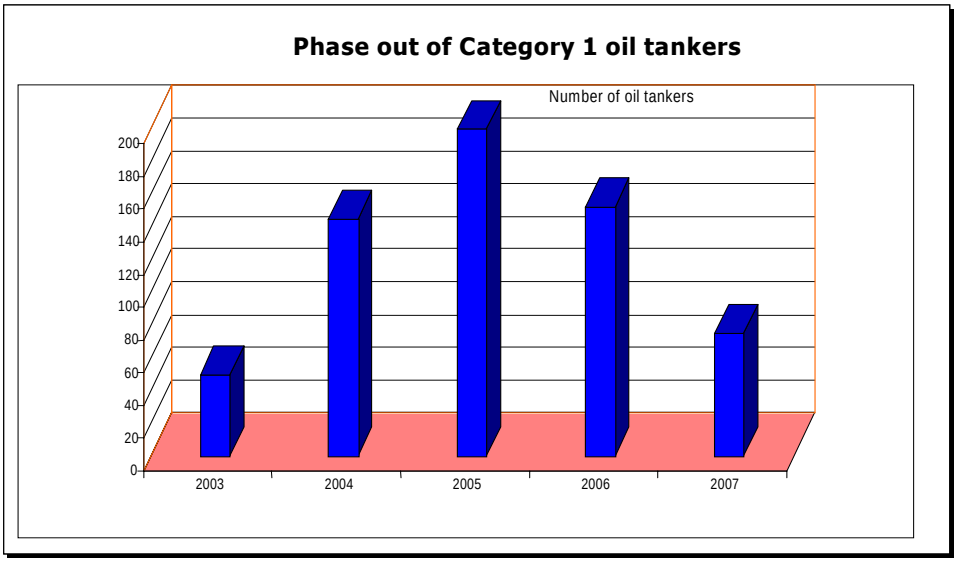
There are no available, fixed facilities for collecting oil residues, tank washings and other oil water mixtures that might be produced and requested to deliver from the incoming oil tankers. Upon request from the ships, the Rijeka based, private companies are called to provide their barges to collect the requested quantities of oily wastes retained onboard.

It should be noted that since the operation of the terminal is as a crude oil and refined products' receiving facility, there is not currently any need to collect dirty ballast from the incoming tankers. The anticipated change of its operation as a crude oil discharging facility, certainly raises concerns over the need that dirty ballast and tank washings to be collected from the oil tankers in ballast condition.

However, taking into account that the average deadweight of tankers that call to the terminal exceed the 20.000 tdw margin and regardless of the policy of JANAF to accept only SBT tankers, it is expected that the revised 13 G Regulation of the Annex I of MARPOL 73/78 will eliminate pre MARPOL, non SBT oil tankers (Category I tankers) from the world scene and the operation in Omisalj.

This category of oil tankers represent those, pre PL - SBT and non double hull oil tankers, which in practice, should be withdrawn by their anniversary date occurring between 2003 and 2007.

According to an INTERTANKO study, it is estimated that about 600 oil tankers falling under the Category 1 representing in total 73 million tons deadweight, will be phased out between 2003 and 2007, reflecting the combined impact of the remnants of the 1970s VLCC fleet and a large number of pre-MARPOL product tankers.




However, SBT tankers will not totally eliminate the need to wash cargo oil tanks or to carry occasionally dirty ballast, since additional ballast (5 – 15% of the deadweight) could be carried in cargo oil tanks, due to severe weather conditions, therefore, such ballast have to be retained onboard, enroute within the Mediterranean Sea area, for final discharge to the available reception facilities.

Invariably, oil tankers arriving in ballast to an oil terminal may also have on board tank washings from tank cleaning before loading ballast or following drainage and stripping of the cargo pumping system which need to be received ashore.

Retention of oil onboard, provides that adequate means shall be provided for cleaning the cargo tanks and transferring the dirty ballast residues and tank washings from the cargo tanks into a slop tank or a combination of slop tanks.

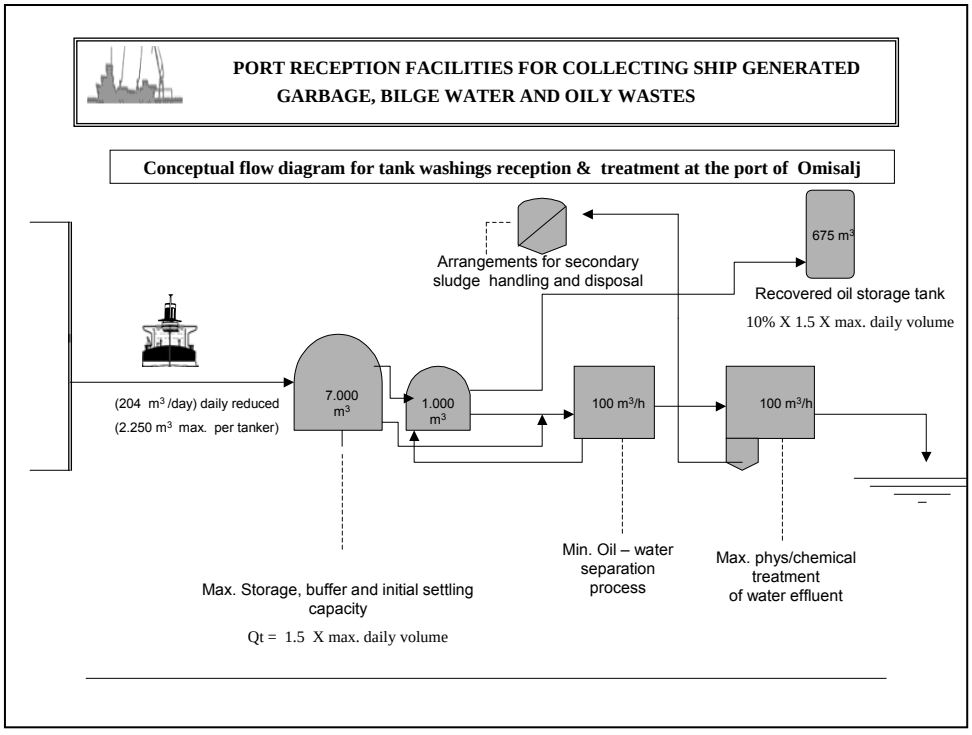
The estimation below has been based on the scenario that following the operation of the terminal as an oil discharging facility, 5.000.000 tons of crude oil will be discharged to thirty three (33) SBT tankers of 150.000 tdw. It was not examined the exceptional case that some of these SBT tankers are likely to take additional ballast in cargo tanks to ensure their intact stability and appropriate trim en route to the terminal, in adverse weather conditions and sea state.

