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 1

COLLECTION AND TREATMENT OF SOLID AND LIQUID WASTES

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 oily ballast waters from tankers (Activity 2), which is the subject of a separate report.

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1. GENERAL

1.1 Subject and scope of the Activity 1 of the project

The Activity 1 of the project "Port Reception Facilities for Collecting Ship-Generated garbage, bilge water and oily wastes" is concerned with the identification of required capacities for collection and treatment of relevant types of solid and liquid wastes, taking into consideration the type and capacity of existing installations and specific nature of traffic in each country and port concerned, as well as specific requirements resulting from such differences.

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.

The ports that were visited and studied by country in the framework of the Activity 1 and 2 *(Collection and treatment of oily ballast waters from tankers)* of the project are listed in the following table. It should be noted that a number from them due to their exclusive oil - related activities, are discussed in the Final Report of the Activity 2.

- Albania: Durres, Vlore, Saranda, Shengjin

- Croatia: Dubrovnik, Omisalj, Ploce, Plomin, Rijeka - Rasa, Sibenik, Split and Zadar

- Slovenia: Koper

1.2 Definitions

Annex I of MARPOL 73/78 contains certain regulations and interpretations related to procedures for the retention onboard, treatment, discharge at sea and disposal of oily mixtures generated in the machinery spaces of all ships and the cargo areas of oil tankers.

Annex V, similarly, contains regulations dealing with the storage, disposal and management in general of garbage produced onboard ships. The terms used

for the purpose of this Report as well as their definitions which are presented below have been extracted by the following sources:

- MARPOL 73/78 Annex I Regulations and unified interpretations.
- MARPOL 73/78 Annex V Regulations.
- IMO Guidelines for the implementation of Annex V of MARPOL 73/78. These Guidelines provide information and guidance to assist vessel personnel in complying with the requirements set forth in Annex V and also port and terminal operators in assessing the need for and providing adequate reception facilities for garbage generated onboard different types of ships.
- IMO Guidelines for systems for handling oily wastes in machinery spaces of ships. These guidelines provide guidance in achieving an efficient and effective system for the management of oily bilge-water and oil residues for new buildings and, where applicable and reasonable, for existing ships.

The terms used and the definitions are as follows:

Oil is defined as petroleum in any form including crude oil, fuel oil, sludge, oil refuse and refined products other than petrochemicals.

Oily wastes means oil residues (sludge) and oily bilge-water.

Oil residues (sludge) means:

- separated sludge, which means sludge resulting from purification of fuel and lubricating oil;
- drain and leakage oil, which means oil resulting from drainages and leakages in machinery spaces; and
- exhausted oils, which means exhausted lubricating oil, hydraulic or other hydrocarbon-based liquid which are not suitable for use due to deterioration and contamination.

Oily bilge water means an oil – water mixture containing potentially sea and fresh water, fuel oil, cooling water, leakage and lubricating oil, accumulated either in designated holding tank/s or bilge wells.

Mediterranean Sea area means the Mediterranean Sea including also 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.

Sludge tanks means:

- tanks for separated sludge;
- drain and leakage oil tanks; and

- exhausted oil tanks.

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

Oil sludge incinerators are systems serving for incineration of oil sludge generated on board seagoing ships. Sludge incinerators should be main and auxiliary steam boilers with appropriate oil sludge processing systems, incinerators with appropriate oil sludge processing systems designed for sludge incineration, etc. .

Harmful Substance means any substance which, if introduced into the sea, is liable to create hazards to human health, harm living resources and marine life, damage amenities or interfere with other legitimate uses of sea. Harmful substances for which MARPOL 73/78 has set discharge limits are oil and oily mixtures (Annex I), noxious liquid substances in bulk (Annex II), sewage (Annex IV), garbage (Annex V), and air emissions (Annex VI).

Discharge, in relation to harmful substances or effluents containing such substances, means any release, from a ship and includes any escape, disposal, spilling, leaking, pumping, emitting or emptying which is limited for the purpose of this Report to the discharge of oily bilge water and garbage. Discharge does not include dumping, within the meaning of the London Dumping Convention.

Food wastes are any spoiled or unspoiled victual substances, such as fruits, vegetables, poultry, meat products, food scraps, food particles, and all other materials contaminated by such wastes, generated aboard ship, principally in the galley and dining areas.

Plastic means a solid material which contains as an essential ingredient one or more synthetic organic high polymers and which is formed during either manufacture of the polymer or the fabrication into a finished product by heat and/or pressure. Plastics have material properties ranging from hard and brittle to soft and elastic. Plastics are used for a variety of marine purposes including, but not limited to, packaging (vapor-proof barriers, bottles, containers, liners) ship construction (fiberglass and laminated structures, siding, piping, insulation, flooring, carpets, fabrics, paints and finishes, adhesives, electrical and electronic components), disposable eating utensils and cups, bags, sheeting, floats, fishing nets, strapping bands, rope and line.

Domestic wastes means all types of food wastes and wastes generated in the living spaces on board the ship.

Cargo-associated wastes means all materials which have become wastes as a result of use on board a ship for cargo stowage and handling. Cargo-associated waste includes but is not limited to dunnage, pallets, lining and packing materials, plywood, paper, cardboard, wire, and steel strapping.

Maintenance wastes means materials collected by the engine department and the deck department while maintaining and operating the vessel, such as soot, machinery deposits, scraped paint, deck sweeping, wiping wastes, rags, etc.

Operational wastes means all cargo-associated wastes and maintenance wastes, and cargo residues as defined below.

Cargo residues are defined as the remnants of any cargo material on board that cannot be placed in proper cargo holds (loading excess and spillage) or which remains in cargo holds and elsewhere after unloading procedures are completed (unloading residual and spillage).

Oily rags are rags which have been saturated with oil while contaminated rags are those which have been saturated with a substance defined as a harmful substance including oil.

Ash and clinkers from shipboard incinerators and boilers are operational other garbage in the meaning of Annex V respective regulations.

2. REGULATIONS & RULES

2.1 Oily Mixtures

2.1.1. Criteria for discharging oily mixtures from the machinery spaces of ships at sea

In accordance with Regulation 10 of MARPOL 73/78 Annex I (Methods for the prevention of oil pollution from ships while operating in Special Areas), any discharge into the Mediterranean sea of oil or oily mixtures from any oil tanker and any ships of 400 tons gross tonnage and above other than oil tankers is prohibited.

The abovementioned prohibition does not apply to the discharge of processed bilge water from machinery spaces, provided that all the following conditions are met:

(a) the bilge water does not originate from cargo pump room bilges of an oil tanker,

(b) the bilge water is not mixed with oil cargo residues,

(c) the ship is proceeding en route,

(d) the oil content of the effluent without dilution does not exceed 15 parts per million; and

(e) the ship has in operation equipment as required by Regulation 16 of Annex I. For ships of 10.000 tons gross and above this equipment includes an oil filtering equipment with arrangements for an alarm and for automatically stopping any discharge of oily mixtures when the oil content in the effluent exceeds 15 parts per million. Any ship of 400 gross tons and above but less than 10.000 gross tons should be fitted with an oil filtering equipment. In parallel, any such ship which carries

large quantities of oil fuel should similarly be fitted with an approved oil filtering equipment with alarm and automatic stopping arrangements.

For ships of less than 400 tons gross, their Flag State Authority should ensure, that as far as practicable, they shall be equipped so to retain on board oil or oily mixtures to discharge them in accordance with the abovementioned requirements. Ships engaged exclusively on voyages within Special Areas can be relieved from installing and operating oil filtering equipment provided that all the following conditions are met:

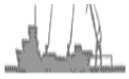
- The ship is fitted with a holding tank having a volume adequate, to the satisfaction of its Flag State Authority, for the total retention on board of the oily bilge water,
- All oily bilge water is retained onboard for subsequent discharge to reception facilities,
- The Flag State Authority has determined that adequate reception facilities are available to receive such oily bilge water in a sufficient number of ports and terminals the ship calls at,
- Appropriate endorsements have been made to those ships' IOPP Certificate and also the quantity, time and port of the discharge are recorded in the Oil Record Book.

The oil residues which cannot be discharged into the sea in compliance with the abovementioned conditions shall be retained on board to be finally disposed of to available port reception facilities. The requirements that oil tankers and other ships should comply with, are presented schematically in the next tables:

OIL TANKERS OF ALL SIZES AND OTHER SHIPS OF 400 GRT AND ABOVE **Control of discharge of oil from machinery spaces**	
Within Special Areas	Any discharge is prohibited, except when, 1. the ship is proceeding en route, and 2. the oil content of the effluent without dilution doesn't exceed 15 ppm, 3. the ship has in operation oil filtering equipment with automatic stopping device 4. bilge water is not mixed with oil cargo residues or cargo pump room bilges (on oil tankers)

SHIPS BELOW 400 GRT OTHER THAN OIL TANKERS **Control of discharge of oil from machinery spaces**	
Within Special Areas	Any discharge is prohibited, except when all the following conditions are satisfied as far as practicable and reasonable: 1. the ship is proceeding en route, and 2. the oil content of the effluent without dilution doesn't exceed 15 ppm, 3. the ship has in operation suitable equipment as required by Regulation 16 of Annex I of MARPOL 73/78

The following table summarizes the requirements related with the installation and operation of appropriate shipboard equipment to process and dispose of oily mixtures produced in the machinery spaces of ships during their normal operation. It has proved that the reliable operation of the integral oily water separating and filtering equipment is critical for the proper discharge of oily water mixtures at sea and the minimization of those mixtures that are likely to be delivered on the existing port reception facilities.



PORT RECEPTION FACILITIES FOR COLLECTING SHIP GENERATED GARBAGE, BILGE WATER AND OILY WASTES

Summary of shipboard equipment for processing and disposing of oily water mixtures from machinery spaces

Size of ships	Applicable Annex I Regulations	Equipment installation and performance standards	Equipment requirements
Ships of more than 10.000 grt and ships between 400 and 10.000 grt carrying large quantities of oil fuel	Regulation 16 (1, 2, 5)	MEPC.60 (33) Resolution	• 15 ppm oil water filtering equipment • Bilge alarm and automatic stopping device • Oil content meter
Ships between 400 and 10.000 grt	Regulation 16 (1, 4)	MEPC.60 (33) Resolution	• 15 ppm oil water filtering equipment and oil content meter

2.1.2 Annex I – MARPOL 73/78 Regulations dealing with the provision of Reception Facilities in ports and terminals

The following tables summarize 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 oil mixtures from all ships.

Regulations of Annex I of MARPOL 73/78	**Summary of the requirements**
Regulation 10 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.* Such facilities shall have adequate capacity to meet the needs of the ships using them without causing undue delay.
	All ports within a Special Area shall be provided with adequate reception facilities for other residues and oily mixtures from ships. Such facilities shall have adequate capacity to meet the needs of the ships using them without causing undue delay.
Regulation 12 Reception Facilities	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* Crude oil loading terminals shall have efficient reception facilities to receive oil and oily mixtures which cannot be discharged in accordance with the provisions of Regulation 9(1)(a) of Annex I from all oil tankers on voyages as described above. - *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* Such loading ports and terminals shall have efficient reception facilities to receive oil and oily mixtures which cannot be discharged in accordance with the provisions of Regulation 9(1)(a) of Annex I from oil tankers which load oil other than crude oil in bulk. - *All ports having ship repair yards or tank cleaning facilities* These ports shall 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.

Regulations of Annex I of MARPOL 73/78	**Summary of the requirements**
Regulation 12 Reception Facilities	In addition reception facilities should be provided in: - *All ports and terminals which handle ships provided with the tank(s) required by Regulation 17 of Annex I.* All facilities provided to the abovementioned ports and terminals shall be sufficient to receive all residues retained according to Regulation 17 from all ships that may reasonably be expected to call at such ports and terminals. - *All ports in respect of bilge waters and other residues, which cannot be discharged in accordance with Regulation 9 of Annex I.* 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 with Regulation 9. - *All loading ports for bulk cargoes in respect of oil residues from combination carriers which cannot be discharged in accordance with Regulation 9.*

Ports involved in the project have in principle to provide reception facilities for either oily bilge water and oil residues as long as due to the effect of MARPOL Annex I Regulations which apply to designated Special Areas, the discharge of non – processed oily bilge water and oil residues is prohibited. Ports handling ocean tonnage should be able to accept larger quantities of oily bilge water while proportionately smaller facilities should be provided at ports serving coastal vessels.

Ships equipped with oily-water separating equipment are not expected to require substantial reception facilities if such effluents are allowed to be discharged also in port areas. There is also a need for facilities to receive dirty ballast water from bunker fuel tanks. Although MARPOL 73/78 prohibits "new" ships over certain tonnages from ballasting bunker fuel tanks, except under abnormal conditions, existing ships have to ballast their bunker tanks to maintain stability for safety reasons.

IMO recommends that some 50 to 60 per cent of ships may sometimes be faced to this requirement and facilities for these residues will be needed at the great majority of ports. However, it was not possible during the project through the input provided by the voluntary response of ships that happened to call to the ports involved, to identify cases where oil contaminated ballast water was requested to be delivered from ships other than oil tankers.

2.1.3 Oily mixtures and residues produced in the machinery spaces of ships and management practices implemented onboard

From the normal operation of ships, different oil liquid and semi-liquid wastes are produced in their machinery spaces which can be broadly distinguished to:

- Oil residues from the purification of fuel and lubricating oil
- Oily leakage from machinery spaces
- Exhausted or contaminated oils
- Oily bilge water

Certainly, there are also other almost solid residues such as oily rags, solid deposits from the oil water separating and filtering equipment, residues from scavenging parts, dirty grease including this one originated from other shipboard spaces, etc. which can be dealt with in the framework of Annex V of MARPOL 73/78 (as special garbage items).

Oil residues that originate during storage and treatment of fuel oil and lubricating oil are produced basically:

- in fuel oil storage tanks
- during purification of fuel oil in settling tanks, separators, filters and the daily supply tanks
- in the lubricating oil separating systems

The volume of sludge produced in the engine room of ships, varies depending on the quality of fuel oil and the compatibility of different grades used on board. The use of low grade fuels is invariably resulting to increasing volumes of residues during the purification process. Fuel oil refers to residual fuel oil that remains usually from the atmospheric distillation process. The majority of marine diesel engines uses Intermediate Fuel Oils for propulsion purposes, produced by blending of the residual fuel oils with marine distillate fuels to obtain the required viscosity (the most commonly used fuel oils from ships are the IFO 180 and IFO 380 with viscosities of 180 and 380 centistokes at 50^0C). The ISO 8217 standard distinguishes 13 grades of residual marine fuel oils which practically all of them (apart the first two RM A 10 and RM B 10) require onboard purification in ordinary purifiers/clarifiers or other specially designed separators.

Almost all ships use Marine Diesel Oil, a light distillate without residual fuel oil as fuel in generators and auxiliary equipment in port areas, while specialized types of ships such as high speed ferries can use marine distillates such as Marine Gas Oil. Several efforts are currently made to reduce either the volume of sludge such as new generations of heavy fuel oil purifiers which

have been developed to reduce the volume of sludge and to cope with the increasing density of fuel oils, or in the shipbuilding and designing phase to reduce fuel consumption (such as the optimization of hull form through the incorporation of computational fluid dynamics calculations in hull designing or the use of aluminum which is about half the weight of steel for equal strength in high-speed craft, superstructures in ferries and cruise ships, etc.).

A diesel propelled ship using residual fuel oil may accumulate sludge from the onboard fuel oil processing at a rate normally not exceeding 1 per cent of the fuel consumption. In broad terms, a 10,000 BHP ship at sea under power may accumulate oil sludge at a rate of about 0,25 metric tons per day. Ships are required to be provided with sludge holding tanks of sufficient capacity in conformance with Regulation 17 of Annex I of MARPOL 73/78. These tanks are identified in the Supplement to the International Oil Pollution Certificate. Piping to and from sludge tanks do not have direct connection overboard, other than the standard discharge connection to enable delivery to port reception facilities.

Ocean-going diesel propelled ships with sludge holding tanks of between 5 and 10 metric tons should provide for 15 to 25 days of steaming without having to empty the sludge tanks. Research on the sludge production onboard ships has demonstrated that sludge generation represent 1. 0 – 2.0 % of the daily fuel oil consumption and also represent 0.5 % of the daily Marine Distillate Oil consumption, as presented in the following table:

Quantity of oil residues (sludge) generated during normal operation of ships	
Residues at HFO operated engines	1.0 – 2.0 % of the daily consumption
Residues at MDO operated engines, generators and auxiliary systems	0.5 % of the daily consumption

As it will be explained later in this Report, for simplicity reasons, a sludge production factor equal to 2% of the daily fuel consumption was used in estimating oil residues from both fuel oil and marine diesel oil use.

Tanks for separated sludge are commonly equipped with tank heating systems. The heating system is designed to enable heating of the oil sludge up to 60^{o}C. The suction line from the sludge tank to the pump should be provided with heating tracing. It is also a common practice that the sludge tank is preferred to be located below the heavy fuel oil purifier. In addition to the provision of sludge tanks, another means for the disposal of oil residues could be the approved oil sludge incinerators. Such a system consists of an oil burner, an oil sludge processing system including a tank for

mixing oil residues with fuel oil, an oil sludge preheating system, a filter and a homogenization system as well as tank/s for separated sludge.

The other component of sludge is represented by:

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

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

Exhausted oils are identical to used lubricating oils or waste oils which have gone through their intended use cycle and must be disposed of or treated for re-use. Lubricating oils are complex mixtures of hydrocarbons containing linear and branched paraffins, cyclic alkanes and aromatic hydrocarbons. Used lubricating oils are present in the general oily wastes stream without however, constituting its main component. The collection of separated, exhausted oils in ports where depots or facilities engaged in re-refining processes of waste oils, operate in the proximity of the port area, could contribute to their re-use.

Separate tanks of appropriate size are recommended to be installed onboard ships. If an exhausted oil tank is installed, in addition to the requirements of Regulation 17 of MARPOL 73/78, Annex I, it should be of sufficient capacity to receive lubricating oil or other oils and hydrocarbon-based liquids from engine-room systems being exhausted due to deterioration, contamination or due to maintenance activities. The oil being discharged from the 15ppm equipment may also be discharged to this tank. For main and auxiliary engines, which require a compete change of the lubrication oil at sea, the capacity of the tank should be determined as $1,5m^3$ for each 1,000 kW engine rating.

Oily bilge water is a mixture of fuel oil, sea water, fresh water, cooling water, leakage oil and lubricating oil. In practice, bilge water may contain cleaning agents such as boiler additives or additives for cooling water to prevent corrosion, detergents, drainage from handbasins situated in the engine room.