**Terminal: Omisalj oil terminal**
**Country: Croatia**

- Estimates of ship-generated oily wastes and residues that could be received at the terminal

| **Oily wastes** | Dirty ballast | Tank washings | Oily bilge water | Oil residues (sludge) and other waste oils |
|---|---|---|---|---|
| Reduced daily volume ($m^3$/day) | - | 203.4 | 0.4 | 0.6 |
| Average annual volume ($m^3$/year) | - | 74,250 | 150.0 | 247.5 |
| Maximum volume to be received per ship/arrival ($m^3$) | - | 2,250 | 30.0 | 25.0 |

The maximum daily volume of tank washings that could be delivered in the terminal might be as much as 4.500 tons which basically determines the storage capacity of the reception facility plus a safety factor 1.5 (6.750 tons), preferably in the form of one or two, steel fixed roof tanks. A separate piping from each one of the two jetties able to tranfer tank washings of various viscosities (up to 800 x $10^{-6}$ $m^2/s$) at a rate not less than 400 $m^3$/hour should be also constructed. A rough, reception and treatment flow diagram is provided below:



Further study is necessary for the design analysis of both the reception-storage facility as well as the waste water treatment facility taking into account a number of critical parameters such as the quality of effluent water, the quality and the disposal options of the oil recovered from the treatment, the pumping station from the two abovementioned tanks to the treatment facility, the level of the treatment technology that will be employed, etc.

In the above proposed flow reception and treatment diagram, apart from the storage tank/s which also serve initial settling and buffer purposes, another tank where induced heat separation of oil from water will take place is incorporated, a waste water treatment arrangement based on an industrial type oil water separator and a chemical treatment method as well as arrangements for the handling and final disposal of oily sludge produced during the whole process.

It should be noted that, oil contaminated drainage, run off from the tank farm as well as liquid spillages recovered at sea or ashore are collected to a 30 tons tank for further treatment to a gravity separator established there.

## A. General Information

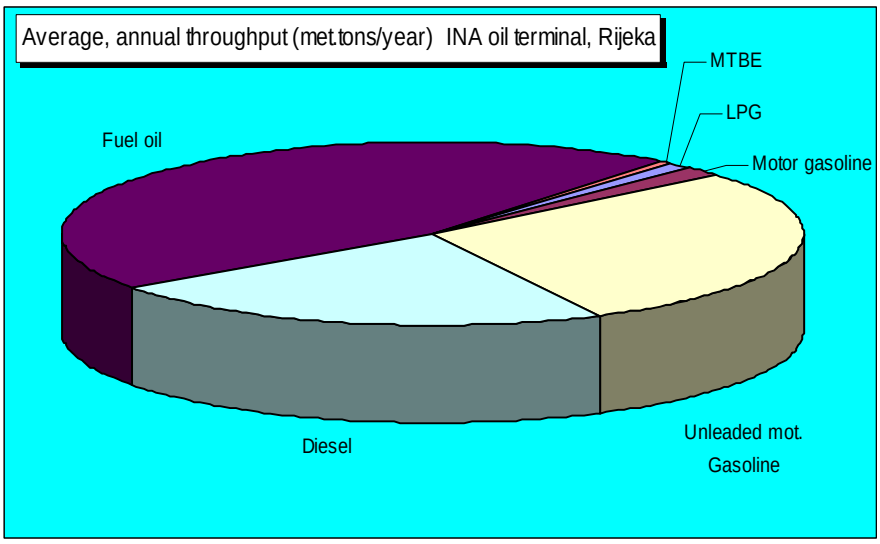
- **Port** Rijeka, Bakar
- **Oil Terminal Operator** INA Rijeka Oil Refinery, Bakar

## B. Type and operation of the oil terminal

South west of the port of Rijeka, an oil terminal zone basically serving the INA operated oil refinery and its refined products distribution activities, is provided within the Bay of Bakar being accessed through a 400 meters wide entrance where handling of a variety of oil products takes normally place. Crude oil is not discharged at the oil terminal but only from the Omisalj terminal via submarine and land-based piping.

A 68 meters long and 10 meters deep alongside, berth for loading LPG is situated at Srscica near Urinj terminal where gas carriers up to 4.500 tdw can be accommodated.

Within the bay of Bakar, 8 berths (in the form of jetties with 9.5 meters maximum allowable draft and moorings by stern ropes with 10.5 meters maximum allowable draft) are provided to oil tankers engaged in loading and discharging oil products such as fuel oil, gasoline, etc. The following diagram illustrates the average, annual maritime cargo handling in the INA operated oil terminal.




## C. Reception facilities for oily wastes from ships & Conclusions

The terminal provides a fixed, reception and treatment facility for dirty ballast, tank washings and other oily residues that serves not only those tankers engaged in its operation but also the barges operated by the waste oils collection companies contracted by the Port Authority of Rijeka. It is apparent

that this facility ensures so far the treatment and disposal of waste oils collected in the wider area of the port of Rijeka. The Bakar based facility provides two tanks of 4.000 cub. meters capacity in which almost any kind of waste oils can be received and treated, provided that their quality meets certain specifications, as follows:

| Parameter | Permissible levels/concentrations |
|---|---|
| Sediments | <10% |
| pH | 6.5-9.5 |
| COD | <400 mg/l |
| Pb | <500 mg/l |
| As | <5 mg/l |
| Si | <10 mg/l |
| Na | <30 mg/l |
| Fe | <30 mg/l |
| N | <30 mg/l |
| Organic chloride substances | <60mg/l |
| Olefins | <30% m/m |

Treatment is effected through primary settling, recovery of separated oil through surface skimming and finally through an open, API separator for the water phase that achieves a 750 cub. meters per hour rate. There is no secondary treatment for the water effluent, however it was reported that the permissible discharges at sea should meet the following, particularly satisfactory specifications:

| Parameter | Maximum allowable concentrations |
|---|---|
| Mineral Oil | 5 mg/lt |
| Total oil and grease | 25 mg/lt |
| BOD | <25 mg/l |
| COD | <125 mg/l |
| pH | 6.5 – 8 |
| Temperature | 30 – 35 |
| Suspended solids | <35 mg/l |
| Total BTEX | <0.02mg/l |

Oil recovered from the separation and treatment process is sent to the oil refinery slop tank used to hold drainage and other waste oils produced in the oil storage tanks.

Collection of dirty ballast and waste oils is charged 25 euros per ton. Sludge produced from the oily water separating API equipment is treated in a decanter/centrifuge unit, while the oily sediments are mixed and stabilized with quicklime to be disposed of within the area of the refinery.

| **Port** | **Type of Facility** | | | **Oily wastes received from the facility** | | | | | | | | | | | | **Operational restrictions on the use of the facility** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fixed | Land based Mobile | Navigable Mobile | Dirty ballast water | | Tank washings | | Chemicals contaminated oily mixtures | | Scale and sludge from tanker cleaning | | Oily bilge water from machinery spaces | | Oily residues from machinery spaces *(sludge)* | | |
| | | | | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | |
| Rijeka<br>Bakar bay | √ | | | 4.000 | | 4.000 | | - | - | * | - | 4.000 | | 4.000 | | No chemicals contaminated wastes can be received |

| **Reception facility Operator** | **Description of the facility** | **Method of treatment of oily wastes** | **Charging system** | **Other remarks** |
|---|---|---|---|---|
| INA OIL REFINERY & OIL TERMINAL | The terminal provides a fixed, reception and treatment facility for dirty ballast, tank washings and other oily residues serving not only the tankers engaged in its operation but also the barges operated by the waste oils collection companies under their authorization from the Port Authority of Rijeka. | Mechanical settling and separation at 750 cub. meters/hour. | 25 euros/ton collected | Oil recovered from the separation and treatment process is sent to the oil refinery slop tank used to hold drainage and other waste oils produced in the oil storage tanks. Sludge produced from the API equipment is treated in a decanter/centrifuge unit, while the oily sediments are mixed and stabilized with quicklime to be disposed of within the area of the refinery. |

## A. General Information

- **Port** Split
- **Oil terminal operator** INA Petronafta, Split

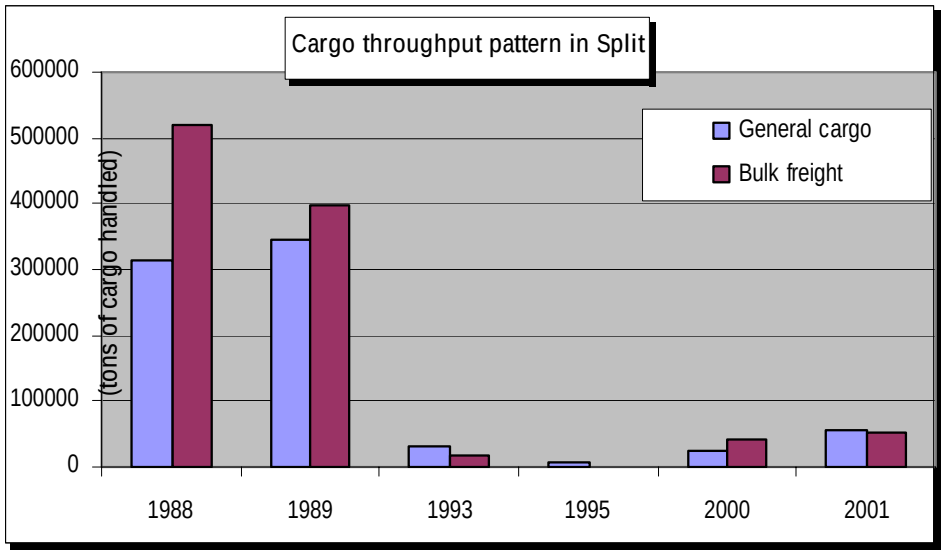
## B. Type and operation of the port

The port of Split is situated in the middle of the east coast of the Adriatic sea at $43^0$ 30'N, $16^0$ 26' E, consisting of two basins, the northern one which hosts the industrialized zone and its teminals and the southern one around the old city which has developed in a cruise and passenger ships' destination.

In Kastela basin, the INA Petronafta terminal, provides a tank farm of 142.000 cub. meters storage capacity and two berths (11.6 and 8.5 meters maximum draught, respectively) able to accommodate up to 50.000 tdw tankers which are exclusively engaged in discharging oil products for domestic distribution and consumption purposes.

Within the same basin, a cement terminal with an annual throughput of about 1.200.000 tons of clinker, slag, cement, etc, operates in front of the cement factories Sv. Kajo and Sv. Jurai, as well as a plastics' producing chemical factory with an annual throughput of 55.000 tons of vinyl chloride monomer.

The volume of general and bulk cargoes handled in the port excluding those handled by the privately operated terminals is showing signs of recovery remaining however significantly lower from the pre-1990 levels, as illustrated below:



**C. Existing Reception Facilities for dirty ballast and other oily wastes**

Ina Petronafta can receive tank washings and other oily residues from the tankers that are engaged in cargo handling at its terminal. The fixed facility, which was not able to visit during the mission, provides a 5.000 cub. meters holding capacity. Request for delivery of oily wastes should be notified in advance to the operators. Chemical contaminated oily wastes are not accepted.

In addition, Split based, Cian d.o.o. company is currently involved in collecting waste oils from ships but also from other land-based sources. The company operates a fleet of vacuum road tankers and small barges to serve ships berthed pierside or at anchor.

The company which is properly authorized by the Authority of the port, requires a 12 hours notice in advance to prepare and arrange its collection means. The company is reported that it treats 3.500 cub. meters annually on average, basically by gravity at its 4 tanks (2 of 270 cub. meters and 2 of 75 cub. meters). Oil recovered through the treatment process is sold as secondary fuel oil to the local cement industry.

| **Port** | **Type of Facility** | | | **Oily wastes received from the facility** | | | | | | | | | | | | **Operational restrictions on the use of the facility** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fixed | Land based Mobile | Navigable Mobile | Dirty ballast water | | Tank washings | | Chemicals contaminated oily mixtures | | Scale and sludge from tanker cleaning | | Oily bilge water from machinery spaces | | Oily residues from machinery spaces *(sludge)* | | |
| | | | | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | |
| Split | √ | | | 5.000 | | 5.000 | | - | - | * | - | 5.0000 | | 5.000 | | No chemicals contaminated wastes can be received |

| **Operator of the reception facility** | **Description of the facility** | **Method of treatment of oily wastes** | **Charging system** | **Other remarks** |
|---|---|---|---|---|
| INA PETRONAFTA | No available information | No available information | No available information | |

## A. General Information

- **Port** Zadar - Gazenica
- **Oil Terminal Operator** Teretna Luka Gazenica

## B. Type and operation of the terminal

The old port of Zadar provides about 1.000 meters of quays, mainly used by coastal and passenger ships of 6.7 meters draft, while the commercial port of Zadar Gazenica, located 2.5 miles from the town provides four berths, comprising two dry cargo terminals, a soya been terminal and a tanker terminal.