The quantity of oily bilge water that can be accumulated in the bilge wells or the dedicated holding tanks of a ship depends on:

- The type, age and maintenance condition of main and auxiliary engines

- The cleaning and repair intervals

- The technical operations performed in the machinery spaces

- The motivation, awareness and qualification of ships personnel

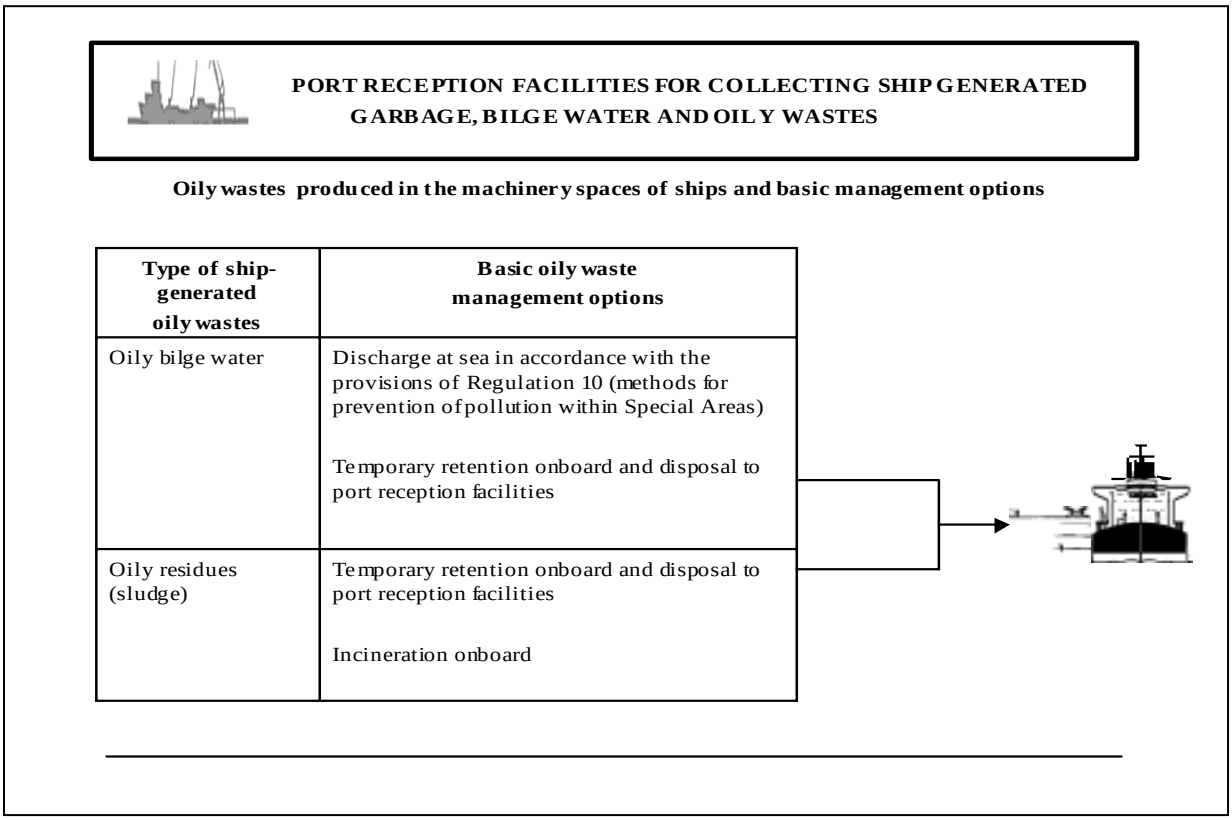
Research on this field has shown that the quantity of oily bilge water in the range of 1 – 10 cubic meters on medium and large vessels per day and 0.1 – 3 cubic meters on ships engaged in near coastal voyages. A bilge-water

holding tank is arranged to receive the daily generation of bilge-water before this water is discharged through the 15 ppm overboard.

A bilge-water holding tank enable ships to operate safely during ports visits, during operation in special areas and coastal waters and during periods of maintenance of the oily water filtering equipment. It has also proved that a bilge-water holding tank also provides additional safeguards in the purification of oily bilge-water when quick-separating detergents are used for cleaning purposes. Bilge-water holding tanks, if fitted, usually have a capacity that provides the ship with the flexibility of operation in ports, coastal waters and special areas, without the need to discharge oil bilge water overboard. Since the average main engines power rating of ships calling normally at the ports of the project was not intended to be reflected in the questionnaires used, a correlation between the gross tonnage of diesel engine ships and the potentially estimated volume of oily bilge water that could be accumulated on a daily basis for water and oil cooling/lubricating shafts was used *(Hellenic Ministry of Merchant Marine, Marine Environment Protection Directorate, 1990).*

Gross Tonnage (grt)	**Estimated daily volume of oily bilge water (lts/day)**		
	Water based cooling/lubricating engine shaft	Oil based lubricating engine shaft	Volume used in the calculations for tonnage scales
< 400	100	50	75
400 – 3.000	100 – 500	50 – 250	375
3.000 – 5.000	500 – 1.500	250 – 750	1.125
5.000 – 7.000	1.500 – 2.500	750 – 1.250	1.875
7.000 – 10.000	2.500 – 4.000	1.250 – 2.000	3.000
> 10.000	>4.000	> 2.000	5.000

In the following diagram, the basic management options for both oily bilge water and oil residues are schematically presented:



2.1.4 Calculation basis for oily wastes streams volumes

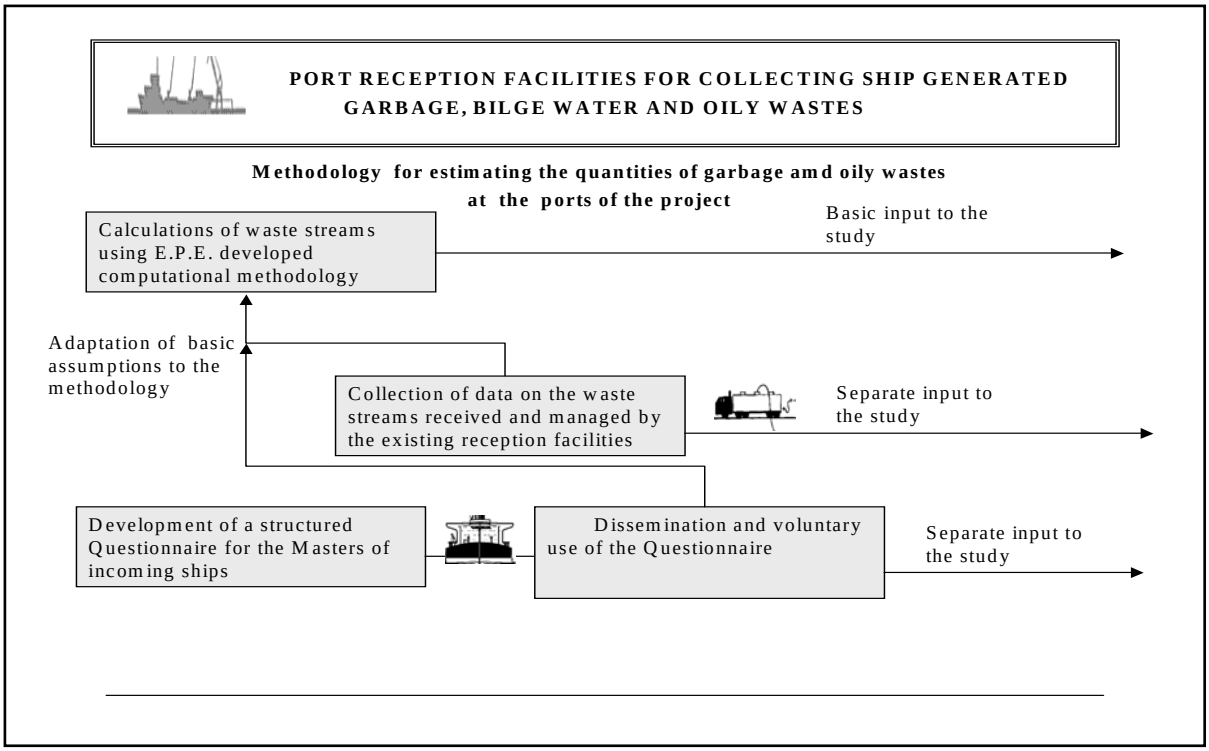
In estimating the quantities that are likely to be collected at ports, the following basic assumptions and criteria were used:

- The ships calling at the ports of the project take all necessary steps to ensure that residues on arrival are reduced as far as possible, in compliance with the relevant provisions of Annex I of MARPOL 73/78 related with the retention of oil onboard and discharge requirements,

- The waste production factors for oily bilge water and oil residues used in the calculations are those provided before, adapted appropriately according to the feedback offered by the voluntary response of the Masters of ships that happened to call at the ports during the project. Apart any necessary adaptations, data received either from the waste handling contractors, port authorities, terminal operators and the Masters of ships are provided as a separate input, as shown in the following diagram.

- The average duration of ships' transit and stay at a port area which is an important variable in estimating the volume of oily wastes to be collected, was extracted from the completed questionnaires.

The methodology used is schematically shown below:



The formulas as well as the basic assumptions used in estimating the production of oil residues and oily bilge water are as follows:

$$Q_t = Q_{sl} + Q_m \quad (m^3/day)$$

$$Q_{sl} = \frac{N_1 * P_{sl} * T}{365}$$

$$Q_m = \frac{N_2 * P_m * T}{365}$$

where:

Q_t = Volume of oily wastes from the machinery spaces of ships to be received (m^3/day)

Q_{sl} = Volume of oil residues (sludge) to be received (m^3/day)

Q_m = Volume of oily bilge water to be received (m^3/day)

N_1 = Number of ships calling at the port annually

N_2 = Number of ships without oily bilge water separating and filtering equipment (with only bilge holding tanks) calling at the port on an annual basis

P_{sl} = Oil residues daily production (0.02 x fuel oil daily consumption per day *(gr/HP * hr)* of voyage (m^3/day)

P_m = Oily bilge water production per sailing day from N_2 ships calling at the port (m^3/day)

T = Average duration of voyage before calling at the port and stay at the port area (days)

For the needs of the project, the daily oil residues production was estimated as a function of the residual fuel consumption using 0.02 as coefficient factor. There is no doubt that marine diesel engines are the predominant type of power unit in the maritime industry for propulsion and auxiliary power generation. In 1991, diesel engine ships accounted for about 98% of the world merchant fleet while the remaining 2% used steam plants (Lloyd's Register 1993). As fuel consumption is related with the engine horse power (considering for simplicity reasons that the consumption remains the same for both cruising underway and maneuvering), the engine horsepower of ships calling at the ports of the project was correlated to their deadweight tonnage by using the equation *HP = Dwt * Dwt Coef + b* (where *Dwt Coef* corresponds to a coefficient factor for different types of ships and b an intercept, both calculated from regressions made by E.P.A. (2000).

In accordance with the requested information by the Port Authorities and Terminal Operators on the ports traffic, the major types of ships were given an estimated horsepower from which the daily production of oil residues was calculated.

Type of ship	***Dwt coefficient***	***b***
Bulk carrier	0.0985	6726
Tanker	0.183	6579
General cargo ship	0.288	3046
Container ship	0.800	-749.4
Passenger ship	6.810	- 4877

The abovementioned approach was considered to be more realistic since a number or dedicated terminals normally accommodate uniform ships' sizes with high main engine outputs and consequently potentially higher fuel oil consumption rates. This is particularly true for the large container ships

(more than 2.500 TEU) with engines output to be up to 60.000 BHP or similarly for large displacement cargo ships.

2.2 Garbage

2.2.1 Criteria for discharging garbage from ships into the Mediterranean Sea

Regulation 5 of Annex V of MARPOL 73/78 provides requirements for the disposal of garbage within Special Areas.

In accordance with the provisions of this Regulation, disposal into the sea of the following items is prohibited:

- all plastics, including but not limited to synthetics ropes, synthetic fishing nets, plastic garbage bags and incinerator ashes from plastic products which may contain toxic or heavy metal residues; and

- all other garbage, including paper products, rags, glass, metal, bottles, crockery, dunnage, lining and packing materials;

Disposal into the sea of food wastes shall be made as far as practicable from land, but in any case not less than 12 nautical miles from the nearest land which is the baseline from which the territorial sea under the jurisdiction of each coastal state is measured. The garbage disposal requirements from ships within and outside Special Areas are presented in the following table:

Type of garbage	Garbage Disposal from Ships	
	Outside Special Areas	**Within Special Areas**
Plastics, including synthetic ropes, fishing nets and plastic garbage bags.	Disposal Prohibited	Disposal Prohibited
Floating dunnage, lining and packing materials.	> 25 miles offshore	Disposal Prohibited
Paper, rags, glass, metal, bottles, crockery and similar refuse.	> 12 miles	Disposal Prohibited
All other garbage including paper, rags, glass, etc. comminuted or ground.	> 3 miles	Disposal Prohibited
Food waste not comminuted or ground.	>12 miles	>12 miles
* Food waste comminuted or ground.	> 3 miles	> 12 miles
Mixed refuse types.	**	**

* Comminuted or ground garbage must be able to pass through a screen with mesh size no larger than 25mm.

****** When garbage is mixed with other harmful substances having different disposal or discharge requirements, the more stringent disposal requirements shall apply.

The abovementioned requirements do not apply to:

(a) the disposal of garbage from a ship necessary for the purpose of securing the safety of a ship and those on board or saving life at sea; or

(b) the escape of garbage resulting from damage to a ship or its equipment provided all reasonable precautions have been taken before and after the occurrence of the damage, for the purpose of preventing or minimizing the escape; or

(c) the accidental loss of synthetic fishing nets, provided that all reasonable precautions have been taken to prevent such loss.

2.2.2 Annex V – MARPOL 73/78 Regulations dealing with the provision of Reception Facilities in ports

Regulations 5 and 7 provide requirements with respect to the establishment and operation of port facilities for receiving garbage from ships.

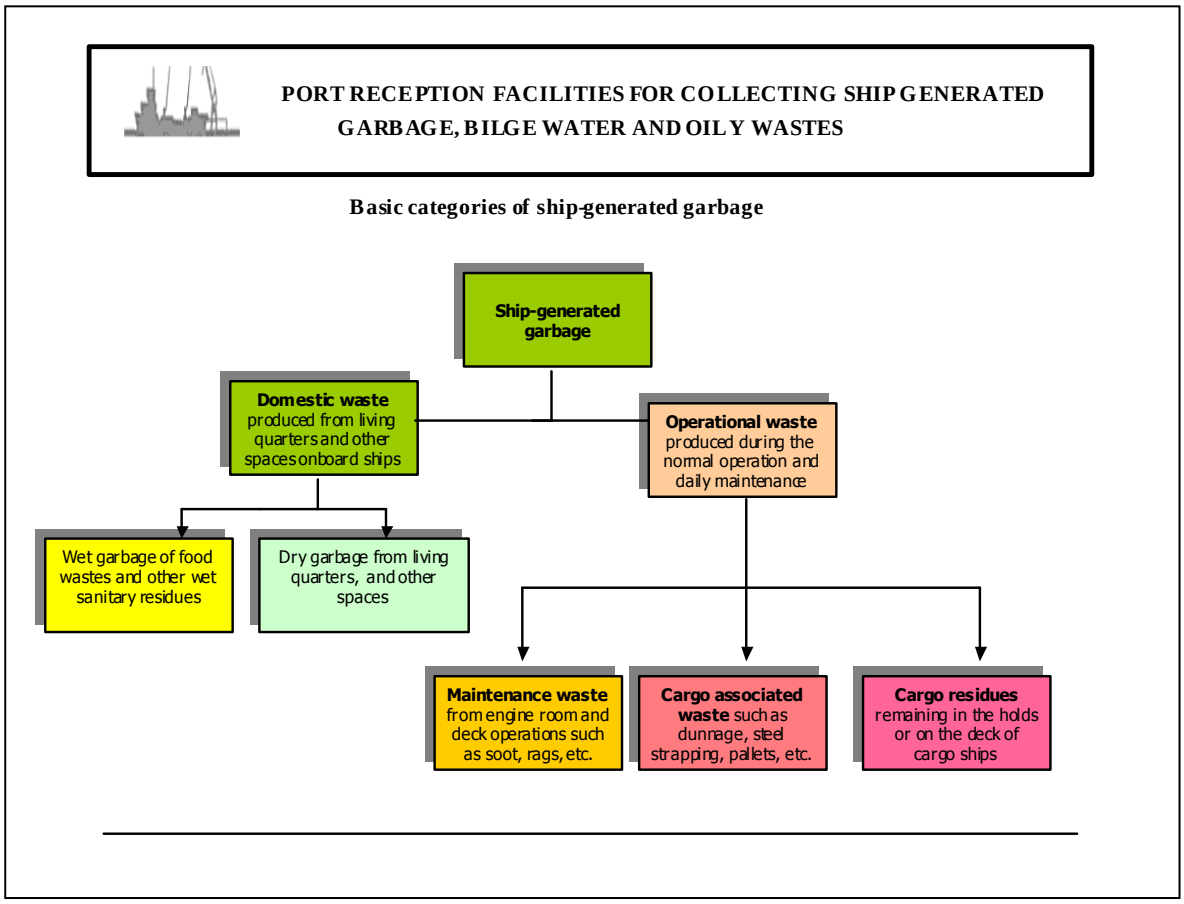
Regulations of Annex V of MARPOL 73/78	Summary of the requirements
Regulation 5 ***Disposal for garbage within Special Areas***	The Government of each Party to the Convention, the coastline of which borders a special area, undertakes to ensure that as soon as possible in all ports within a special area adequate reception facilities are provided in accordance with the Regulation 7, taking into account the special needs of ships operating in these areas.
Regulation 7 ***Reception Facilities***	The Government of each Party to the Convention undertakes to ensure the provision of facilities at ports and terminals for the reception of garbage, without causing undue delay to ships, and according to the needs of the ships using them.

2.2.3 Ship – generated garbage and current management practices implemented onboard

Ship-generated garbage can be divided into the following categories:

Domestic wastes including wet and dry garbage, represent all types of food waste and wastes generated in the living quarters of a ship such as paper products, textiles, glass, rags, bottles, plastics, etc. Domestic wastes consists of food wastes generated in the galley and dining rooms and of all materials contaminated by such waste and disposed of as solid materials and also of refuse produced in living spaces of crew and passengers including paper products, textiles, glass, rags, bottles, plastic items, etc. Garbage of this type can also originate from medical spaces including expired medicines, lining and packing material, sweepings, etc.

Operational wastes that consists of *cargo-associated wastes* originated from cargo stowage and handling works in general and *maintenance wastes* collected by the engine department and the deck department while maintaining and operating the vessel. In this category, also small quantities of solid cargo residues are included. Usually about 1.5 – 2.5 kgs of domestic waste is generated on a daily basis per person on a commercial, cargo ship and about twice as much on a passenger ship. On average, 75% per weight and 10% per volume of domestic waste is food waste and the remaining 25% per weight and 90% per volume is refuse as delineated before.



In respect of the cargo-associated waste, there is no doubt that both the increase of the containerization of maritime transport and also the need for more efficient and clean loading unloading operations have reduced the quantities of this type of waste. Waste due to break bulk cargo operations remains the largest source of shipboard solid waste in both volume and weight.

Such waste consists of dunnage, pallets, paper and cardboard material, wire and steel strapping, etc.

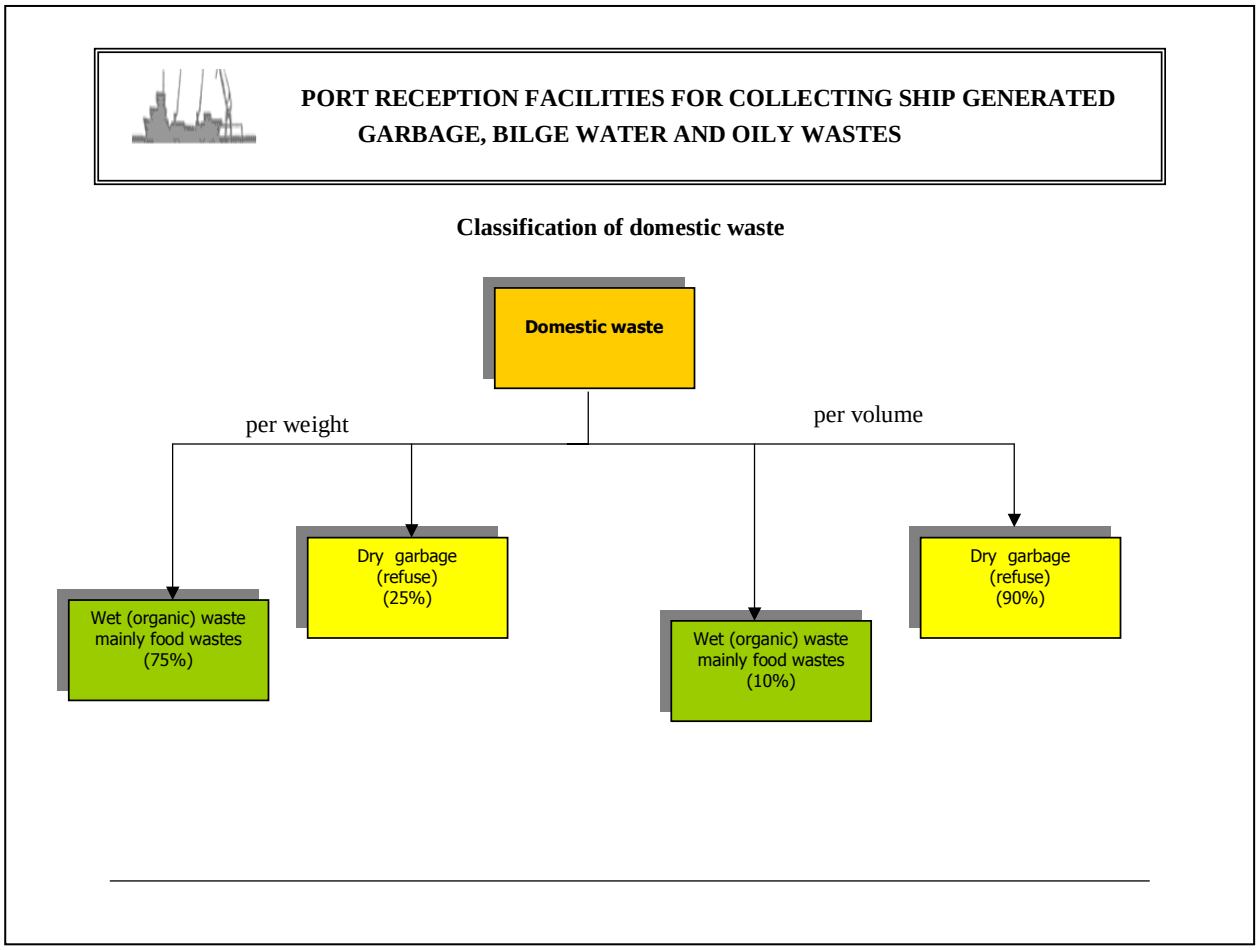
A variety of works carried out onboard ships normally, such as cleaning of boilers, tanks, decks and platforms result in the production of maintenance wastes, the quantity of which that can be accumulated on a large sea-going ship could exceed 20 kgs daily.

Other than routine maintenance, carried out in port including major and overhaul work would be additional to the abovementioned figure.

The table below provides some average figures of wastes generated by the engine and deck department while operating and maintaining a vessel, provided by the IMO respective Guidelines mentioned in the beginning of this Report.

Maintenance waste per day on a medium sized ship	
Kind/origin of waste	**Quantity (kgs/day)**
Soot and machinery deposits	4
Paint scraping waste	3
Wiping wastes and rags	3
Sweepings	1

The composition of domestic waste is schematically presented in the following diagram.



The following table provides an arbitrary estimate of cargo associated waste per kind of cargo handled in a port.

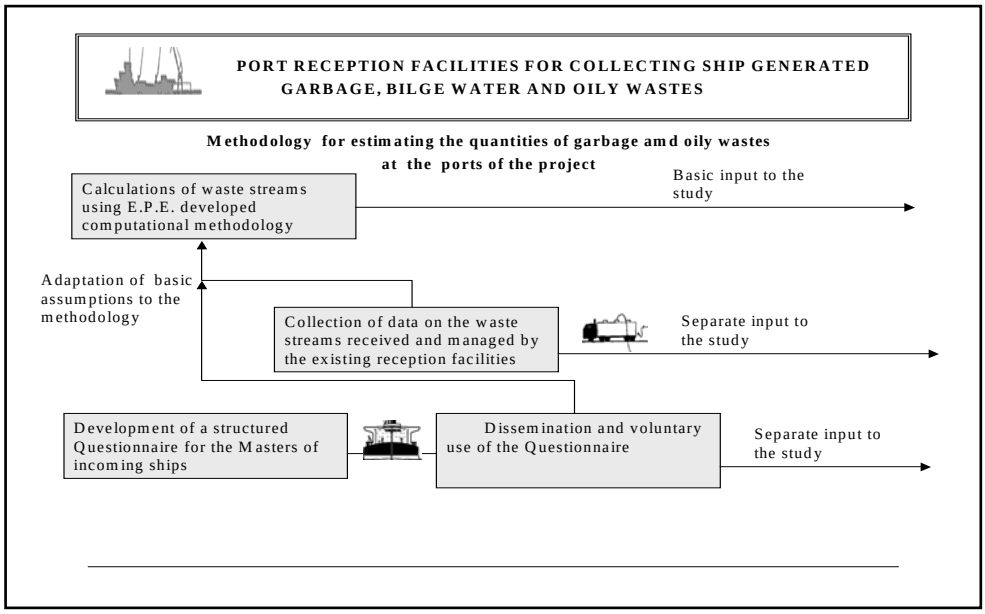
Quantities of cargo- associated waste	
Kind of cargoes	**Cargo generation factor(tons of waste per quantity of cargo)**
Break bulk cargoes	1 : 123
Dry bulk cargoes	1 : 10.000
Containerized cargoes	1: 25.000

2.2.4 Calculation basis for garbage streams volumes

The calculation of the volumes of garbage that are likely to be collected at a port reception facility was based on the following assumptions and criteria:

- Ships calling at the ports of the project take steps to ensure that garbage is collected in a manner consistent with the requirements of Annex V of MARPOL 73/78 and predominantly that illegal discharges do not occur at sea while engaged in voyages within the Mediterranean sea or other navigable areas.

- Garbage production factors used in the formulas which are presented below are those described before, adapted appropriately according to the feedback offered by the voluntary response of Masters of ships that happened to call the ports of the project. Apart any necessary adaptation, data received either from the waste handling contractors, port authorities, terminal operators and the Masters of the ships are provided as a separate input, as shown in the following diagram.



- The average duration of ships' transit and stay at the port area was extracted from the completed questionnaires.

The volumes of domestic, maintenance and cargo – associated waste are calculated from the following formula:

$$G = G_D + G_M + G_C \quad \text{(kg/week)}$$

or

$$G = G_D + G_M + G_C / \rho \quad \text{(m}^3\text{/week)}$$

(where ρ=250 kg/ m^3 the average density of shipboard garbage)

where:

G = the quantity of garbage received in peak seven day period (kg/week)

G_D = the quantity of domestic solid waste received in a peak seven day period (kg/week)

G_M = the quantity of maintenance solid wastes received in a peak seven day period (kg/week)

G_C = the quantity of cargo associated waste received in a peak seven day period (kg/week)

Quantity of domestic waste

$$G_D = G_B + G_P + G_H$$

$$G_B = N_B * T_B * Q_B * P_B$$

where

G_B = quantity of domestic garbage received in peak seven day period from sea-going cargo ships (kg/week)

N_B = number of cargo ships calling at the port in the same period

T_B = average duration of voyage and stay at the port of sea going cargo ships (days)

Q_B = average daily domestic garbage generation rate on sea-going cargo ships (2.0 kg/person and day)

P_B = average number of persons onboard a typical sea-going cargo ship (persons/vessel)

$$G_P = N_P * T_P * Q_P * P_P$$

where

N_P = number of passenger ships calling at the port in the same period

G_P = quantity of domestic garbage received in peak seven day period from passenger ships (kg/week)

T_P = average duration of voyage and stay at the port this kind of ships (days)

Q_P = average daily domestic garbage generation rate on passenger ships (3.0 kg / person and day)

P_P = average number of persons onboard a typical passenger ship (persons/vessel)

$G_H = N_H * T_H * Q_H * P_H$

where

N_H = number of harbour craft engaged in the port operation

G_H = quantity of domestic garbage received in peak seven day period from harbour craft (kg/week)

T_H = average duration of voyage and stay at the port of harbour craft (7 days)

Q_H = average daily domestic garbage generation rate on harbour chart (1.0 kg/person and day)

P_H = average number of persons onboard a typical harbour craft (persons/vessel)

Quantity of maintenance waste

$G_M = N * T * M$

N = number of vessels in port during a peak seven-day period (vessels/week);

T = average duration of ships' transit and stay at the port area (days);

M = average quantity of maintenance solid wastes generated daily from a typical vessel (11 kg/vessel-day)

Quantity of cargo – associated waste

$$G_C = C_B + C_D + C_C$$

where:

$C_B = W_B * 1/123$ = quantity of break bulk cargo solid wastes received in a peak seven-day period (kg/week);

W_B = quantity of break bulk cargo received in a peak seven-day period (kg/week);

1 / 123 = break bulk cargo waste generation factor;

$C_D = W_D * 1/10{,}000$ = quantity of dry bulk cargo solid wastes received in a peak seven-day period (kg/week);

W_D = quantity of dry bulk cargo received in a peak seven-day period (kg/week);

1/10,000 = dry bulk cargo waste generation factor;

$C_C = W_C$ 1/25,000 = quantity of container cargo solid wastes received in a peak seven-day period (kg/week);

W_C = quantity of container cargo received in a peak seven-day period (kg/week);

1/25,000 = container cargo waste generation factor.

2.2.5 Projection of wastes production and collection

The quantity of wastes generated during the normal operation of ships is influenced by a variety of circumstances and factors which are either related directly to the cargoes' carriage process (representing the material input from which wastes are produced or to the daily operation of ships in combination with any waste prevention efforts dictated by their management including planned maintenance, use of new environmentally sound marine technologies, etc.

It's really difficult to develop and apply a projection scheme for ship-generated wastes production as it has been conceived and used in the case of land-based waste streams such as municipal waste or specific industrial wastes for which close links between the economic or production activity and wastes generation has been demonstrated.

It is a fact that reliable and comprehensive information on waste produced by ships is even today not sufficient making the analysis and forecast of future developments on waste generation more difficult.

The use of waste generation factors for both oily wastes and garbage from ships in estimating the potential volume produced from the last port of call or from the last port where wastes were delivered in conjunction with the actual number of ships calling at a port led to the argument to correlate the future volumes of waste streams with the anticipated growth or decline of traffic at each port (as estimated from the last three years period data).

The projection of volumes of wastes that could be collected at each port was based on the following assumption which excludes the effect of a number of factors (waste prevention measures, port state control procedures, charging systems, etc) :

$W_t = f(W_{bs}, T_i)$ = average annual change of traffic (%) X W_{bs}

where
(*f*) underlines the simple linear function of waste production onboard ships with the port traffic development, so that a 5 % increase of the number of ships calling at a port annually increases proportionally 5% the wastes produced that could be delivered to the port reception facilities, and

(W_t) is the estimated volume of the two major waste streams, oily wastes and garbage in the near future *t* (Ti means 2004 and 2005 years).

(W_{bs}) is the baseline estimate of both oily wastes and garbage streams which is also considered as identical for 2003 due to the uncertainty of the port traffic progress in relation with the last three years period.

It should be noted that the abovementioned approach is subject to considerable margins of error due to the quality of data used and the exclusion of factors outlined before.

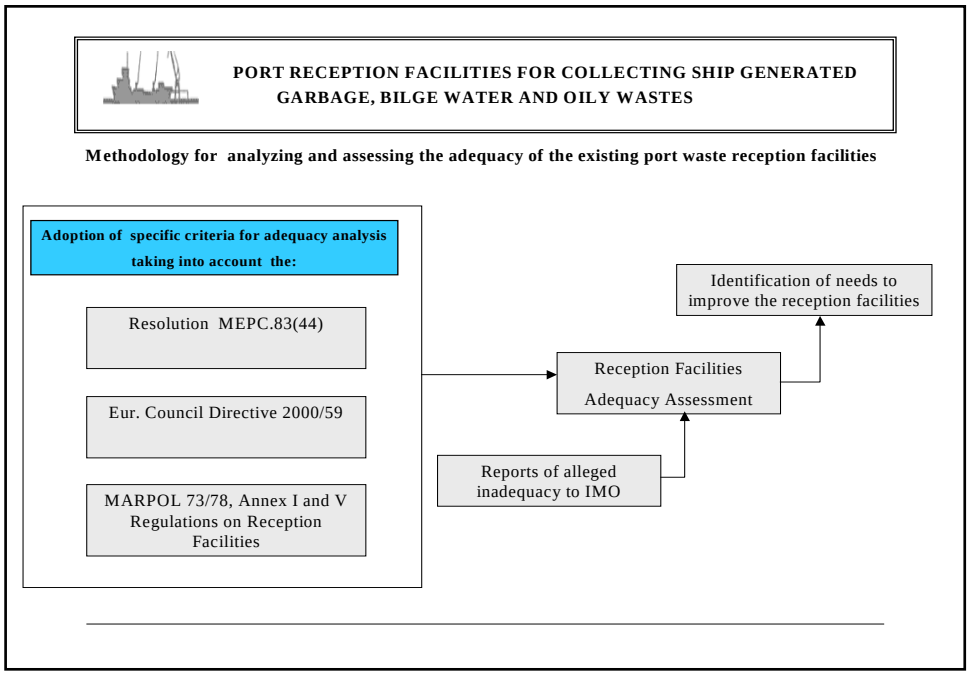
3. METHODOLOGY

3.1 Maritime traffic data and analysis

The collection and analysis of information regarding the maritime traffic and the carriage of cargo or passengers at each port, was essential for the preparation of the variables used in the formulas to estimate the potential for delivery volumes of ship-generated waste. The methodology used for the collection and analysis of these data consisted of the collection of data through the No.2 and 3 questionnaires (developed for oil terminals and ports respectively) as well as from other sources.

3.2 Methodology for analyzing 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, valorization 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.

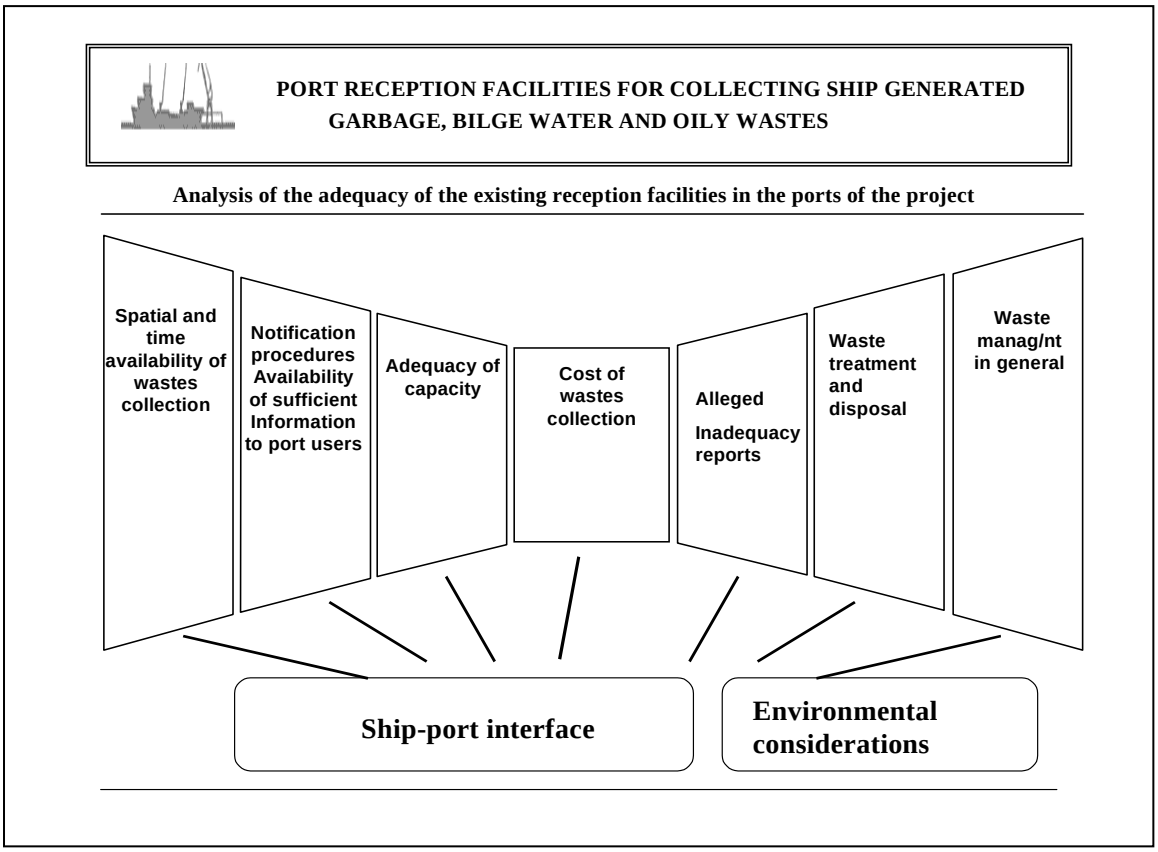
The first set provides a series of criteria emphasizing on the operational needs of ships normally calling at the ports and terminal of the project. There is no doubt that a port to become successful and adequate in providing reception facilities for ship-generated waste, should have regard to the

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 deballasting 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 minimize 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 *(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. ▪ 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. ▪ 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 analyzed, 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.

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.

It was witnessed during the missions that some fixed port based facilities for collecting and treating oily wastes were faced with operational problems due to the incompatibility of the applicable treatment method and the nature of the treated mixtures.

- **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.

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).*

Disposal of oily semi-solid sludge produced either as a secondary waste from treatment processes or, as heavy scale and sludge from tank cleaning activities collected in port areas (in particular in ship repairing zones and tank cleaning facilities) was another issue to which the assessment concentrated, attempting to verify the compliance of disposal options with the existing legal requirements.

In respect of garbage collected from ships, it was endeavored 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 recordkeeping 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 comprises the major ports of Durres and Vlore and the relatively smaller in terms of size and traffic, ports of Shengjin and Saranda. Port of Durres handles almost 85% of the total volume of goods discharged from or loaded to ocean going ships.

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 Industry, Transport and Trade, 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 is indicated below. The oil terminal in Saranda is not in use.

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	✔					✔	

B. Legislative framework for port reception facilities and waste management

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.

The 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 succeeded 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 Pollution 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 is compulsory for ships that enter the ports of the country in accordance with the Article 12 of the Law and also of oily wastes in Durres, giving 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 facilities. 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 Transport and Communications, the Ministry of Industry and Energy, the municipalities and the private sector, which is particularly active in the ports of the country.

C. Port Reception Facilities - Analysis

A. General Information

Port	Durres
Port Authority	Durres Port Authority

B. Type and operation of the port

The port of Durres is the most important port of the country in terms of size and traffic, but also due to its association with the European Corridor 8. The port handles almost 85% of the country's maritime traffic, which is basically related to cargoes such as minerals, fuel oil, cement and a limited number of containers. The majority of the traffic to and from the port comes or is destined for adjacent ports and terminals in Italy, Greece, Slovenia, and Croatia.