A tanker berth operates in the Zadar Gazenica port which provides storage capacity for a number of products including vegetable oils, fuel oil, other oil refined products and chemical substances. The operational status of the terminal has changed recently, becoming a storage and distribution deport for products like those mentioned above. The storage capacity is about 92.000 tons, discharging/loading rates are up to 300 tons/hour, while on average 150.000 tons of products are handled annually, as illustrated in the following table:

| **Product handled** | **Throughput** ***(in metr. tons)*** | | |
|---|---|---|---|
| | **2001** | **2002** | **2003** (first six months) |
| Styrene monomer | 44.192 | 35.814 | 20.842 |
| Fuel oil | - | 53.889 | 40.630 |
| Gas oil | 66.441 | - | 6.290 |
| Naftha | 63.090 | 61.767 | 64.330 |
| Other | - | 6.000 | 4.956 |

In the last three years period, 60 tankers called annually to exclusively discharge, thus eliminating any need to deliver dirty ballast or tank washings in particular produced from the carriage of fuel oil.

## C. Existing Reception Facilities for dirty ballast

The terminal can receive via a separate line from the dockside berth up to 400 cub. meters of dirty ballast and other cargo – associated liquid wastes. The land-based facility was not able to be seen during the mission in the port of Zadar. The operation of the terminal as a receiving facility entails no needs for the incoming tankers to discharge dirty ballast and tank washings. With regard to the handling of vegetable oils, it should be noted that according to the requirements of Annex II of MARPOL 73/78 and the IBC Code, this kind of cargoes is basically classified as Category D substances for which Cleaning and Disposal Procedures can effect the dilution of their residues and the subsequent discharge at sea under certain conditions.

## D. Conclusions & Recommendations

Croatia's maritime transportation sector has been constantly recovering with its seaports to record growth and present significant potential for further development, in particular in those, where construction and expansion of road transportation corridors will link their port areas to the mainland infrastructure such as in Ploce and Rijeka and building or operation of dedicated passenger terminals will promote tourism and cruise ships activity such as in Zadar and Dubrovnik.

Being already a signatory Party to the International Convention MARPOL 73/78 and its Annexes I to V, Croatia has incorporated to its legislative framework, specific provisions for the establishment and operation of reception facilities for ship-generated wastes. The Authorities of the ports are responsible to estimate the needs of ships that normally call and to organize and provide adequate reception facilities. In accordance with the Sea Port Law, basically all ports classified as ports open to international traffic are required to provide reception facilities.

However, apart from Rijeka, Ploce, Split and Zadar, flexible waste collection schemes have been operating also in the ports of Dubrovnik, Plomin, Sibenik and the oil terminal of Omisalj. Collection of ship-generated wastes can be carried out either by the port Authority through subsidiary companies or properly authorized private companies. The operators of oil terminals are providing in practice facilities for collecting dirty ballast and tank washings from tankers.

*Adequacy of the available reception facilities*

- The available facilities for dirty ballast and tank washings at the INA operated oil terminal in Rijeka – Bakar, meets the needs of oil tankers that normally load oil products for basically, domestic distribution purposes. The role of the treatment facility is vital for the collection of other kinds of oily wastes from ships in the wider Rijeka – Rasa area. A new, storage and treatment facilty has been recommended in the Report of Activity 1 of the project, to be established in Rijeka to ensure the treatment of oily wastes collected from ships other than oil tankers, following their future, non acceptance from the treatment facility of the oil terminal.

- The rehabilitation of the treatment facility in the Energopetrol terminal in the port of Ploce, is recommended to optimize the treatment process and ensure the sound management of collected waste oils including dirty ballast and tank washings.

- The operational status of the oil terminals in Split and Zadar is mainly related with oil products and other non – oil liquid substances receiving activities, eliminating any need for the incoming tankers to deliver dirty ballast or other cargo – associated wastes.

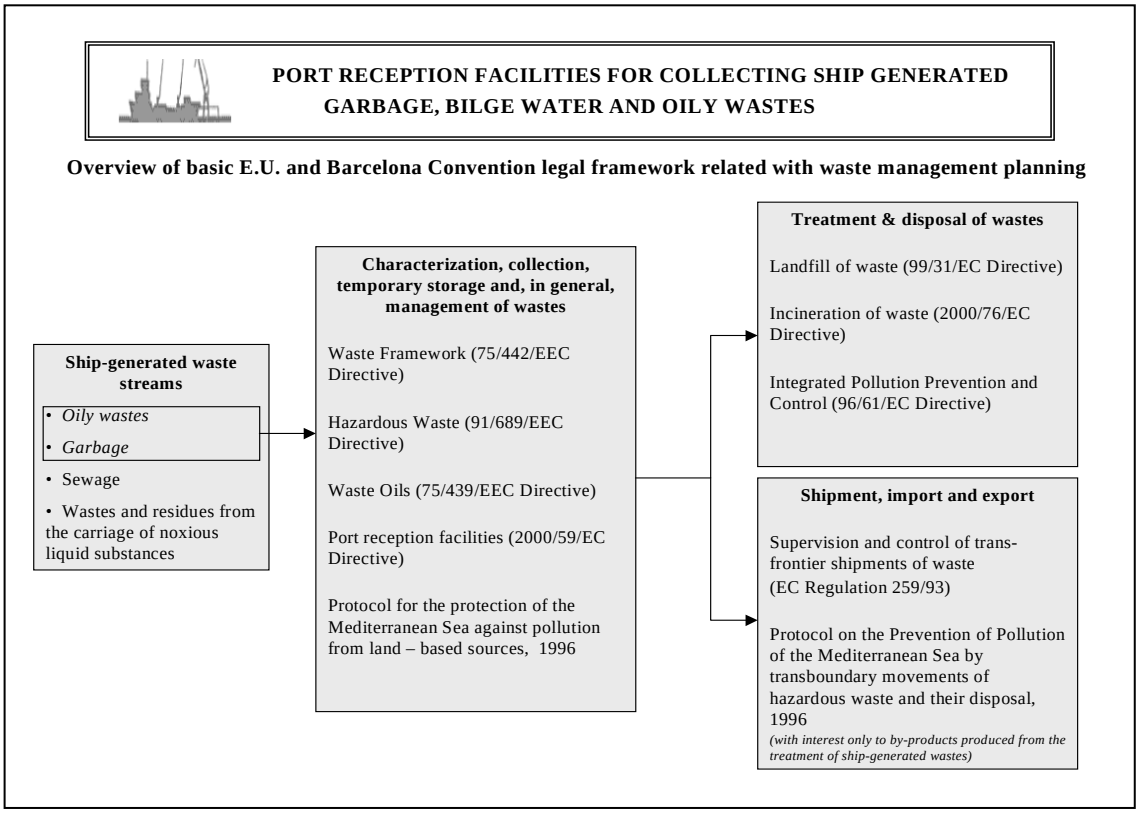
- A change in the operational status of the Omisalj oil terminal was examined, since the materialization of two energy projects can render the terminal as a crude oil discharging one also. In particular, through the materialization of the Druzba Adria project, 5 million tons annually (to progressively become 10 and 15

million tons per year) of crude oil will be exported. The maximum daily volume of tank washings that could be delivered in the terminal following its new mode of operation might be as much as 4.500 tons which basically determines the storage capacity of a reception and treatment facility that needs to be constructed.