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. 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. Data with respect to the cargo ships' traffic and the cargo throughput is presented in the following table:

Year	Number of cargo ships	Containerised cargo throughput *(TEUs)*	Oil products throughput *(met. Tonnes)*	Bulk liquid products other than oil *(met.Tonnes)*	Solid bulk and general cargoes *(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

The port provides 8 berths, 7.33 – 9.85 meters deep, and 16 – 421 meters long where ships up to 200 meters long and 30.000 dwt can be accommodated.

Number of berths	**Actual Depth (m)**	**Berths lengths (m)**	**Type of ships that can be accommodated**	**Maximum size of ships**	
				LOA (m)	DWT (t.dw)
8	7,33 - 9,85	16 - 421	All types	220	30.000

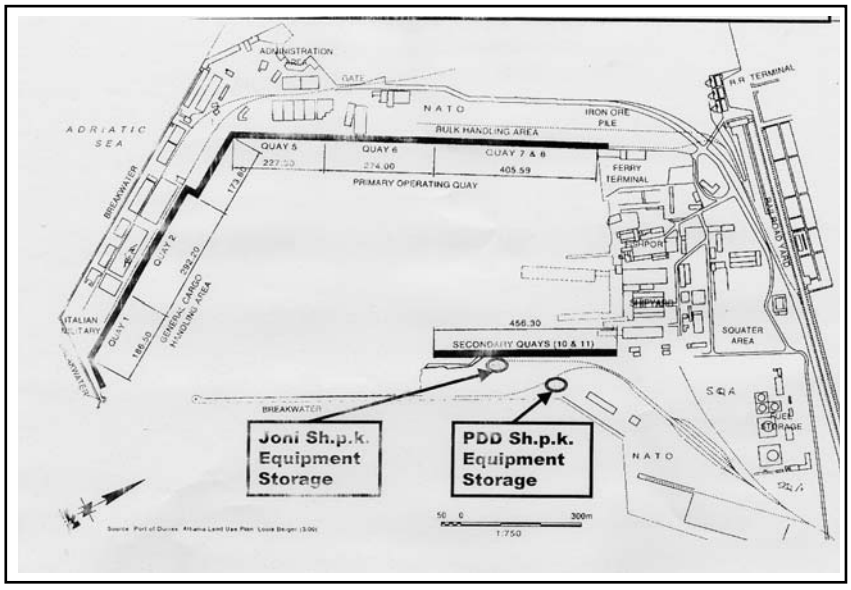
The port has already been subject to a Development Study in the form of Master Plan financed from the World Bank.

	Passenger ships				
Year	Number of ships	Average Size of ships *(grt)*	Average number of persons onboard	Average duration of stay at the port *(hours)*	Average duration of voyage from last port of call *(hours)*
2002	1.749	1.500	800	8 - 24	12
2001	1.683				
2000	1.978				

	Cargo ships				
Year	Number of ships	Average Size of ships *(grt)*	Average number of crew onboard	Average duration of stay at the port *(days)*	Average duration of voyage from last port of call *(days)*
2002	1.098	3.000	8	4	2
2001	1.089				
2000	1.142				

C1. 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 and berthed pier side.



The Porto Romano based, treatment facility operated by P.D.D. consists of a 20 tons/day employing a two phase treatment process that involves heating to enable oil - water separation and an air induced phase to optimize oil recovery and water effluent treatment.

Oil treatment facility in Porto Romano

The treatment facility of Joni sh.p.k. consists of a three phase process able to accomplish a 500 lts/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.

C2. Existing Reception Facilities for garbage

The above - mentioned private companies are also involved in collecting garbage from ships berthed pier side and at anchor, following their authorization from the Port Authority.

P.D.D. sh.p.k provides two, 10 cub. meters capacity, boats and a number of receptacles to enable the physical scheme of the service. Garbage collected is eventually landfilled at a designated, disposal area outside the city of Durres.

Joni sh.p.k provides trucks and receptacles for small volume garbage.

Ship-generated garbage is usually collected in one of the following ways depending on the volume of garbage and the type of ship:

- In the available receptacle brought to the ship filled by its Officers,
- In a receptacle pre-positioned at a site designated for garbage collection, and
- Off-loaded directly to the hauling truck.

Since garbage delivery is mandatory, a fixed fee has been specified by the Ministry of Transport for use in the ports of the country. The applicable fees for garbage collection are variable according to the tonnage of ships, as per the following table:

Ships Dwt range (tdw)	Charge ($ US)
0 - 500	10
500 - 1.000	15
1.000 - 3.000	25
3.000 - 6.000	35
6.000 - 10.000	38
10.000 - 15.000	42
15.000 - 20.000	48
Over 20.000	60

The following table presents the existing reception facilities for garbage and waste oils at the port of Durres.

<table>
<tr><td rowspan="2">Port

Durres</td><td colspan="4">Garbage collection capacity provided in the port (m^3 per allocated means)</td><td colspan="2">Description of port- based treatment of garbage collected from ships</td><td>Operational restrictions on the use of the facilities</td></tr>
<tr><td>Trucks
(used as reception and transportation means)</td><td>Navigable means
(such as barges used as reception and transportation means</td><td>Receptacles provided at the quayside</td><td>Other reception means</td><td colspan="2" rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>8 (15 m^3 each one)</td><td>3 (8 - 10 m^3 capacity each one)</td><td>20 (20 m^3 total capacity)</td><td>1 small debris skimmer vessel</td></tr>
<tr><td>Authorized private companies</td><td colspan="2">Requirements for ships to deliver garbage</td><td>Method of final disposal</td><td>Charging system</td><td colspan="3">Other remarks</td></tr>
<tr><td>1.Izir Karagjozi (PDD)
Tel: 0030355052/ 24228
Mob 00355/ 682043397)
2.Arian Quteza (Joni sh.p.k.)
Tel:00355052/ 31352
Mob:00355/ 692094621)</td><td colspan="2">No requirements</td><td>Disposal at the local landfill a few kms far from the port area</td><td>(Tdw range) $ US

0 - 500 10
500 - 1.000 15
1.000 - 3.000 25
3.000 - 6.000 35
6.000 - 10.000 38
10.000 - 15.000 42
15.000 - 20.000 48
Over 20.000 60</td><td colspan="3"></td></tr>
</table>

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)	
Durres	-	√	√					-	-	*	-	40 max		40 max		No chemicals contaminated wastes can be received

Authorized private companies	**Description of the facility**	**Method of treatment of oily wastes**	**Charging system**	**Other remarks**
1.Izir Karagjozi (P.D.D.) **Tel: 0030355052/ 24228** **Mob 00355/ 682043397)** **2.Arian Quteza (Joni sh.p.k.)** Tel:00355052/ 31352 Mob:00355/ 692094621)	Both companies operate their own storage and treatment facilities outside the port area	Settling, heating and air induced oil water separation (1) 20 tons/day (2) 500 lt/hour	No information	

D. Estimation of waste streams

During the project, 15 ships responded to the request of the Port Authority to complete the Questionnaire that was produced especially to provide an input from the Masters of ships with regard to their needs to use the port reception facilities.

	General cargo ships	Ro-Ro/ Passengers ships	Tankers	Total
Number of ships responded	10	5	-	15
Number of ships that would deliver or delivered oily wastes	10	5	-	15 *(100%)*
Number of ships that would deliver or delivered garbage	10	5	-	15 *(100%)*

The volume of garbage to be delivered varied between 0.1 (from cargo ships) and 4 m^3 (from passenger ships), consisting of segregated plastic, other domestic garbage (rubbish) and mixed garbage including food wastes.

Oily wastes discharged to the port reception facilities consisted of oily residues (sludge), oily bilge water and other waste oils such dirty lub oils, etc. Volumes varied between 0,1 and 1 m^3 (for cargo ships) and 1 - 9 m^3(for passenger ships).

From the calculations of the waste streams that are presented in the following table, collection of oily wastes and garbage by the two private companies match the needs of ships in terms of the daily loads landed as well as the maximum, anticipated volumes in peak periods.

It should be noted that the operational standards of the private sector in the port of Durres, are high, the means are satisfactory which comply with the national requirements, and the workforce and management particularly dedicated to the service they provide.

Garbage collected in the port area is destined for land filling in neighbouring areas, integrating ship-generated waste management to the local waste management.

Port: Durres
Country: Albania

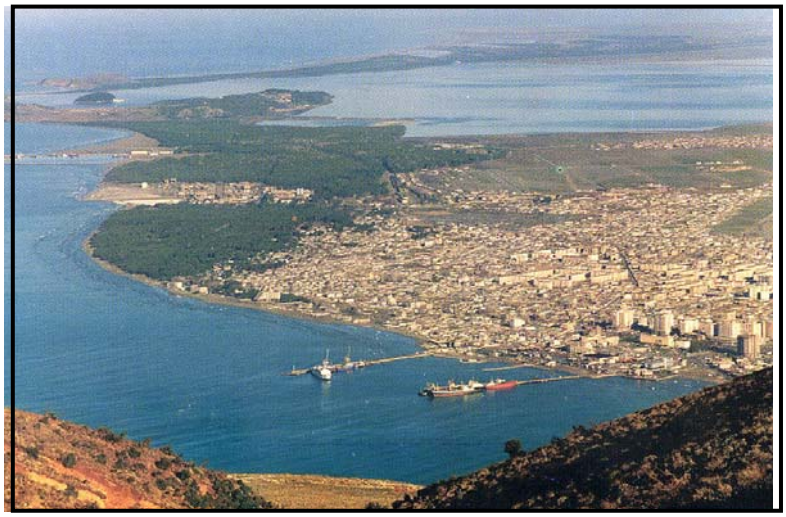
❑ Estimates of ship-generated oily wastes and residues that could be received at the port					❑ Estimates of ship-generated garbage that could be received at the port				
Oily wastes	Dirty ballast	Tank washings	Oily bilge water	Oil residues (sludge) and other waste oils	**Garbage**	Domestic garbage	Maintenance waste	Cargo-associated waste	Total volume of garbage
Reduced daily volume (m^3/day)	-	-	11.5	5.6	Reduced weekly volume (m^3/week)	65.3	3.3	-	68.6
Average annual volume (m^3/year)	-	-	4.233,3	2,061.7	Average annual volume (m^3/year)	3,395.6	176.0	-	3,571.6
Maximum volume per ship/arrival (m^3)	-	-	20.0	15.0	Maximum volume to be received per ship/arrival (m^3) (only domestic and maintenance)				5.0

A. General Information

Port	Vlore
Port Authority	Vlore Port Authority

B. Type and operation of the port

The state managed port of Vlore is the second largest port of Albania situated at the Vlora Bay constituting an open harbour with two main quays and an anchorage. The port, based on governmental investments and funding provided by the World Bank and the PHARE Development Program presents positive development perspectives aimed at improving the existing infrastructure, the optimization of berthing capacities, the construction of a passenger terminal, etc.



At its 360 meters long east quay commercial, cargo ships up to 6.000 tdw. are mainly berthed, while at its 145 long west quay passenger liners and other cargo ships can be accommodated as shown in the following table:

A/A	Name of Berth	Actual Depth (m)	Berth overall length (m)	Type of ships that can be accommodated	Maximum size of ships accommodated LOA (m)
1	East quay	8,0	360	General cargo ships, Ro-Ro, etc.	130
2	West quay	8,5	145	Ro-Ro passenger ships, LPG, other ships	100

The port handles building material, cement, etc. mainly imported from the neighbouring Italy. Data with respect to the maritime traffic and the annual cargo throughput is presented in the following table:

Year	Total number of ships	Oil products throughput *(met. Tonnes)*	Throughput of bulk liquids other than oil *(met. Tonnes)*	Solid bulk and general cargoes throughput *(met. Tonnes)*
2002	1.108	16.927	1.500	669.000
2001	1.059	729	9.126	589.000
2000	728	-	4.717	500.000

At its designated anchorage, on average 150 ships are accommodated monthly either awaiting orders or awaiting berthing in the port.

C. Existing Reception Facilities for oily wastes & garbage

There are not any available, port – based facilities for collecting oily wastes from ships. Shqiponja sh.p.k and L.SH.I sh.p.k. are privately, operated companies authorized by the Port Authority to provide garbage collection services. The above mentioned companies are able to collect garbage for ships berthed pier side while the first one can also accomplish collection from ships at anchor. No notice in advance is required from ships to arrange collection of garbage and there are not any specific separations - containment requirements to follow. Almost all incoming cargo ships deliver garbage which is then transported to the local landfill located about 5 kilometres far from the port area. In 2002, around 230 cub. meters of garbage were collected from 355 ships. Delivery of garbage is mandatory entailing a fixed fee which fluctuates upon the deadweight of ships. The charge is determined by the Ministry of Transport. Two garbage reception trucks of 10 cub. meters capacity and a small, 3 cub. meters holding capacity are used for collecting garbage. Garbage collected is land filled at a designated, disposal area outside the city of Vlore.

The applicable fees for garbage collection are fixed and variable according to the tonnage of ships, as per the following table:

Ships Dwt range (tdw)	Charge ($ US)
0 - 500	10
500 - 1.000	15
1.000 - 3.000	25
3.000 - 6.000	35
6.000 - 10.000	38
10.000 - 15.000	42
15.000 - 20.000	48
Over 20.000	60

The following table provides the existing reception facilities for garbage at the port of Vlore.

<table>
<tr><td rowspan="2">Port

Vlore</td><td colspan="4">Garbage collection capacity provided in the port (m^3 per allocated means)</td><td colspan="2">Description of port- based treatment of garbage collected from ships</td><td>Operational restrictions on the use of the facilities</td></tr>
<tr><td>Trucks
(used as reception and transportation means)</td><td>Navigable means
(such as barges used as reception and transportation means</td><td>Receptacles provided at the quayside</td><td>Other reception means</td><td colspan="2" rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>2 of 10 m^3
and
1 of 3 m^3</td><td>1 reception boat
(3 m^3)</td><td></td><td></td></tr>
<tr><td>Authorized private companies</td><td colspan="3">Requirements for ships to deliver garbage</td><td>Method of final disposal</td><td>Charging system</td><td colspan="2">Other remarks</td></tr>
<tr><td>1. Shqiponja sh.p.k

2. L.SH.I sh.p.k.</td><td colspan="3">No requirements</td><td>Land filling under not strictly controllable conditions</td><td>(Tdw range) $ US

0 - 500 10
500 - 1.000 15
1.000 - 3.000 25
3.000 - 6.000 35
6.000 - 10.000 38
10.000 - 15.000 42
15.000 - 20.000 48
Over 20.000 60</td><td colspan="2"></td></tr>
</table>

D. Estimation of waste streams & Recommendations

Ten ships that called at the port of Vlore during the limited period of the project, responded to the request of the Port Authority to complete the Questionnaire to provide an input with regard to their needs to be provided with reception facilities.

	General cargo ships	Ro-Ro/ Passenger ships	Oil tankers	Total
Number of ships responded	2	7	1	10
Number of ships that would deliver or delivered oily wastes	--	--	--	0 (0%)
Number of ships that would deliver or delivered garbage	2	7	1	10 (100%)

According to the information collected, only two ships were not equipped with oily water separating and filtering equipment.

The volume of garbage that wished to or was actually delivered varied between 0.3 cub. meters (from cargo ships) and 5 m^3 (from passenger ships), consisting of separated plastic, other domestic garbage (rubbish) and mixed garbage including food wastes.

Port:	**Vlore**
Country:	**Albania**

❑ Estimates of ship-generated oily wastes and residues that could be received at the port					❑ Estimates of ship-generated garbage that could be received at the port				
Oily wastes	Dirty ballast	Tank washings	Oily bilge water	Oil residues (sludge) and other waste oils	**Garbage**	Domestic garbage	Maintenance waste	Cargo-associated waste	Total volume of garbage
Reduced daily volume (m^3/day)	-	-	2.6	1.2	Reduced weekly volume (m^3/week)	6.0	4.6	-	10.6
Average annual volume (m^3/year)	-	-	958.5	443.7	Average annual volume (m^3/year)	316.2	242.0	-	558.2
Maximum volume per ship/arrival (m^3)	-	-	10.0	7.5	Maximum volume to be received per ship/arrival (m^3) (only domestic and maintenance)				5.0

No significant changes are expected in the future to the above estimated figures of waste streams

A. General Information

Port	Shengjin
Port Authority	Shengjin Port Authority

B. Type and operation of the port

The port of Shengjin is a small port located in the northern part of the country, some 60 kms north of Durres, representing a commercial port basically engaged in handling of cement, building material, foodstuff, and petroleum products. Government's plans to assess the feasibility for developing and expanding the port have been incorporated into a study financed by the World Bank which actually constitutes an extension of the Durres Port Development Master Plan Study to the ports of Vlore, Shengjin and Saranda.

Data with respect to the maritime traffic and the annual cargo throughput are presented in the following table:

Year	Number of ships	Oil products throughput *(met. Tonnes)*	Solid bulk and general non- containerised cargo throughput *(met. Tonnes)*
2002	234	67.497	2.876
2001	248	97.482	1.876
2000	221	21.035	1.321

Oil products are basically diesel and gasoline discharged to the port for internal distribution purposes (in 2002 46 product carriers discharged 67.497 tons of diesel and gasoline). The berthing capacity of the port is presented below:

A/A	Name of Berth	Actual Depth (m)	Berth length (m)	Type of ships that can be accommodated	Maximum size of ships accommodated LOA (m) – DWT (tdw)
1	Old terminal	5 - 6	80	All types of ships	100 m – 2.500 tdw
2	New terminal	5 - 6	70	All types of ships	70 m – 1.500 tdw
3	East berth	7	270	All types of ships	150 m – 5.000 tdw

C. Existing Reception Facilities for oily wastes and garbage

There are not any available reception facilities for oily wastes from ships. The input that was provided voluntarily by the Masters of ships demonstrated that since the port does not provide this service as systematically provided for garbage, in practice, there are not any requests.

However, it's always recommended that ports open to ocean-going ships should provide a facility to collect even a limited volume of waste oils, at least for those ships whose holding capacity for sludge and bilge oil does not guarantee a voyage to the next port of call without discharging at sea in excess of the permissible levels according to MARPOL 73/78 discharge criteria.

It should be noted that the three oil terminals that operate in the wider port area as oil receiving facilities do not need under the existing legal framework to collect waste oils from ships. Gravity induced oil water separating equipment currently established for processing drainage and run-off in their own tank farms was not considered in this Report, since the total oil throughput of the port has been significantly lower than MARPOL thresholds (1.000 metric tons daily on average).

Kadeli sh. p. k. is the private company, that following its authorization from the Authority of the port, provides garbage collection services operating both land based and navigable means, as outlined in the following table. Garbage collected is transported to the local landfill which is situated 5 kms far from the port area.

Applicable fees for garbage collection are fixed and variable according to the tonnage of ships, as described in the previous ports.

<table>
<tr><td rowspan="2">Port
Shengjin</td><td colspan="4">Garbage collection capacity provided in the port (m^3 per allocated means)</td><td>Description of port- based treatment of garbage collected from ships</td><td>Operational restrictions on the use of the facilities</td></tr>
<tr><td>Trucks
(used as reception and transportation means)</td><td>Navigable means
(such as barges used as reception and transportation means</td><td>Receptacles provided at the quayside</td><td>Other reception means</td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>1 (5 m^3 total capacity)</td><td>1 reception boat
(3 m^3 capacity)</td><td></td><td></td></tr>
<tr><td>Authorized private companies</td><td colspan="2">Requirements for ships to deliver garbage</td><td>Method of final disposal</td><td>Charging system</td><td colspan="2">Other remarks</td></tr>
<tr><td>Gjovalin Kadeli

Tel: 003550281-2221

Mob: 00355-692023489</td><td colspan="2">No requirements</td><td>Landfilling under not strictly controllable conditions</td><td>(Tdw range) $ US

0 - 500 10
500 - 1.000 15
1.000 - 3.000 25
3.000 - 6.000 35
6.000 - 10.000 38
10.000 - 15.000 42
15.000 - 20.000 48
Over 20.000 60</td><td colspan="2"></td></tr>
</table>

D. Estimation of waste streams' volumes

Port: Shenghjin
Country: Albania

❑ Estimates of ship-generated oily wastes and residues that could be received at the port					❑ Estimates of ship-generated garbage that could be received at the port				
Oily wastes	Dirty ballast	Tank washings	Oily bilge water	Oil residues (sludge) and other waste oils	**Garbage**	Domestic garbage	Maintenance waste	Cargo-associated waste	Total volume of garbage
Reduced daily volume (m^3/day)	-	-	2.1	0.8	Reduced weekly volume (m^3/week)	3.2	1.1	-	4.3
Average annual volume (m^3/year)	-	-	784.2	310.2	Average annual volume (m^3/year)	167.1	60.2	-	227.3
Maximum volume per ship/arrival (m^3)	-	-	10.0	7.5	Maximum volume to be received per ship/arrival (m^3) (only domestic and maintenance)				3.5

No significant changes are expected in the future to the above estimated figures of waste streams.

A. General Information

Port	Saranda
Port Authority	Saranda Port Authority

B. Type and operation of the port

The port of Saranda is a small port situated in the southern part of the country close to the border of Greek territory serving limited traffic. It provides two berths able to accommodate ships up to 65 meters long as outlined below:

A/A	Name of Berth	Actual Depth (m)	Berth lengths (m)	Type of ships that can be accommodated	Maximum LOA of ships (m)
1	No 1	5 - 6	75	All types of ships	65
2	No 2	5 - 6	65	All types of ships	50

A limited number of cargo ships call to either to load bulk and general cargoes or to discharge oil products at two terminals outside the port area (one 400 cub. meters storage capacity operating within the local naval base and another located two n. miles south of the port). On average, these cargo ships spend two days on steaming from the last port of call and three days in port to complete the cargo handling operation.

Year	Number of cargo ships	Oil products through out *(met. Tonnes)*	Solid bulk and general non- containerised cargo throughput *(met. Tonnes)*
2002	60	7.200	420
2001	58	6.765	397
2000	56	6.654	386

In accordance with the data collected for the 2000 – 2002 period, 900 passenger ships of various sizes call at the port annually, carrying 120 persons, carrying out near coastal voyages lasting a few hours from neighbouring ports of the country or abroad (Corfu, Patras, Shengjin, etc.) as outlined in the following table:

Year	**Passenger ships**				
	Number of ships	Average size of ships *(LOA meters)*	Average number of persons onboard	Average duration of stay at the port *(hours)*	Average duration of voyage from last port of call *(hours)*
2002	987	40	120	4 - 12	2
2001	876				
2000	765				

C. Existing Reception Facilities for oily wastes and garbage

There are not any facilities available for collecting oily wastes from ships.

One, authorized by the Port Authority, company currently provides garbage collection from ships berthed pier side by using one 1 m^3 container for small volume garbage and a 10 m^3 capacity truck.

Ship-generated garbage is usually collected in one of the following ways depending on the volume of garbage and the type of ship:

- In the available receptacle brought to the ship filled by its Officers,
- Off-loaded directly to the hauling truck.

There are not any port based temporary storage and treatment facilities. The whole service can be considered satisfactory meeting the limited needs of ships that normally call at the port.

<table>
<tr><td rowspan="2">Port
Saranda</td><td colspan="4">Garbage collection capacity provided in the port (m^3 per allocated means)</td><td colspan="2">Description of port- based treatment of garbage collected from ships</td><td>Operational restrictions on the use of the facilities</td></tr>
<tr><td>Trucks
(used as reception and transportation means)</td><td>Navigable means
(such as barges used as reception and transportation means</td><td>Receptacles provided at the quayside</td><td>Other reception means</td><td colspan="2" rowspan="2">There are not available, treatment facilities in the port area</td><td rowspan="2"></td></tr>
<tr><td>1 (10 m^3 total capacity)</td><td></td><td>1 of 1 m^3</td><td></td></tr>
<tr><td>Authorized private companies</td><td colspan="3">Requirements for ships to deliver garbage</td><td>Method of final disposal</td><td>Charging system</td><td colspan="2">Other remarks</td></tr>
<tr><td>Riza Abedin owned Co.

(Mob 00355 - 692483227)</td><td colspan="3">No requirements</td><td>Disposal at the local landfill 1.5 kms far from the port area</td><td>(Tdw range) $ US

0 - 500 10
500 - 1.000 15
1.000 - 3.000 25
3.000 - 6.000 35
6.000 - 10.000 38
10.000 - 15.000 42
15.000 - 20.000 48
Over 20.000 60</td><td colspan="2"></td></tr>
</table>

D. Estimation of waste streams' volumes

Port: **Saranda**
Country: **Albania**

❑ Estimates of ship-generated oily wastes and residues that could be received at the port					❑ Estimates of ship-generated garbage that could be received at the port				
Oily wastes	Dirty ballast	Tank washings	Oily bilge water	Oil residues (sludge) and other waste oils	**Garbage**	Domestic garbage	Maintenance waste	Cargo-associated waste	Total volume of garbage
Reduced daily volume (m^3/day)	-	-	2.4	0.4	Reduced weekly volume (m^3/week)	4.5	2.1	-	6.6
Average annual volume (m^3/year)	-	-	900.0	150.0	Average annual volume (m^3/year)	234.6	112.6	-	347.2
Maximum volume per ship/arrival (m^3)	-	-	10.0	7.5	Maximum volume to be received per ship/arrival (m^3) (only domestic and maintenance)				3.5

No significant changes are expected in the future to the above estimated figures of waste streams.

D. Conclusions & Recommendations

Need for MARPOL 73/78 ratification

As stated in the beginning, Albania is not a Signatory 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 proper reception facilities are not available.

Management of garbage

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. This kind of management becomes more demanding when hazardous wastes produced either during the normal operation of ships or during repairs and other works in ship repairing zones and facilities, are collected for further disposal.

With regard to the burning of garbage onboard the collection boats, it should be mentioned that under the Law on the Environmental Management of Solid Waste, burning, at sea or ashore of ship-generated garbage, is prohibited.

Similarly, incineration onboard ships, is not allowed according to the London Dumping Convention and MARPOL 73/78 Annex VI.

Article 16 of the latter Annex VI, (adopted but not yet in force) prohibits shipboard incineration of the following:

- Annex I, II and III cargo residues and related packing materials,
- Polychlorinated biphenyls,
- Garbage, as defined in Annex V that contains more than traces of heavy metals
- Refined petroleum products containing halogen compounds.

Regulations have been developed in a few countries across the world, aimed to ensuring that special wastes, in practice, potentially hazardous wastes from ships, are handled with responsibility from anyone who may carry and deliver or receive them.

Wastes from ships that could be hazardous are those listed or delineated in terms of the properties they display, in specific catalogues of basic legal instruments such as the Basel Convention, the Barcelona Convention related Hazardous Protocol, the E.U. Council Directive 91/689/EEC, etc.

To indicate a few of these potentially, hazardous wastes from ships, the following table of Wastes and Substances that may be onboard a vessel has been extracted from the "List of hazardous waste and substances under the Basel Convention that are onboard or inherent in the ships' structure when a vessel arrives at a dismantling site" which is incorporated in the Technical Guidelines for the Environmentally Sound Management of the Full and Partial Dismantling of Ships, Decision VI/24 as adopted by the Sixth Meeting of the Conference of Parties to the Basel Convention, 13/12/2002.

Wastes (exluding those specified on List B of the Convention)	**Product where waste may be found**
A 1170 Unsorted waste baterries	Portable radios, torches
A 3140 Waste non halogenated organic solvents	Solvents and thinners
A 3150 Waste halogenated organic solvents	Solvents and thinners
A 4010 Wastes from the production, preparation and use of pharmaceutical products	Miscellaneous medicines
A 4030 Wastes from the production, formulation and use of biocides and phytopharmaceuticals including waste pesticides and herbicides which are outdated, off-specification or unifit for the intended use	Insecticide sprays
A 4070 Wastes from the production, formulation and use of inks, dyes, pigments and paints etc.	Paints and coatings
A 4140 Waste consisting of or containing off specification or outdated chemicals corresponding to Annex I categories and exhibiting Annex III hazard characteristics	Consumables

It should be noted that in the framework of the 1996, Barcelona Convention related LBS Protocol and the Strategic Action Program to Address Pollution from Land-Based Activities, a number of important targets and proposed measures in national and regional level have been adopted with regard to hazardous waste management. The recommendations set below are in line with the abovementioned Action Program:

- Where facilities for the environmentally sound treatment and disposal of hazardous wastes are to be established or currently operate, considerations should be made for the hazardous waste streams that may originate from major shipyards and ship repairing zones and the feasibility of properly disposing them to these facilities.

- When national plans are developed for the management of hazardous wastes, an evaluation of the quality and quantity of hazardous wastes from ships delivered in the ports and other facilities of the country should be included.

- The cost recovery and polluter pays principles should be integrated into future hazardous waste management plans to ensure their economic viability and to encourage the involvement of private sector.

- Ship – port notification systems and procedures, established to facilitate the collection of wastes from the available facilities, should enable the formal exchange of information on the existence of hazardous wastes or substances and the subsequent need for disposal at the port.

Management of oily wastes

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

During the mission in the port of Durres, it was realized that most of the existing oily wastes treatment facilities employ mild processing techniques to produce oil that can be burnt or recycled. 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.

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.

Adequacy of the reception facilities for oily wastes

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, as explained above, 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.

There are not any available facilities for oily wastes in the ports of Saranda, Vlore and Shengjin. It is recommended that ports like them open to ocean-going ships should provide a facility to collect even a limited volume of waste oils, at least for those ships whose holding capacity for sludge and bilge oil does not guarantee a voyage to the next port of call without discharging at sea in excess of the permissible levels according to MARPOL 73/78 discharge criteria. Since the estimated volume (reduced daily volume) of oily wastes was significantly low, it is only advisable that only collection means should be provided at each port, able to receive up to 18 cub. meters, maximum, of oily wastes that will be transported to a licenced, nearby treatment facility or in the country's refineries. There is no need for the ports of Saranda, Vlore and Shengjin to establish port-based pre-treatment facilities.

Adequacy of the reception facilities for garbage

The mandatory disposal of garbage at the ports of the country has enhanced the technical and operational capability of the private sector to deal with the the collection and transport of domestic like garbage from ships. In the ports of Durres, Vlore and Shengjin, the available facilities for collecting garbage from ships were found to be adequate in terms of their reception capacity, the service they provide with regard to the needs of ships, the emptying of positioned containers, the measures taken for the containment and transport of garbage, etc.

The port of Saranda needs more reception capacity (at least two more, pre-positioned 1.1 m^3 containers) to serve the needs of ships delivering small volume garbage and a more frequent emptying and transport to the landfill.

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 representatives of the Ministry of Maritime Affairs, Transport and Communication as well as 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.

Excluding the dedicated oil terminals of Omisalj, Ploce, Split, Rijeka and Zadar which are discussed in detail in the Report of Activity 2 of this project, the ports of Dubrovnik, Ploce, Split, Sibenik, Rijeka – Rasa, Zadar and Plomin are analyzed here, the operational status of which is indicated in the following table:

Ports involved in the project	**Port**		**Oil Terminal**					
	Commercial Port	Port with major ship - repairing and/or tank cleaning facilities	Crude oil		Oil Products		Fuel Oil fired power plant	Other facility
			Loading terminal	Unloading terminal	Loading terminal	Unloading terminal		
Dubrovnik	√							
Rijeka Rasa	√			√*	√	√		

Ploce	√				√	√		
Split	√				√	√		
Sibenik	√							
Zadar	√				√	√		

** 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 Annexes I and V dealing in particular 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 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 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, etc.

- 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. Wastes 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, recordkeeping, hazardous waste and its storage, transport and recordkeeping, 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 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 works related with waste management, etc.

Rule Book on Waste Types (O.G. 27/96) prescribes the types of wastes in accordance with their characteristics and origin, ways of handling, procedures for 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 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 on 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.

B.1 Management of oily wastes

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. 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.

B.2 Garbage management

Law on Waste, Law on Municipal Management (O.K. 36/95) in conjuction with Rule Books on waste types, waste management requirements and container waste management provide the framework dealing with the collection, storage, transport, treatment and disposal of land-based or ship-generated garbage.

Public Authorities are basically engaged in collecting garbage from the port areas provided that similar requirements like those applying for the management of waste oils are met.

A summary of the applicable provisions of the Rule Book on Waste Management Requirements (O.G. 123/97), is provided below:

- *waste collection*: waste must be collected in suitable bins, containers properly equipped so that spilling or scattering of waste is prevented as well as spreading of dust, noise or smell.
- *storage of waste*: waste storage facilities should be equipped with plants for preliminary waste treatment, a base course from which the scattered or spilled waste may be collected, a rainwater drainage system and waste water collection system. It must also include facilities, equipment and devices for fire signaling and prevention of spreading of fire as well as other protective devices and systems in compliance with the existing regulations. These storage facilities must be equipped so that the scattering or spilling of wastes, spreading of dust, noise, smell and other emissions are prevented. Proper placards should be placed denoting the purpose of use, the waste type, name of the company, legal or physical person and data on working hours.
- *transportation*: waste should be transported in properly equipped vehicles.
- *treatment and disposal of waste*: waste treatment facilities intended for thermal, physical, chemical and biological treatment of wastes should comply with certain technical requirements and standards including at least equipment for storage purposes, equipment for preliminary waste treatment, equipment for treatment of waste gases, waste waters and waste by-products, other safety, and environmental control arrangements, etc.

A. General Information

- **Port** Dubrovnik
- **Port Authority** Port Authority of Dubrovnik

B. Type and operation of the port

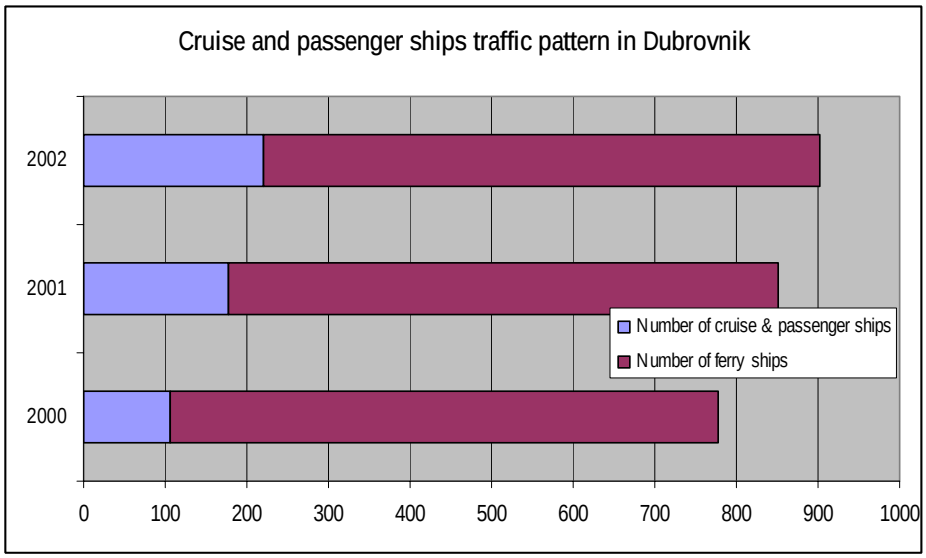
The port is located in a well protected bay around the town of Dubrovnik which in turn encloses the Elaphite archipelago (Sipan, Lopud, Kolocep, Tajan, Olipa, Daksa and Jakljan). Being a popular destination for cruise ships due to the cultural and historical significance of the town and the natural beauty of the coastal area, the port provides excellent port services at its all – weather berthing facilities at Gruz Harbour where predominantly cruise ships and passenger ships are accommodated. The Dubrovnik Port Authority is in charge of operating the port enabled by the services provided by properly authorized local companies, including also that of ship-generated wastes' collection and management.

Seven nominal berthing areas are provided able to accommodate up to 300 meters long, cruise ships, liners and other ships, as outlined in the following table:

A/A	Name of Berth	Designed/ Actual Depth (m)	Berth overall length (m)	Type of ships that can be accommodated	Maximum size of ships accommodated
					LOA (m)
1	16	11,5	300	Cruise ships	300
2	15	7,5	230		230
3	14	7.5	190		170
4	12, 13	7,0	70		70
5	10, 11	7,0	130	Ferry - Passenger ships	130
6	7, 8, 9	6,5	300		200
7	6	6,5	30	Local Traffic ships	30
8	5	6,5	60	Local Traffic ships	50

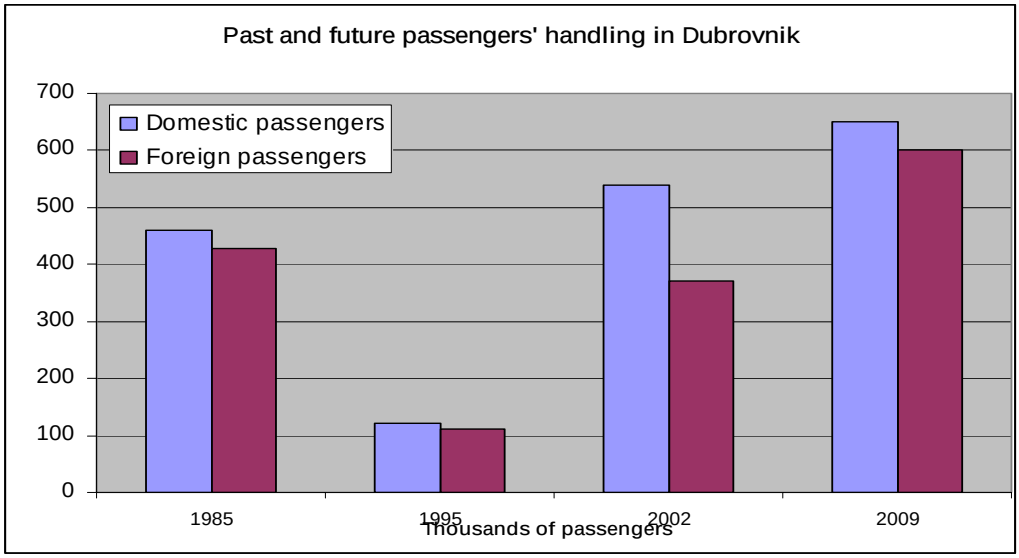
The total surface of the port area is 83.100 m^2 allocating 21.700 m^2 for the operational quay-wharf, 11.400 for warehousing purposes and the remaining for offices, road transport and open areas. On a yearly basis, 200 cruise ships

and 650 ferries call at the port which connect it with the offshore islands of Korcula and Mljet, other ports along the coast line such as Split, Zadar and Rijeka as well as with those of Bari, Ankona and Pescara in Italy and Corfu and Igoumenitsa in Greece.



A significant re-development project based on an urbanistic conception of the area of the port is under planning towards the building of a passenger terminal and other related commercial and passengers' support facilities. A significant part of the port area is expected to become a dedicated, cruise passenger terminal able to accommodate all kinds of passenger and touristic ships.