*Development of a waste management plan for the ports of the country*

Towards its effort to develop national and local waste management plans with the aim to achieve sustainable waste management, the Ministry of Maritime Affairs, Transport and Communication in cooperation with the Ministry of Environmental Protection and Physical Planning is recommended to develop a national, waste management plan that could be implemented across the ports of the country aimed at consolidating and formulating a number of elements (notification, charges, record-keeping, wastes traceability procedures, etc.) and ensuring compliance of the respective port activities with the national waste management policy and legislation. It should be noted that similar plans are required from regional obligations that the country should comply with, such as those stemming from the Barcelona Convention, related Protocols (i.e. Protocol for the protection of Mediterranean Sea against Pollution from Land Based Sources and Activities).

The Eur. Council Directive 2000/59/EC promotes the development and implementation of up-to-date waste reception and handling plans in ports of each E.U. Member State to improve the adequacy of the reception facilities. The next diagram presents the basic legislation that requires or recommends some kind of waste management planning.



*Collection means for separated, used oils from ships*

To achieve full adequacy, the reception facilities should be capable of receiving the types and quantities of wastes related with the normal needs of ships. Since it has been already a practice in new ships to allocate a tank for holding, used, basically lubricating oils that became unfit for use, it is recommended that small, portable receptacles in the form of standard IBC containers or other means to be provided to ships upon request for receiving the respective waste oils. This collection practice could be important in the future, in case that treatment in the ports or in the mainland is to involve regeneration or recycling of waste oils.

*Oily wastes treatment and disposal*

Bilge water and sludge produced in the machinery spaces of ships represent a kind of liquid waste, usually contaminated with fuel and lighter oils, pollutants such as inorganic salts, metals, sea water, etc. Similarly regardless of the hydrocarbons concentration, oil contaminated ballast and tank washings may contain pollutants such as residues from crude oil, fuel oils and other oil products carried as cargo on oil tankers. It should be noted that oily wastewater mixtures in general and waste mineral oils are distinguished for the purposes of the:

a) Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Waste and their Disposal, where in Annex I (Categories of hazardous wastes), the following categories are given:

*Y8 Waste Mineral oils unfit for their originally intended use*

*Y9 Waste oils/water, hydrocarbons/water mixtures, emulsions*

- Protocol for the Prevention of the Mediterranean Sea against Pollution from Land Based Sources and Activities, where in Annex I, C, the following categories of substances are given:

*6. Used lubricating oils*

*10. Crude oils and hydrocarbons of petroleum origin*

Two items that were considered to be essential for identifying the favourable level of treatment were as follows:

a) Discharge of effluent water from port-based reception and treatment facilities

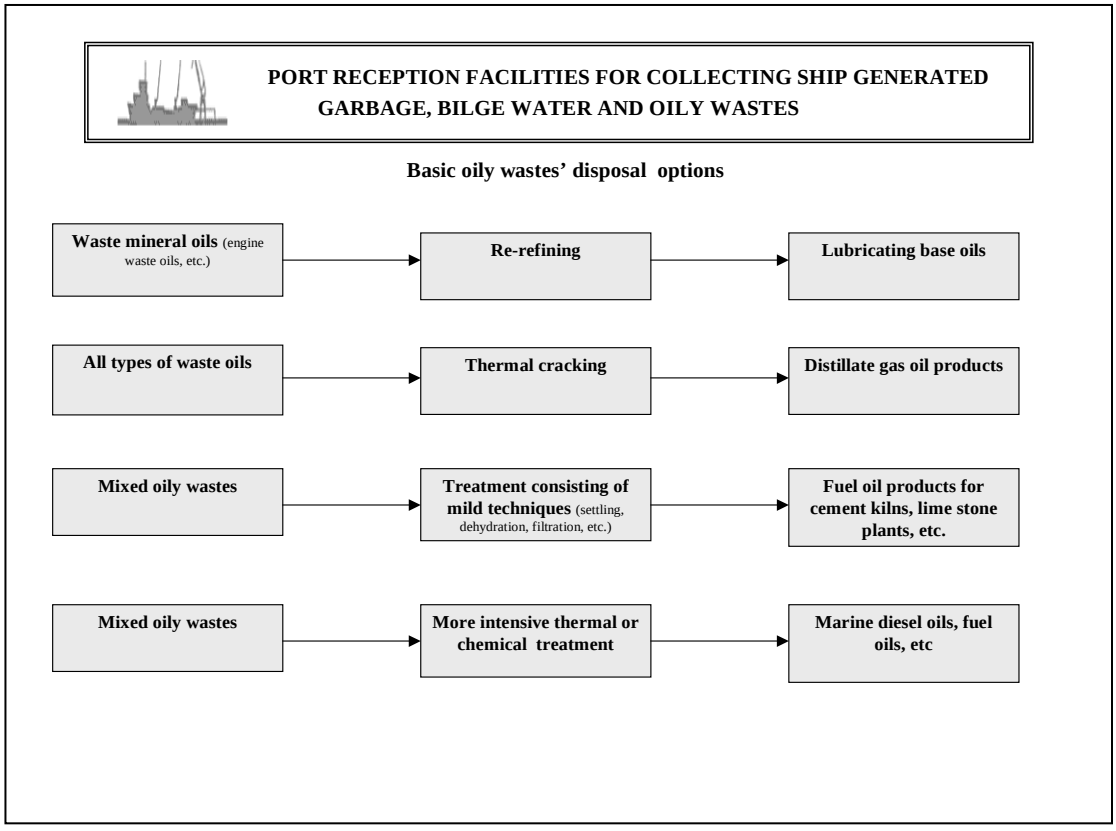
Discharges of effluent water produced during treatment of oily wastes can be considered as point source, industrial discharges, the authorization and control of which can be dealt with, in the framework of the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and certainly in accordance with any national or local existing regulations. Unless wastewater reclamation is to take place, the basic, recommended principle that must be taken into account, is that the resultant effluent water should be subjected to such a

treatment that discharges directly at sea or into an existing sewage network have the prescribed concentration limits for petroleum hydrocarbons but also for other pollutants that are likely to be present.

b) Treatment and final disposal of oily wastes

The operation of a port-based treatment facility assisted by an efficient collection system can ensure that illegal dumping or even burning of oily wastes collected from ships is prevented. Waste Oils Directive 75/439/EC as amended, gives priority, in managing waste oils, to processing by regeneration, then to combustion and finally to safe destruction and disposal. In parallel, Guidelines for treatment of used lubricating oils have been issued by the UNEP/MAP in collaboration with WHO.

A comprehensive diagram of the different oily wastes routes in terms of the after-treatment and disposal processes used and the final products, is presented below:




Generally, oily wastes can be recovered and recycled, either directly in the case of high oil content wastes or after some form of separation and concentration from high aqueous content wastes such as dirty ballast. While certain types of oily wastes such as waste mineral oils in particular, can be subjected to regeneration processes which give products of comparable quality to the original base material, a large volume of oily wastes is used for its energy potential as a secondary or substitute fuel.

Apart from economic considerations, regeneration of waste mineral oils from ships is an option depending to some degree on the quality of waste oils and in particular on the presence of contaminants that can disrupt the technical performance of some of the processes used. There is no doubt that the most important sources of waste oils in the form of waste mineral oils are the land – based ones such as the industry,

motor vehicles, etc. National or local programs that will be implemented or currently are in progress for collecting, recycling and disposing of used lubricating oils is recommended to be extended also in ports and terminals where the delivery of separated, waste oil from ships has been demonstrated. The operation of the recommended, new reception and pre-treatment facilities should ensure that oil recovered from the treatment process, is disposed of in the proximity of the port area minimizing the need of distant road or sea transport and that are re-used in a way that does not pose risks to the environment or to human health.

# 4.3 SLOVENIA

## A. Introduction

A a candidate country to join the European Union in the following phase of enlargement, having already achieved a high level of alignment with acquis communautaire, it was deemed as necessary to concentrate the attempts of the project towards the adaptation of the existing operational framework of the country's port reception facilities to the 2000/59/EC Directive requirements.

It should be noted that due to the extensive investment in modernization and to the adoption of a transport policy aimed in quality services, cost – effectiveness, environmental protection and safety, the country's infrastructure has made substantial progress towards reaching the Community level.

The strategic geographical position of Slovenia (the 5$^{tt}$ and 10$^{th}$ paneuropean railway and road transport corridors come across the country with the port of Koper to offer international and regional competitive maritime transport links) in association with its future role in the integration of the european transport networks, makes the port of Koper, which is basically discussed here, one of the most significant North – Adriatic ports.

As Koper is the only port for international transport purposes it accounts almost for 100% of the total freight tonnage handled in the country, as summarized below (data taken from Eurostat New Chronos Database):

| **Total of gross weight of cargoes** *(million tons)* | | | **Number of vessel calls** | | | **Total number of passengers** *(excluding cruise ships)* | | |
|---|---|---|---|---|---|---|---|---|
| 1995 | 2000 | Average annual growth (%) | 1995 | 2000 | Average annual growth (%) | 1995 | 2000 | Average annual growth (%) |
| 6.8 | 9.0 | 5.8 | 1.557 | 2.368 | 8.7 | 40.000 | 38.000 | -1.3 |

From the 9 million tons of cargo handled in the port of Koper, 6.7 million tons were discharged and the remaining 2.4 million tons were exported.

## B. Legislative framework dealing with the provision of port reception facilities & waste management

Slovenia is a signatory Party to the international Convention of MARPOL 73/78 and its Annexes dealing with the prevention of ship-generated pollution from oil and garbage as illustrated below.

| MARPOL 73/78 Annex | Kind of pollutant | Entry into force internationally | Status of ratification in Slovenia | Requirement for provision of Reception Facilities according to MARPOL 73/78 |
|---|---|---|---|---|
| I | ***Oil*** | √ | √ | √ |
| II | Noxious Liquid Substances carried in bulk | √ | √ | √ |
| III | Harmful substances in packaged form | √ | √ | **x** |
| IV | Sewage | √ | √ | √ |
| V | ***Garbage*** | √ | √ | √ |
| VI | Air emissions | **x** | **x** | √ |

The government of Slovenia has adopted a number of regulations and other instruments which deal with the provision of port reception facilities, which are as follows:

1. ***Maritime Code*** which provides for the organization of the facilities for ship-generated wastes collection, the requirements of the incoming ships with regard to the use of the available facilities, the prevention of pollution within the marine territory of the country, etc. A summary of the most important provisions of the Code related with the abovementioned issues is presented in brief below:

Article 44 prescribes that collection of ship generated wastes is considered as public service performed on the basis of concessions granted upon certain technical and economic criteria.

Article 72 prescribes that ships in port shall deliver oily mixtures and other wastes in to the place and the company authorized for the collection of

these wastes. Article 184 empowers the Port State Control Officers to detain a ship when clear grounds exist that the ship is polluting or can pollute the sea exist.

Article 69 forbids any action in ports or the territorial and internal sea, which endangers the safety of persons or ships or pollute the sea.

Article 976 prescribes penalties to be imposed against those involved in pollution incidents.

It should be noted that a procedure for amending the Maritime Code has been in progress in the Parliament of the country. Some of the amendments concerning the provision of facilities for collecting ship - generated wastes are as follows:

- Collection of ship generated wastes won't be a public service.
- The Port Authority will be responsible for organizing, collecting, treating and disposing of cargo residues and operational wastes from ships.
- The Master of a ship shall deliver wastes retained onboard in compliance with the applicable regulations dealing with waste management.
- The Minister of Transport and the Minister of Environment will approve the fees for the entire service of collection and treatment of wastes delivered by ships in the port area.

2. ***Regulation on safe traffic and order in ports and other parts of the territorial and internal sea*** which among others provides regulations on the shipboard management of wastes in the above mentioned jurisdictional zones of the country as summarized below:

Article 29 prescribes that the Masters of ships shall prepare before arrival in the port area a form of the management of waste on board, to be at the disposal of the Port State Control Officers for any subsequent exercise of control of the ship.

Article 30 prescribes that ships at anchor shall dispose daily the ship generated waste to the company authorized to this effect. The discharge at sea of cargo - generated waste is prohibited. The Master is responsible for disposing them to the authorized companies.

3. ***Decree for the concession to perform the public service of collection and removal of ship-generated waste.***

The decree for the concession to perform the public service of collection and removal of ship generated waste from ships determines the method of collecting, transporting, treating and disposing of garbage generated by ships

as well as with the authorization of the concessionaires which will carry out the abovementioned activities.