The port area in Batahoviva would become a ferry port, open for commercial purposes while at the same time the bay of Gruz is becoming an integral component of the town providing a broad spectrum of services for tourists and the local population. It should be noted that a forecast of the anticipated traffic in 2009 indicates that the port is expected to handle up to 1.250.000 passengers annually, as illustrated below:



C. Existing Reception Facilities for garbage and oily wastes

An effective and sufficient scheme for collecting oily wastes and garbage from ships calling at the port is coordinated and organized by the Port Authority which has granted contracts with properly licenced and authorized companies (private for oily wastes and public for domestic garbage) to perform the physical work.

Information on the availability and use of the reception facilities is provided by the Port Authority technical staff, the website of the port in the Internet and other awareness brochures as well as by local agents.

The Port Authority as well as the Harbour Master are in charge of receiving and processing any reports of alleged inadequacies of port reception facilities. Discussions are subsequently held to identify the cause of the report and corrective actions if any, while the IMO respective procedures are strictly implemented.

Three specialized waste oils collection and management private companies (Cian, Vebecot and Platanus), are authorized, and following a prior notice from ships, can provide appropriate road tankers to pump out the requested quantities which are normally small (less than 100 metric tonnes on an annual basis). On average 10 ships annually request to deliver oily wastes consisting basically of sludge and waste oils. The significantly small percentage of ships that request to deliver oily wastes (less than 5 % of the total) is reasonable due to the limited time that the cruise and passenger ships spend to the port and also due to their routeing pattern.

Respectively, with respect to garbage collection, 1 out of the 5 ships which call at the port, request to deliver garbage, on average 10 cub. meters per delivery, which is reasonable for the type and size of ships, the port accommodates.

The public service Cistoca d.o.o. is in charge of receiving and transporting the collected garbage to a designated landfill, located 30 kms far from the port area. In terms of the requirements placed by the Port Authority on the separation and containment of garbage delivered by ships, it is recommended that domestic like items to be packaged into proper bags to enable collection and transport preventing spillages and odour emmissions.

Co-estimating a number of factors (cost of oily wastes and garbage collection, notification and record-keeping procedures, data availability, etc) and witnessing the services and related facilities during the mission in the port, it is concluded that the port Authority organizes and provides excellent services to its users with respect to ship-generated wastes collection.

The following table presents the existing reception facilities for garbage at the port.

Port	**Garbage collection capacity provided in the port** *(m^3 per allocated means)*				**Description of port- based treatment of garbage collected from ships**	**Operational restrictions on the use of the facilities**
Dubrovnik	**Trucks** (used as reception and transportation means)	**Navigable means** (such as barges used as reception and transportation means	**Receptacles provided at the quayside**	**Other reception means**		Potentially hazardous wastes are not collected but only domestic like garbage
	2 (16 m^3 capacity)		40 (110 m^3 total capacity)			
Name, Address and other contact details of Operator	**Requirements for ships to deliver garbage**		**Method of final disposal**	**Charging system**	**Other remarks**	
Luka. Dubrovnik Public Service Cistoca d.o.o	A prior notice. Proper containment of the organic portion of garbage		Controlled landfilling	Charge for cruise and passenger ships that deliver domestic like garbage is 20 $ US per m^3	A 24 hours a day service is provided at all berths of the port	

Port: Dubrovnik
Country: Croatia

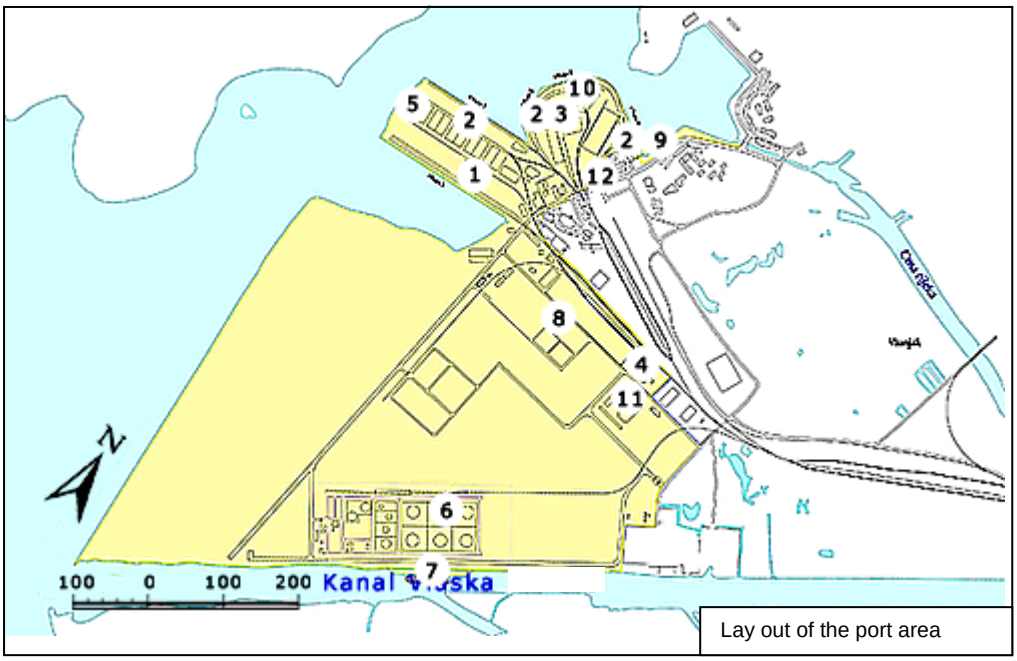
▪ Estimates of ship-generated oily wastes and residues that could be received at the port					▪ Estimates of ship-generated garbage that could be received at the port				
Oily wastes	Dirty ballast	Tank washings	Oily bilge water	Oil residues (sludge) and other waste oils	**Garbage**	Domestic garbage	Maintenance waste	Cargo-associated waste	Total volume of garbage
Reduced daily volume (m^3/day)	-	-	1.2	0.9	Reduced weekly volume (m^3/week)	25.4	1.9	-	27.3
Average annual volume (m^3/year)	-	-	450.0	350.0	Average annual volume (m^3/year)	1,325.3	92.0	-	1,417.3
Maximum volume per ship/arrival (m^3)	-	-	25.0	15.0	Maximum volume to be received per ship/arrival (m^3) (only domestic and maintenance)				10.0

A. General Information

– **Port**	Ploce
– **Port Authority**	Port Authority of Ploce

B. Type and operation of the port and oil terminals

The port of Ploce is the country's second largest cargo port with international significance and a nominal cargo handling capacity that exceeds 5 million tons of cargo per year. The port is located at 43^0 42′ N, 17^0 26′ E in a bay, three kilometers from the mouth of the river Neretva, constantly developing to a multipurpose port, serving sufficiently the needs of the steel, non-ferrous, wood and chemical local industry. A free zone status has been provided, enabling the port to become an important economic centre for the wider area.

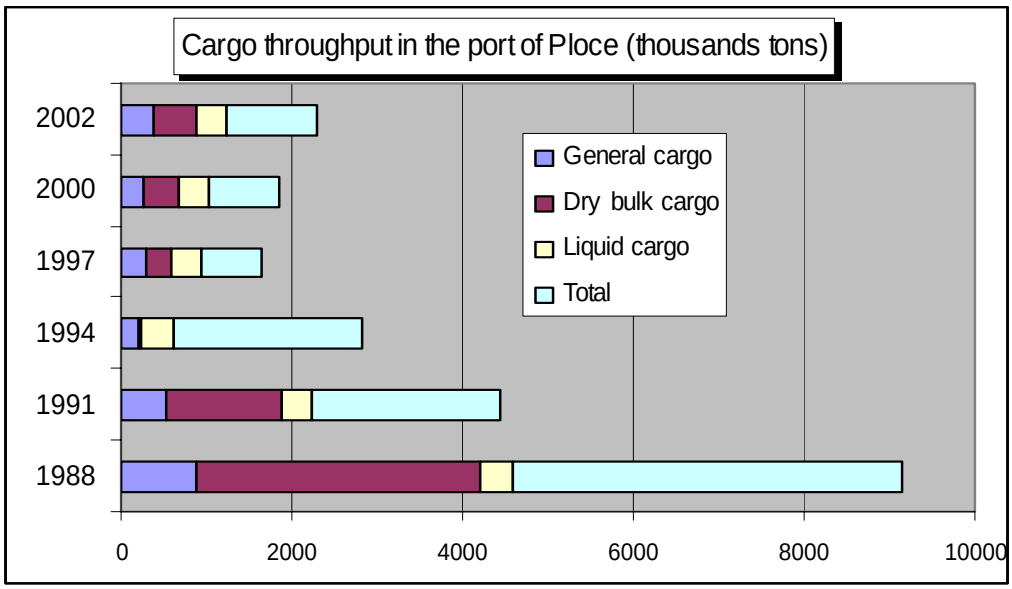


Lay out of the port area

Fig: 1 Dry bulk cargoes warehouse, 2 General cargo warehouse, 3 Grains warehouse, 4 petcoke storage area, 5 storage area for refrig. cargoes, 6 - 7 Energopetrol and LPT oil terminals, 8 timber terminal, 9 passenger terminal, 10 alumina silo, 11 service zone and 12 Headquarters of Port Authority.

The port provides specialized terminals for bulk dry and liquid cargoes and other packaged cargoes, accommodating vessels up to 220 meters LOA and 10.50 meters draft, and offering 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 building 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 framework of 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 constant recovery of cargo throughput in the last years is demonstrated in the following figure.



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.

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

C. Existing Reception Facilities for garbage and oily wastes

Both, two oil terminal operators provide their own facilities for collecting tank washings but also other oily water mixtures from the tankers engaged in cargo discharging operations. These facilities are discussed in detail in the Report of Activity 2 of this project. Energopetrol terminal provides a separate 4", 5 bar maximum working pressure, 500 meters long piping from the jetty in Vlaska channel to collect tank washings and other mixtures for subsequent storage in a 400 m^3, open - roof cement tank. Oily wastes pumped from the storage tank are treated at an open interceptor.

It should be noted here, that the rehabilitation and upgrade of the existing treatment facility of Energopetrol has been recommended through which a new steel, fixed rood tank, at least of 550 cub. meters capacity 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 industrial type mechanical separator in series to 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 of arrangements for treating sludge produced during the whole process as well as from the tank farm routine cleaning.

L.P.T. operated floating storage facility, allocates (4) tanks of 800 cub. meters capacity for receiving slops and other mixtures. It should be noted that the both the tanker used for storage as well as the land-based control rooms are modern, automatically controlled which have 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.

Vebecot d.o.o. and Pomorski Service Luka Ploce d.o.o. are authorized by the Authority of the port to collect oily wastes from ships calling at the port, by employing basically road tankers. Collection cost was reported to be as much as 120 $ US per cubic meter. Domestic like garbage and cargo associated waste is collected by another similarly authorized company which employs skip containers and hauling trucks. Since garbage delivery is mandatory, a fixed and varying daily charge applies depending on the tonnage of ships (up to 500 grt 50.0 $US, 501- 1.000 grt 75.0 $US, 1.001 – 1.500 grt 185.0 $ US, etc.).

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	√			400 **(1)** 800 **(2)**		400 **(1)** 800 **(2)**		-	-	*	-	400 **(1)** 800 **(2)**		400 **(1)** 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) **L.P.T. (2)** **Vebecot d.o.o. Pomorski S.LP. d.o.o**	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.	Vebecot d.o.o. and Pomorski SLP d.o.o. charge 120 $US per cub. meter collected	

Port: Ploce
Country: Croatia

▪ Estimates of ship-generated oily wastes and residues that could be received at the port					▪ Estimates of ship-generated garbage that could be received at the port				
Oily wastes	Dirty ballast	Tank washings	Oily bilge water	Oil residues (sludge) and other waste oils	**Garbage**	Domestic garbage	Maintenance waste	Cargo-associated waste	Total volume of garbage
Reduced daily volume (m^3/day)	-	-	7,1	4.7	Reduced weekly volume (m^3/week)	13.4	2.9	5.9	22.2
Average annual volume (m^3/year)	-	-	2,625.0	1,750.0	Average annual volume (m^3/year)	700.0	154.1	308.6	1,162.7
Maximum volume per ship/arrival (m^3)	-	-	25.0	15.0	Maximum volume to be received per ship/arrival (m^3) (only domestic and maintenance)				5.0

A. General Information

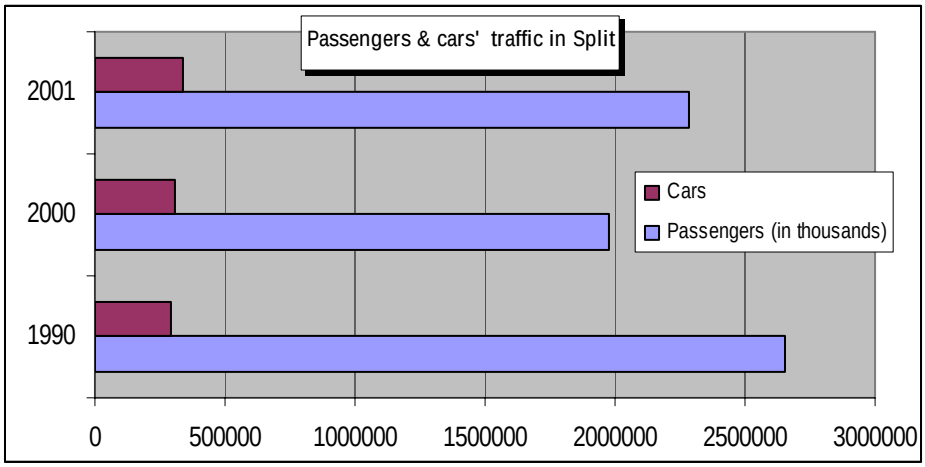
- **Port** Split
- **Port Authority** Split Port Authority

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. Following the Resolution of the Government of the Republic of Croatia on 24/4/1997, the Split Port Authority has been established with the objective to construct, use and manage the port of Split which is port open for international public transport and of international, commercial interest of the country. The Authority is in charge of managing the port, constructing and maintaining its infrastructure, planning and monitoring the performance of these trade companies which operate in its area, etc.

The port consists of two basins, the northern one, which hosts the industrialized zone and its terminals and the southern one around the old city which has developed in a cruise and passenger ships' destination. The southern basin (city port) situated in front of the nucleus of the old city, provides a 182 ha wide basin and thirty five berths, 6 – 9 meters deep, able to accommodate all types of Ro-Ro passenger ships, cruise ships, etc. The east part of the basin has a 419 meters long breakwater for mooring high speed craft and other passenger ships engaged in near coastal voyages.

At the 459 meters long pier in Sv.Duje and the 344 meters long pier in St. Peter up to six car ferries, ocean-going cruise liners and small passenger ships can moor simultaneously while in the part in front of the Harbour Master's Office and Sv. Nikola high speed craft and other small passenger ships can be accommodated. As it can be shown from the following diagram, the traffic in the city port is constantly growing, having recovered almost completely since the achievement of political and social stabilization in the wider area of Balkans.



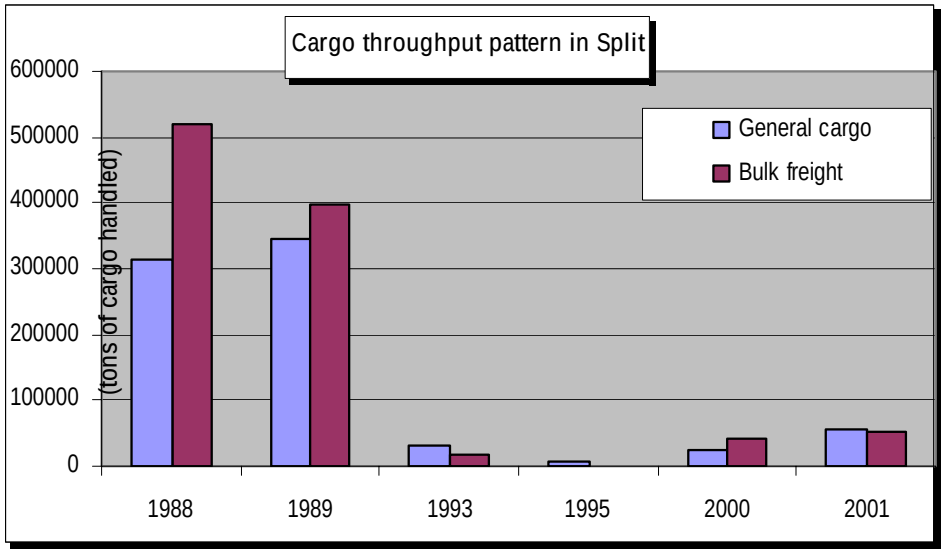
In terms of the 2000 traffic data the port is ranked as the 5th busiest in the Mediterranean area, following those of Naples, Piraeus, Geneva and Civita Vechia, handling about 2.000.000 passengers annually.

In the Vranjic – Salin Basin four terminals operate handling basically scrap iron, sulfur, fertilizers, pyrite, cotton, coal, sugar and other foodstuff. The available wharves provide 8 – 12 meters deep berthing sites, sufficient closed and open storage areas, silos, loading machinery, etc.

In Kastela basin, an INA owned oil terminal operates with a tank farm of 142.000 cub. meters storage capacity, accommodates 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 oily wastes and garbage

Split based, Cian d.o.o. private 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.

During the mission in the port, an extensive exchange of views took place between the Consultant with the Cian d.d.o. responsible persons on the available technologies for treating waste oils, on forthcoming specifications for replacement fuel oils, sludge treatment methods, etc.

Cian d.d.o. is currently building new treatment facilities in Split, examining at the time being, the final drawings of the installations, the treatment flow, the necessary storage and treatment capacity, the oil water separation technology, etc.

Privately operated companies upon concessions granted by the Authority of the Port have undertaken the collection of basically, domestic like garbage from ships. Ship-generated garbage is usually collected in one of the following ways depending on the volume of garbage and the type of ship:

- In receptacles brought to the ships,
- In receptacles pre-positioned at a site designated for garbage collection, and
- Off-loaded directly to the hauling truck or barges.

It should be noted that during the mission in the port, the Consultant was given the opportunity to witness the modern means used for collecting ship-generated garbage including press containers, skip containers, etc.

The capacity of the facilities, in conjunction with the systematic, emptying and transportation for final disposal matches both the recorded needs of ships by the Authority and also the estimated waste streams volumes.