Discharge at sea of oily water mixtures from the machinery spaces of ships and garbage might be carried out in the jurisdictional, navigable marine waters of the country in compliance with the respective criteria of MARPOL 73/78. The oil terminal that is discussed here is this one operated by Instalacija situated in the zone of liquid cargoes terminals of the port of Koper.

| **Port involved in the project** | **Port** | | **Oil Terminal** | | | | |
|---|---|---|---|---|---|---|---|
| | | | Crude oil | | Oil Products | | Fuel Oil fired power plant |
| | Commercial Port | Port with major ship - repairing and/or tank cleaning facilities | Loading terminal | Unloading terminal | Loading terminal | Unloading terminal | |
| Koper | √ | | | | | √ | |

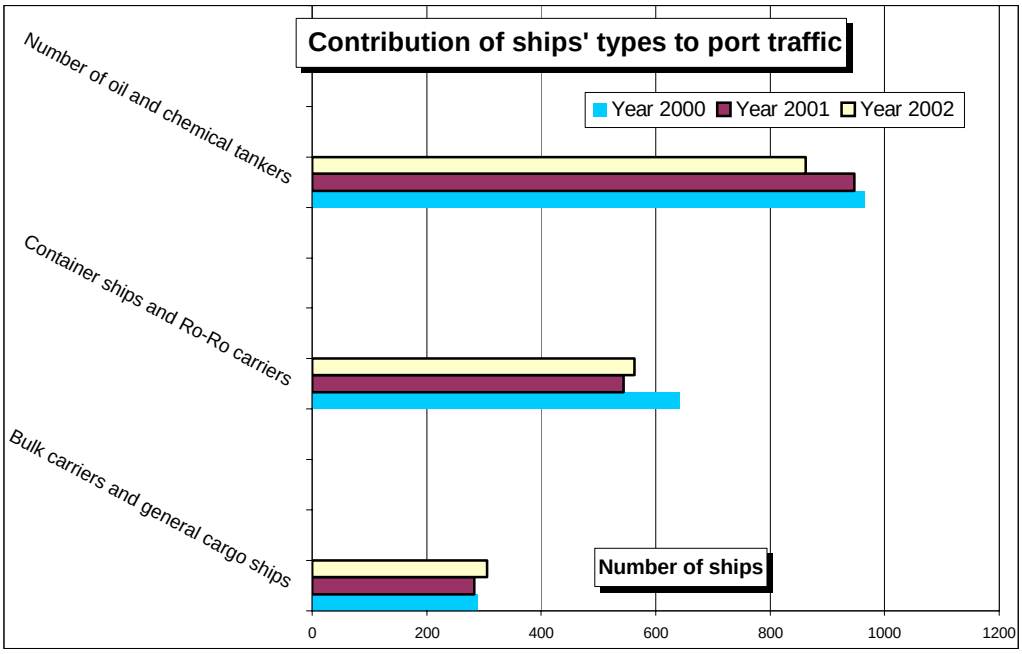
## A. General Information

| | |
|---|---|
| **Port** | Koper |
| **Port Authority** | Luka Koper d.d. |
| **Oil Terminal Operator** | Instalacija |

## B. Type and operation of the port

The port of Koper constitutes the only port of Slovenia engaged in international transport representing the southern gate to commercial links between Europe and overseas and also an expanding, modern logistic and distribution centre. The Republic of Slovenia remains the major owner of the port with 51% participating shares. The management and the entire operation of the port is committed to high quality services, effective environmental control, systematic development, improvement of cargo handling and storage capacities and integration with the european and international transport systems.

As a multipurpose port, which combines containerized cargo, general dry and packaged as well as liquid cargoes handling, it presents a constant growth in terms of the number of incoming ships as well as of the tonnage of cargo handled. The number of ships that called to the port in the 2000 – 2002 period is illustrated below:




Instalacija, a member of the Istrabenz Group, is engaged in the storage and handling of petroleum products. The company's base is located at Sermin near Koper where the largest, tank farm for petroleum products in Slovenia, operates.

The oil terminal is part of the dedicated zone of the port, which handles and stores liquid chemical substances such as inorganic acids, vegetable oils, wine and other products. Providing a 11 meters depth for berthing alongside and about 22.000 cub. meters storage capacity a number of services such as mixing, dilution, etc. are offered through the necessary piping and infrastructure. The maximum size of oil tankers that call to the Instalacija terminal exclusively for discharging oil products is 20.000 dwt. On average one million tons of diesel heating oil and gasoline are discharged annually through the jetty and its associated twin, separate piping, all destined for transport and distribution to the local market. The majority of refined products come from the adjacent refinery in Rijeka.

*Bulk dry & liquid cargoes terminals in the northern basins*

In addition, a 200 meters long and 14 meters deep quay is allocated for vegetable oil carriers with a 25.000 cub. meters capacity to be provided in a 8 tanks' farm.

It is obvious that the current type of operation of the terminal entails no needs for the incoming oil tankers to retain onboard and deliver dirty ballast to the terminal. In parallel, due to the quality of the white products and the location of the terminal from which they were loaded, tank washings and other cargo-associated wastes are not normally expected to deliver.

A number of 4 oil tankers which happened to call at the terminal during the period of the project, responded to the request of the Koper Port Authority to complete the Questionnaire that was produced especially to provide an input with regard to the needs of ships to use reception facilities. Both these tankers requested to or actually delivered oil wastes which were exclusively wastes produced in their engine room spaces and namely sludge and bilge oils in volumes varying from 2.5 to 15.0 cubic meters in total.

## C. Existing Reception Facilities for oily wastes

The Authority of the port is currently providing the collection and pre-treatment of oily wastes from ships in the port area, allocating a 30 cub. meters road tanker, a 40 cub. meters tank for reception and storage

purposes and also a fixed, port based facility able to achieve tertiary treatment of collected oily bilge waters.

The treatment facility for the latter type of oily wastes consists of a small buffer tank, a DAF unit (dissolved air flotation), a filtering arrangement and an ozonation unit which enable the discharge of the effluent water under the permissible levels.

A 24 hours service is provided at all berthing places of the port following a prior notice from the Masters of the incoming ships. Used oils in limited quantities, sludge produced from the fuel and lubricating oils separating equipment as well as oil recovered from the treatment facility is collected from a properly authorized private company.

In accordance with the procedures followed by the Authority of the port and its licenced companies, the content of delivered waste oils is visually checked to verify its quality (bilge water free of oil, oily bilge water and sludge). In case that the representative of the ship fails to agree on the audit performed by the collector, the sample is delivered to the competent Institute for Health Protection to be analysed for its content of water, oil and sediment. Results are provided in a few hours to all interested parties. In practice, bilge water is considered water retained in the bilge wells of ships having an oil concentration less than 15 mg/lt, where sludge is considered as this mixture that its sediment content is equal or more than 1%.

In accordance with the applicable Tarrifs and Terms for collection and removal of bilge water, oily water and mixture of oily water and sludge, a direct fee depending on the quality and the actual quantity of the oily wastes delivered, is charged as follows:

| **Kind of pollutant** | **Bilge water** | **Bilge oil** | **Sludge** |
|---|---|---|---|
| **Fee ($ US/$m^3$)** | 100 | 300 | 500 |

Additional charges apply depending on the days that the collection takes place (non working days and holidays), prolonged pumping out, etc.

| **Port, name and location of Facility** | **Type of Facility** | | | **Oily wastes received from the facility** | | | | | | | | | | | | **Operational restrictions on the use of the facility** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fixed | Land based Mobile | Navigable Mobile | Dirty ballast water | | Tank washings | | Chemicals contaminated oily mixtures | | Scale and sludge from tanker cleaning | | Oily bilge water from machinery spaces | | Oily residues from machinery spaces *(sludge)* | | |
| | | | | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | Nominal reception capacity ($m^3$) | Maximum receiving rate ($m^3$/hour) | |
| Koper | √ | √ | | - | - | - | - | - | - | - | - | 47 | 30 | 47 | 30 | No chemicals contaminated wastes can be received |

| **Name, Address and other contact details of Operator** | **Description of the facility** | **Method of treatment of oily wastes** | **Charging system** | **Other remarks** |
|---|---|---|---|---|
| Luka Koper d.d.<br>Address: Vojkovo nabrezje 38<br>SI – 6501 Koper<br>Tel: +386 5 6656 100<br>Fax:+386 5 6395020<br>Email: portkoper@luka-kp.si<br><br>Ecoles private company | | Bilge water is treated through port based a DAF unit, filtering and ozonation systems.<br><br>Used oils and sludge is collected by Ecoles road tankers. | A direct fee depending on the quality and the actual quantity of the oily wastes delivered applies varying from 100 – 500 $US per cubic meter for bilge water free of oil to sludge. | |

## C. Estimation of oily waste streams

In the absence of detailed information on the number and port of origin of the tankers approaching at the terminal, the oily waste streams expected to deliver were estimated on the basis that 50 oil tankers of 20.000 dwt call to discharge white oil products on an annual basis.

**Terminal : Instalacija Oil Terminal**
**Port : Koper**

- Estimates of ship-generated oily wastes that could be received at the terminal

| **Oily wastes** | Dirty ballast | Tank washings | Oily bilge water | Oil residues (sludge) and other waste oils |
|---|---|---|---|---|
| Reduced Daily Volume ($m^3$/day) | - | - | 1.7 | 1.3 |
| Average Annual Volume ($m^3$/year) | - | - | 642.5 | 464.1 |
| Maximum volume per ship/arrival ($m^3$) | - | - | 25.0 | 7.5 |

## D. Conclusions & Recommendations

There is not any current need for the Instalajica operated oil terminal in the port of Koper to receive and treat dirty ballast from oil tankers due to its oil receiving type of operation. The following constitute a summary of the main findings that have been incorporated in the Report of Activity 1 of the project.

There is no doubt that the port of Koper represents a port, the Authority of which, has set high operational and environmentally sound standards having established before, concrete grounds of understanding and common targets with the operators of its terminals as well as the public of the wider urban area. The main findings of the assessment performed during the mission in the port and the subsequent data collection and processing, are the following while a number of issues are discussed in detail below:

- The available facilities are adequate in terms of capacity to meet the needs of ships that normally call at the port. The estimation of the expected volumes of waste streams (5.250 $m^3$ of oily bilge water, 3.150 $m^3$ of sludge from all ships) was carried out by applying the principle of mandatory delivery in conjuction with the average annual traffic pattern.

- The implementation of the Directive 2000/59/EC of the European Parliament and of the Council on port reception facilities for ship-generated waste and cargo

residues, following its transposition from the country, will not bring significant difficulties to the port of Koper to adapt the existing operational scheme of its facilities (either those provided by the Authority or private companies) to that one outlined in the Directive. Changes to procedures and formalities dealing with the processing of notice from ships, to the establishment of consultations with all interested parties, the favorable treatment of the environmentally friendly ships, the recordkeeping, etc., are rather necessary to be introduced.

*Development of a waste reception and handling plan*

As only a few months have been left before Slovenia becomes a full member of the European Union and bearing in mind that the port has already introduced a dynamic environmental management system, what it seems as an immediate step towards the implementation of the E.P. & C. Directive 2000/59/EC, is the development of a waste reception and handling plan.

*Fees for ship-generated wastes collection and treatment*

So far, a direct fee applies to those ships that wish to deliver wastes at the available reception facilities of the port. While the applicable charges for garbage seem to be reasonable, the respective charges for sludge in particular and other oily water mixtures seem to be expensive taking into account the existing, average collection and treatment costs in other countries of the European Union. It should be noted that in the interest of protecting the environment, the fee system should encourage the delivery of ship-generated waste to the ports instead of discharge into the sea. Article 8 of the E.P. & C. Directive 2000/59/EC determines that the cost recovery system such as that which is expected to be adopted in the port following the transposition and implementation of the above mentioned Directive, should give an incentive to ships to use the available reception facilities.

*Collection means for separated, used oils from ships*

To achieve full adequacy, the reception facilities should be capable of receiving the types and quantities of wastes related with the normal needs of ships. Since it has been already a practice in new ships to allocate a tank for holding, used, basically lubricating oils that became unfit for use, it is recommended that small, portable receptacles in the form of standard IBC containers or other means to be provided to ships upon request for receiving the respective waste oils. This collection practice could be important in case that either the Koper port acting, private treatment companies or others in the country regenerate or recycle waste oils.

*Further improvements to the waste management scheme*

The Authority of the port in conformity with the Ministry of Transport and the Ministry of Environment could improve further the existing procedures with which ships' requests are handled, monitored and also waste management is generally carried out, in particular by:

- Standardizing notification, record-keeping, and monitoring of ships' requests to deliver wastes at the port of Koper as well as the actual use of the available reception facilities,

- Encouraging the private companies that act in the port as licenced waste collection and treatment companies to introduce procedures and technologies able to ensure a progressive reduction of the environmental impact from their activities.