Controlled land-filling is the predominant option of final disposal for domestic like garbage from ships. It should be stressed out that ship-generated garbage collection and its further management is carried out in a way that ensures the protection of the marine environment of the port, which is of paramount importance for the country due to its strong reliance on the tourism 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		√	√	100		100		-	-	*	-	100		100		No chemicals contaminated wastes can be received

Authorized private company	**Description of the facility**	**Method of treatment of oily wastes**	**Charging system**	**Other remarks**
CIAN d.d.o. 21000 Split, Varazdinska 51 **Tel: +385 21540 190** **+385 21540 192** **Fax:+385 21 540 199** **e-mail:** **cian@st.tel.hr**	The company operates a number of vacuum road tankers and small capacity barges (skimmer vessels) to collect waste oils from ships. Waste treatment is carried out at its own facility.	Mechanical settling carried out to separate oil before its further filtration and homogenisation.	No available information	

Port: Split
Country: Croatia

▪ Estimates of ship-generated oily wastes and residues that could be received at the port					▪ Estimates of ship-generated garbage that could be received at the port				
Oily wastes	Dirty ballast	Tank washings	Oily bilge water	Oil residues (sludge) and other waste oils	**Garbage**	Domestic garbage	Maintenance waste	Cargo-associated waste	Total volume of garbage
Reduced daily volume (m^3/day)	-	-	13.6	8.5	Reduced weekly volume (m^3/week)	115.3	5.3	2.1	122.7
Average annual volume (m^3/year)	-	-	4,964.0	3,102.5	Average annual volume (m^3/year)	6,000	277.9	111.2	6,389.1
Maximum volume per ship/arrival (m^3)	-	-	25.0	15.0	Maximum volume to be received per ship/arrival (m^3) (only domestic and maintenance)				>5.0

A. General Information

- **Port** Zadar
- **Port Authority** Zadar Port Authority

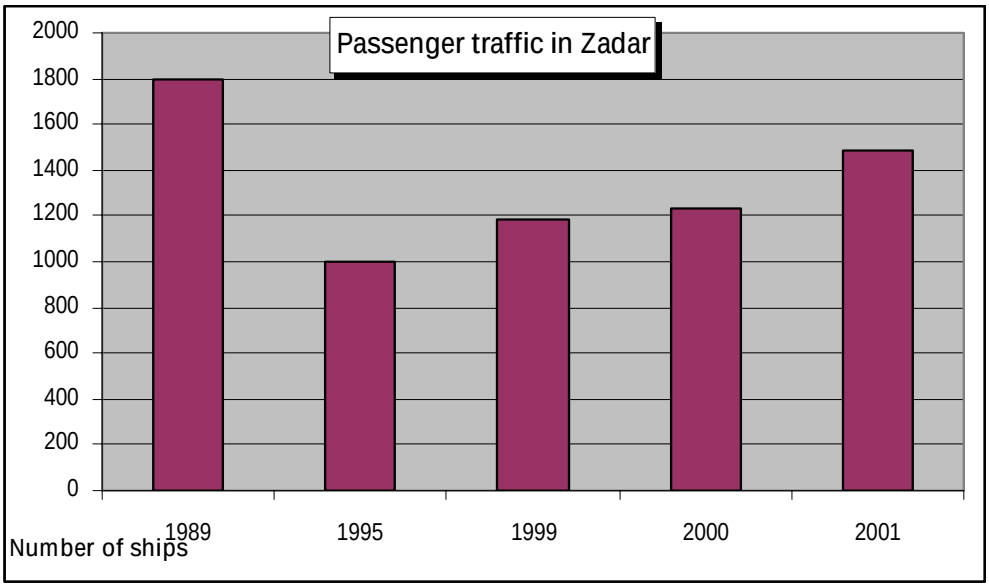
B. Type and operation of the port

The port of Zadar, situated at $44^0$07′ N, $15^0$14′E consists of the old port in a well - sheltered harbour, accessed through a 7.01 meters deep and 70 meters wide entrance between Zadar peninsula and the breakwater, and the Gazenica commercial port located 2.5 miles from Zadar. Zadar is the second largest passenger seaport in the country presenting important potential for further recovery and growth as a major reconstruction project for its new passenger terminal worthing 75 million euros is under development.

The old port provides about 1.000 meters of quays and ten nominal berths, mainly used by coastal and passenger ships of 6.7 meters maximum draft. The strategy for developing the port is strongly related with its passenger traffic and the distinction between cargo and passenger operations. Emphasis for the development of the port has been given to the construction and operation of a state of art, cruise and passenger terminal in Gazenica, as mentioned previously.

Zadar is connected to the national railway network enjoying a modern bus terminal and a short distance from the local airport, all, contributing to enhance the port operation and productivity. Traffic congestion in peak periods, air pollution and devastation of the historical city centre are among the problems that the dynamic administration of the port with the assistance of the local, Harbour Master office is currently trying to solve.

Zadar accounts for around 32% of the passenger traffic in principal Croatian ports including those of Split, Rijeka, Ploce and Dubrovnik, recovering almost entirely, after the stabilization in the wider area of Balkans.



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, all privately operated. In 2002, 120 ships called at the port handling 307.846 tons of cargo while in 2001, 106 ships called and the cargo throughput was 242.185 tons respectively.

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 depot 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 oily wastes and garbage

Effective collection of oily wastes and garbage from ships calling at the port is coordinated and organized by the Port Authority which has granted contracts with properly licenced companies (private for oily wastes and public for domestic garbage) to perform the physical work.

The Port Authority as well as the Harbour Master are in charge of receiving and processing any reports of alleged inadequacies of port reception facilities.

Upon concessions, waste oils collection and management companies provide appropriate road tankers to pump out the requested quantities which are normally small. It should be noted that Jadrolinjia, the major passenger ships' operator of Croatia, the ships of which link Zadar with international and other local destinations, has been offered waste oils collection services upon a contract with the above companies.

Garbage collection is carried out through the involvement of the local, public enterprise which provides special trucks to receive and transport, basically, domestic like garbage. In terms of the requirements placed by the Port Authority on the separation and containment of garbage delivered by ships, it is recommended that domestic like items to be packaged into proper bags to enable collection and transport preventing spillages and odour emissions.

In the absence of input from the ships that used to call to the port during the project and other, traffic related, information, in particular, from the commercial cargo port, it was realized that what is really important, for the continued adequate garbage collection is the smooth absorption of the volume of garbage that will be delivered in the future. Estimations for 2010, forecast that 750.000 passengers from ferry and cruise liners will be accommodated in the port, a significantly higher figure compared to the 2002 level (170.000 passengers in total).

Port: Zadar
Country: Croatia

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

Oily wastes	Dirty ballast	Tank washings	Oily bilge water	Oil residues (sludge) and other waste oils	**Garbage**	Domestic garbage	Maintenance waste	Cargo-associated waste	Total volume of garbage
Reduced daily volume (m^3/day)	-	-	8.13	5.2	Reduced weekly volume (m^3/week)	40.3	2.5	1.9	44.7
Average annual volume (m^3/year)	-	-	2,969.5	1,898.0	Average annual volume (m^3/year)	2,100	133.7	102.6	2,336.3
Maximum volume per ship/arrival (m^3)	-	-	25.0	15.0	Maximum volume to be received per ship/arrival (m^3) (only domestic and maintenance)				>5.0

A. General Information

- **Port** Sibenik
- **Port Authority** Sibenik Port Authority

B. Type and operation of the port

The port is situated at 43^0 44' N, 15^0 54' E, accessed through Dvainka passage with a minimum depth of 23 meters. While the port has been used to export coal from the Drnis-Siveric basin in quantities more than 50 thousand tons per year, for export to Trieste, Syria, Turkey and Egypt, today it specializes in handling of raw phosphates providing a number of dedicated terminals for general cargo ships and bulk carriers serving in this way the needs of the locally established industry.

About 60 cargo ships annually call at the three terminals where handling of average 500.000 tons of fertilizers, aluminum metals and timber takes place. A large number of small pleasure craft as well as passenger and cruise ships are accommodated also in the berthing areas due to the fact that Sibenik is a tourist city with important natural and cultural assets. Information on the berthing infrastructure of the port is summarized below:

A/A	Name of Berth	Designed/ Actual Depth (m)	Berth overall length (m)	Type of ships that can be accommodated	Maximum size of ships
					LOA (m)
1	Drvni terminal	5.5 – 7.0	290	General cargo ships carrying timber	150
2	Rogac	7,0 – 11.0	432	General cargo ships and bulk carriers	250
3	Dobrika	10.0	228	Bulk carriers	190
4	Vrulje - SE	8,0	135	Cruise ships and passenger ships	180
5	Vrulje - SW	7,0	110	Cruise ships and passenger ships	150
6	Vrulje - NW	6.0	95	Cruise ships and passenger ships	130
7	Obala HRM	3.0 – 5.0	444	Passenger ships & pleas. yachts	100

Cargo handling operations in one of the cargo terminals

C. Existing Reception Facilities for oily wastes and garbage

The Authority of the port arranges garbage and oily wastes collection through the involvement of locally operated and properly licenced private companies.

On a yearly basis, 400 and 500 cub. meters of garbage are collected from cargo and passenger ships respectively. Bulk cargo - associated waste remaining upon the completion of discharging and loading operations is collected also from the abovementioned companies. Facilities and the whole service for receiving ship-generated waste is adequate and good record-keeping is maintained regarding the requests of ships and the quantities delivered and managed, and therefore, since maritime traffic has been almost constant, estimation of the anticipated waste streams was not attempted.

A. General Information

Port	Rijeka - Rasa
Port Authority	Rijeka Port Authority

B. Type and operation of the port

The port of Rijeka Authority is a non-profit organization established by the decision of the Government of the Republic of Croatia on 28/5/1996 based on the Law of Sea Ports. A free zone has been established pursuant to a Decision of the Government since 1997, offering customs benefits, tax exemptions, etc. enhancing the economic activities of the port. The port located at $45^0$20'N, $14^0$26'E, provides 39 nominal berths stretched at a 7.183 meters long operating queyline and a total surface area of 2 million sq. meters.

Its entire area consists of a number of basins: The *Rijeka* basin with a 3.7 kms piers, 6 – 8.5 meters depth in which bulk carriers and general cargo ships engaged in handling phosphates, grains, cereals, etc, are normally accommodated, the *Susak* basin with a 1.0 kms pier length, 7.0 meters depth in which bulk carriers and general cargo ships carrying timber, ore, etc, are normally accommodated, the *Container terminal* with 475 meters long piers and 11.2 meters depth, the *Bakar* basin with 533 meters long piers and 15 meters depth, where iron ore, bauxite and coal is handled and, the *Rasa* port which is discussed in more detail later in this part of the Report. The Omisalj based oil terminal is exclusively discussed in the Report of the Activity 2 of this project.

A/A	Bssins	Actual Depth (m)	Berths overall length (m)	Type of ships that can be accommodated	Maximum size of ships accommodated	
					LOA (m)	DWT (t.dw)
1	Rijeka Basin	6 - 8.5	3.732	General Cargo ships & Bulk Carriers	250	60.000
2	Susak Basin	7	1.000	General Cargo ships & Bulk Carriers	170	25.000
3	Container Terminal	11.2	475	Container & Ro-Ro ships	280	40.000
4	Bakar Basin	15	533	Oil tankers and cargo ships	270	80.000
5	Rasa Basin	6 - 8.5	272	Cargo Ships	150	20.000

Data with respect to the maritime traffic and the annual cargo throughput are presented in the following table:

Year	**Total number of cargo ships** *(excluding oil tankers)*	**Containerised cargo throughput** ***(TEUs)***	**Solid bulk and general cargo throughput** ***(met. Tonnes)***
2002	719	18.078	2.571.578
2001	712	14.381	2.187.654
2000	731	11.461	2.475.111

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.

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 stern ropes mooring systems 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 internal part of the Rijeka basin has been traditionally destined to passenger traffic linking the port with almost all other passenger ports of the country such as Zadar, Split, Dubrovnik, etc. Four berths, 189, 202, 195 and 146 meters long respectively are currently used for accommodating cruise and passenger ships, the traffic of which in the recent period is presented below:

Year	**Cruise ships and passenger ships**				
	Number of ships calling at the port	Average Size of ships *(grt)*	Average number of persons onboard	Average duration of ships'stay at the port *(hours)*	Average duration of voyage from last port of call *(days)*
2002	550	3000	400	12	8
2001	400		350		
2000	30				

It should be noted that in accordance with the development visualized by the Authority of the port in the framework of the Rijeka Gateway Project, the passenger port is planned to be integrated with the town, becoming a dedicated passenger and cruise port to offer high quality tourism activities.

The Rasa port, the berthing capacity of which is summarized below, is located in the 11 Km long, Bay of Rasa southwest of Rijeka constituting a safe harbour in a naturally protected bay.

A/A	**Name of Berth**	**Actual Depth (m)**	**Berth overall length (m)**	**Type of ships that can be accommodated**	**Maximum size of ships** (t.dw)
1	Timber Pier	9	164	Timber vessels and general cargo ships	16.000
2	First Cattle Pier	6	20	Cattle vessels	2.800
3	Second Cattle Pier	6	20	Cattle vessels	2.800

The maritime traffic as well as the cargo handled in the the 2000 – 2002 period is presented below:

Year	**Total number of ships**	**Cargo throughput** ***(met. Tonnes)***
2002	4 cattle ships	977
2001	9 cattle ships 51 ships carrying building material	2.898 121.000
2000	64 Cattle ships 4 G.Cargo ships	22.648 9.866

C1. Existing Reception Facilities for oily wastes

A number of well-organized private companies are engaged in collecting oily wastes from ships calling at the port following their authorization from the Rijeka Port Authotity. Collection can be carried out through road tankers and barges from ships berthed pierside and at anchor. During the mission in the port, it was noticed, the modern equipment provided by these companies and the safe practices followed. The means employed and their capacity are outlined in the following tables.

With respect to the treatment of oily wastes, the INA operated oil terminal in the Bakar basin provides a treatment facility for dirty ballast, tank washings and other oily residues not only from tankers engaged in its operation but also from all ships calling at the port of Rijeka following the collection of oily wastes from the private companies. It is apparent that this facility ensures the treatment and disposal of waste oils collected from the marine sources in the port of Rijeka. The facility provides two tanks of 4.000 cub. meters 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.

C1. Existing Reception Facilities for garbage

The public, garbage management service CISTOCA d.o.o, operated by the local municipality is engaged in collecting ship-generated garbage. No notice in advance is required from ships to arrange collection and there are not any special separation/containment requirements.

Garbage collected from ships at anchor or berthed pierside is landfilled at a designated, disposal area outside the city of Rijeka. The fees paid by ships vary according to their type and tonnage as presented below:

	Price list for garbage collection ($US/day)		
Gross Tonnage (grt)	Recreational Craft	Passenger ships	Other ships
Less than 500	17.28	13.92	58.00
501 - 1.500	24.00	15.68	76.00
1.501 - 5.000	45.60	24.96	124.00
5.001 - 10.000	53.60	29.28	140.00
More than 10.001	53.60	29.28	144.00

Port	**Type of Facility**			**Oily wastes received from the facilities**												**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)	
Port of Rijeka	√	√ 10 road tankers (85 m^3 total capacity)	√ 5 barges	1.000		1.000		-	-	-	-	1.000		1.000		No chemicals contaminated wastes can be received

Waste oils collection companies	**Description of the facilities**	**Method of treatment of oily wastes**	**Charging system**	**Other remarks**
-*DEZINSEKCIJA d.o.o.* **Address: Brajsina 13, 51000 Rijeka** Tel: + 38551512-533 e-mail: dezinsekcija@ri.tel.hr -*IND-EKO* **Address: Korzo 40, 51000 Rijeka** Tel: + 38551336093 e-mail: ind-eko@ri.tel.hr -*Rijekatank d.o.o.* **Address: Dalmatinskih brigada 17, 51211 Matulji** Tel: + 38551276750 e-mail: mareco@ri.tel.hr	Apart from the collection means operated by the authorized, private companies, a fixed reception and treatment facility is operated in the Bakar based INA oil terminal and refinery. Its storage capacity is 4.000 tons and the nominal treatment rate 750 m^3/hour.	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. No secondary treatment for the water effluent		

Port: **Rijeka - Rasa**
Country: **Croatia**

▪ Estimates of ship-generated oily wastes and residues that could be received at the port					▪ Estimates of ship-generated garbage that could be received at the port				
Oily wastes	Dirty ballast	Tank washings	Oily bilge water	Oil residues (sludge) and other waste oils	**Garbage**	Domestic garbage	Maintenance waste	Cargo-associated waste	Total volume of garbage
Reduced daily volume (m^3/day)	-	-	8.7	8,1	Reduced weekly volume (m^3/week)	22.7	5.0	4.8	32.5
Average annual volume (m^3/year)	-	-	3,199.5	2,962.5	Average annual volume (m^3/year)	1,185.0	260.7	252,5	1,698.2
Maximum volume per ship/arrival (m^3)	-	-	30.0	15.0	Maximum volume to be received per ship/arrival (m^3) (only domestic and maintenance)				5.0

The traffic of cargo ships in the port of Rijeka remains almost constant in the last years period, while this one of passenger ships engaged in international and near coastal voyages shows an increase that exceeds 35% (taking into account the 2002 – 2001 period.) Since, it was reported that much of the oily wastes collected in the area of the port comes from the passenger liners operated by the Domestic shipping companies, it was not intended to project the waste-stream flows in the future. However, the projection of volumes of wastes that could be delivered can be based on the assumption that there is a linear function of waste production onboard and delivered with the port traffic development, as explained earlier in this Report.

D. Conclusions & Recommendations

In the framework of a pilot project, currently run in Croatia under the United Nations Environment Program and the Strategic Action Programme of the Mediterranean Action Plan, efforts are made to study and develop proper economic instruments regarding the collection, transport, treatment and disposal of used oils and oily waters from ships in the area of Kvarner Bay, with emphasis in the Rijeka port and its related facilities.

The aim of this ongoing pilot project is to develop and introduce sufficient economic instruments able to improve the existing system of waste oils management in the area. It should be noted that at present, while collection of oily wastes is carried out by authorized private companies, treatment and final disposal is performed in the Bakar based, INA operated treatment facility where basically tank washings and other oily water mixtures from oil tankers are collected and treated.

It is reported that the INA operated treatment facility apart from having strict specifications with respect to the reception of oily wastes, has announced refusal of oily wastes coming from ships other than oil tankers which discharge or load oil products in its terminal, in the near future.

Apparently, the port of Rijeka will be deprived of a proper treatment facility and the existing collection scheme offered by the private sector will be destabilized in the absence of alternative treatment and disposal options.

It should be noted that some of the companies employ modern, portable equipment able to treat qualities of wastes similar to sludge produced from the fuel and lubricating oil separating equipment, however the treatment rates and the need for effluent water discharge limit their effectiveness.

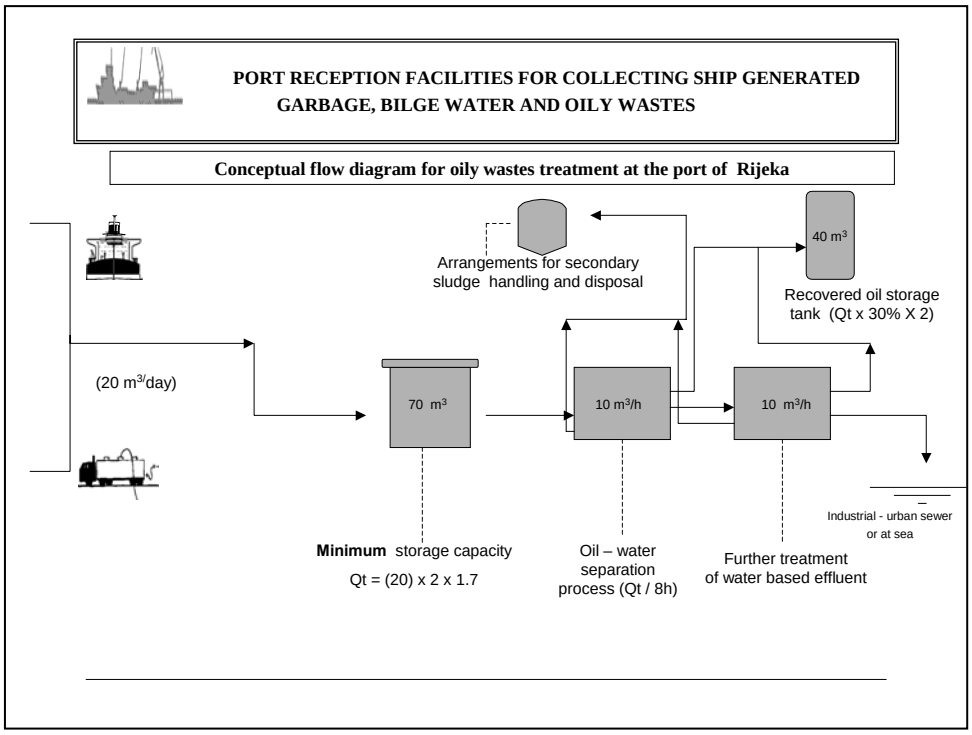
The need for establishing a near to the port, waste oils treatment facility operated either by the private sector or the Port Authority, is really immediate. The establishment of a land – based, treatment facility for oily wastes in the port is recommended because, the estimated, volume of more than 6.150 cub. meters of oily wastes that can be delivered annually, along with the daily, batch volume of about 17 cub. meters exceed the threshold that normally determines the feasibility of setting up a port - based, collection and treatment system that could be cost effective and technically sound.

The collection means should certainly incorporate those provided by the private companies.

Since the greatest portion of oily wastes from ships is currently collected with navigable means, the construction of a special berth in the port to transfer the collected quantities in the holding tanks of the facility is rather necessary.

A conceptual, flow process diagram of the facility is illustrated below, in which only, the minimum capacities have been estimated, since a further

study needs to identify other design elements and critical parameters, such as the peak flows, waste characterization, treatment objectives, disposal of oil recovered, secondary sludge treatment, drainage and spill capacity, etc.



With respect to the economic sustainability of the proposed facility but also of the entire management of waste oils from ships in the port, it should be noted that a similar practice of imposing a fixed, variable fee as currently applying for the collection of garbage in the port, could be investigated.

Such an incorporation of a fee collected from all ships, would be in line with the provisions of the Directive 2000/59/EC following its transposition and implementation in the future when Croatia will become a full E.U. member, which determines that the cost recovery system, should give an incentive to ships to use the available reception facilities. The real cost of collection, transport and treatment should be identified to enable the quantification of the above-mentioned fee and the margins left to impose additional charges for the actual use of reception facilities.

A. General Information

Port	Plomin
Bulk Coal Terminal Operator	HEP – PROIZVODNJA d.o.o.

B. Type and operation of the port

The Bay of Plomin is located on the eastern side of the Istrian peninsula, extending less than 2 n.m. in length, with a depth at the mouth of the bay to be approximately 40 meters. The bulk coal terminal is located at 45^0 03' N, 14^0 16' E on the southern coast of the bay serving the needs of the nearby power plant. On average twelve bulk carriers of 65.000 dwt and 13.2 meters maximum draught call to the terminal to discharge coal, as outlined in the following tables:

Berth	Actual Depth (m)	Berth overall length (m)	Type of ships that can be accommodated	Maximum size of ships	
				LOA (m)	DWT (t.dw)
(1)	15.0	210	Panamax type	225	65,000

The discharging wharf of the termimal

Year	Traffic, cargo throughput & other details			
	Number of ships	Quantity of cargo discharged (tons)	Average duration of ships' stay at the terminal *(days)*	Average duration of voyage from last port of call *(days)*
2002	13	854.000	5	25
2001	10	658.000		
2000	12	695.000		

Vessels whose destination is the port of Plomin, if required, have to use the anchorage in the Bay of Rijeka, approximately 13 n.m. away from the mouth of the Bay of Plomin. The depths at this anchorage are between 55 - 65 meters and the seabed is muddy. The discharging operations are carried on a 24 hours basis and the storage capacity of the port area is approximately 180.000 tons. The unloading operation is carried out by a vertical elevator able to achieve a 800 tons per hour disharging rate.

The notice of arrival that includes among others, information on the ETA, ships' particulars, type and amount of cargo for discharge and in transit, etc. should be sent immediately after the departure from the loading port and then 5, 3 and 1 day prior to the arrival. Information with regard to oily wastes or garbage retained onboard for disposal at the terminal can be also included in the abovementioned notice.

C1. Existing Reception Facilities for oily wastes

Oily wastes collection means are available on a 24 hour basis, provided by the Rijeka established, Rijekatank d.o.o., Indeco d.o.o. and Dezinsekcija private companies. Collection of oily water mixtures and sludge is carried out by five road tankers with a net volume of 25 m^3.

Oily wastes collected are transported to the Rijeka Oil Refinery for treatment. On average 2 bulk carriers delivered oily wastes annually consisting of 2.3 – 4.0 cub. meters of oily bilge water and 0.8 – 1.4 cub. meters of sludge produced by the oily bilge water separating equipment and the fuel - lubricating oil separating equipment as well.

C2. Existing Reception Facilities for garbage

Garbage collection services for the bulk carriers berthed at the terminal are provided by the local municipality's public service. A notice in advance (at least 24 hours prior to ships' arrival) from incoming ships is required to arrange the details of the collection. Separation of food waste and other organic part of garbage is recommended.

The cost of garbage collection is about 120 $ US which is equivalent to a 15 cub. meters truck activity to collect and transport garbage delivered at the final disposal site. Since delivery of garbage is mandatory, all ships that call to the terminal deliver a volume of about 5 cub. meters which entails an annual volume of 60 cub. meters.

Good record-keeping procedures maintained by the terminal make the estimations for the anticipated wastestreams not necessary. The needs of the ships that are normally accommodated to the concrete wharf of the dedicated coal terminal that serves the needs of the nearby power plant, are sufficiently met by the reception facilities provided either by the authorized, private companies or the public service respectively. The neighbouring port which accommodates fishing vessels, small craft and other small passenger vessels engaged in near coastal voyages that fall out of the MARPOL 73/78 scope for the provision of reception facilities was not examined.

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 where 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 Covnention 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 esimate 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. Since delivery of garbage is mandatory, high collection rates have been achieved, while charges are almost fixed and variable depending on the type and size of ship.

Adequacy of the available reception facilities

The available facilities for oily wastes and garbage are adequate in terms of capacity to meet the needs of ships that normally call at the ports. The daily as well as the maximum per delivery volumes of oily wastes and garbage can be absorbed by the currently available, collection means and also the treatment and disposal facilities. However, it should be noted, that so far, most of the ports that were studied in the framework of this project have recovered in terms of cargo throughput and traffic up to 50% of the 90's rates. In addition, treatment and disposal of oily wastes in Rijeka seems uncertain in the near future due to the reported refusal of the Bakar based, INA Oil Refinery operated treatment facility to collect oily wastes from ships other than the tankers call to its oil terminal, while the expansion of the tank farm of Energopetrol in Ploce dictates the rehabilitation of the existing treatment facility.

- The estimated annual flow of oily wastes in the port of Rijeka - Rasa was about 6.150 tons. It is recommended that a port - based or near to the port, storage and treatment facilty to be established that will incorporate the available navigable and land-based collection means of the private sector. A conceptual flow process diagram has been produced demonstrating the minimum design elements.

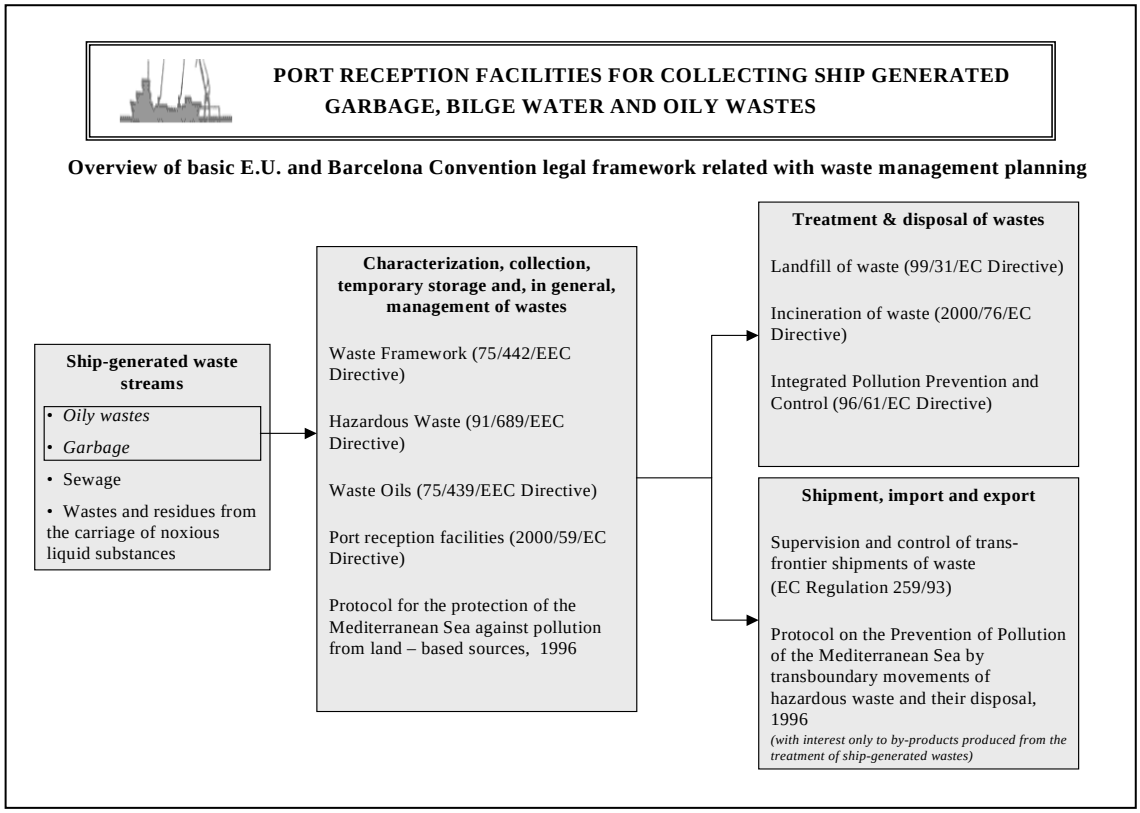
- The rehabilitation of the treatment facility in the Energopetrol terminal in the port of Ploce, is recommended to optimize the treatment process and ensure the sound management of collected waste oils.

- In the congested passenger and cruise ships' areas in ports such as Zadar and Split, where the greatest volumes of garbage are delivered, there is no need for providing mechanical treatment means or transfer stations. Collection,

immediate transport and disposal should continue to take place like today. In case that the construction of dedicated terminals for passenger ships goes ahead, the feasibility of the operation of means like those mentioned before, could be assessed.

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

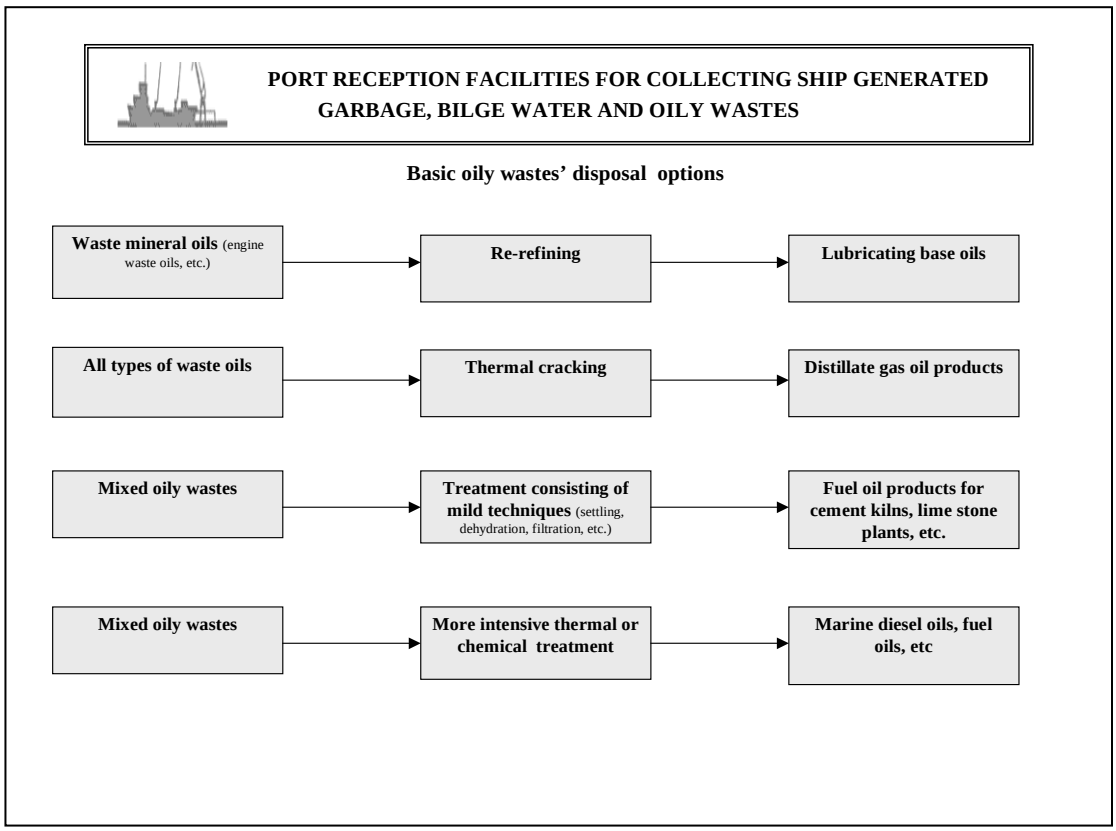
Two items that were considered to be essential for identifying the favourable level of treatment were as follows:

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 and having already achieved a high level of alignment with acquis communautaire, it was considered as necessary to focus the assessment of the available reception facilities in the port of Koper, on the new operational framework for ship-generated reception facilities in ports, promoted through the implementation of the 2000/59/EC Directive.

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 10th paneuropean railway and road transport corridors come across the country) 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 emmissions	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 st clear ground 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 endanger 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 poublic 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.

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	√					√	

C. Port Reception Facilities - Analysis

A. General Information

Port	Koper
Port Authority	Luka Koper d.d.

B. Type and operation of the port

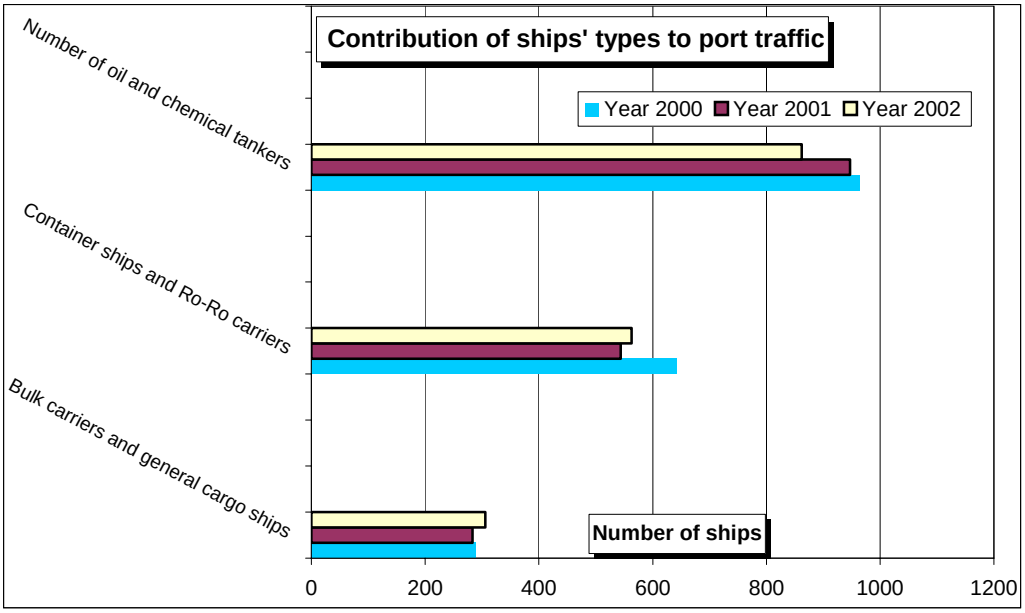
The port of Koper constitutes the only port of Slovenia engaged in international transport representing the southern gate to commercial links between Europe and overseas and also an expanding, modern logistic and distribution centre. The Republic of Slovenia remains the major owner of the port and the management offered 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.

Bulk dry & liquid cargoes terminals in the northern basins

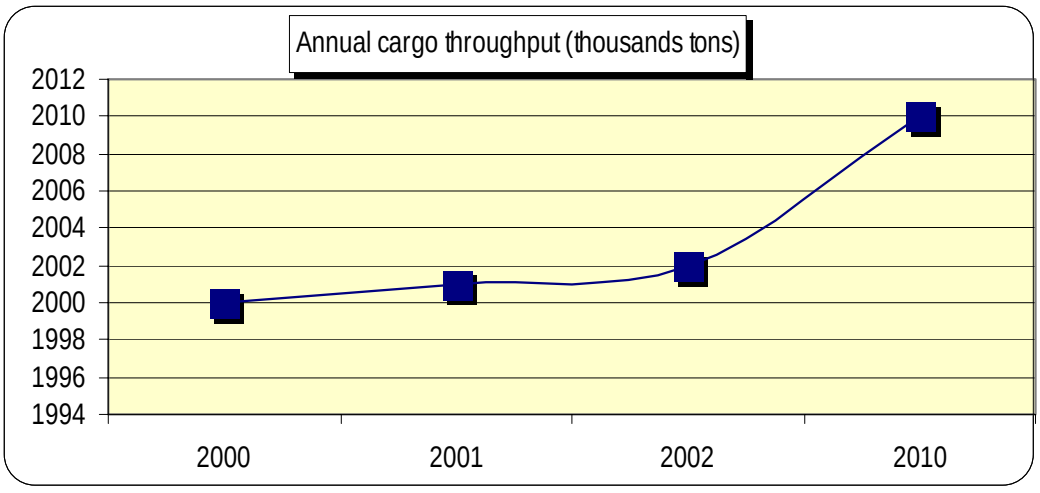
Southern basin of the port

As a multipurpose port, which combines containerized cargo, general dry and packaged as well as liquid cargoes handling, it presents almost a constant

growth in terms of the cargo throughput. The number of ships that called to the port in the 2000 – 2002 period is illustrated below:



Year	Number of ships	Contain. cargo hroughput *(TEUs)*	Oil products throughput *(met. Tonnes)*	Other Bulk liquid products throughput *(met.Tonnes)*	Solid bulk and general cargo throughput *(met. Tonnes)*
2002	1.731	1.282.630	1.826.005	68.466	720.558
2001	1.774	1.025.476	1.808.229	94.865	926.528
2000	1.898	991.085	1.866.393	125.008	958.262



Cargo handled and its forecast in the future (million tons)

Data, with respect to the cargo throughput for the first half of 2003 year are presented in the following table:

	Cargo throughput January - June 2003 (tons)		
	Outgoing	Incoming	Total
General Cargo	579.217	80.217	659.433
Containers	299.887	330.465	630.352
Vehicles	37.897	86.044	123.941
Dry Bulk Cargoes	674.127	2.375.962	3.050.089
Liquid Bulk Cargoes	4.139	888.162	892.301
Total	**1.595.267**	**3.760.849**	**5.356.116**

The port normally handles containers of various types and sizes including conventional, refrigerated, open-top and other special containers.

General cargo comprises all types of goods, normally transported in bags, boxes, cardboard boxes and on pallets. Goods transported in this way through port of Koper are mostly: coffee, rice, cotton, refrigerated and frozen goods, fruit, household appliances, iron, ironware, paper, cellulose, wooden products etc.

Liquid cargoes comprises chemicals, vegetable oils, petroleum products, while dry bulk cargoes basically consist of coal, iron, ore, alumina, various minerals, cereals, foodstuffs etc.

The KOPER Port has 11 dedicated terminals, as follows:

- General Cargo Terminal
- Container and Ro-Ro Terminal
- Car Terminal
- Fruit Terminal
- Timber Terminal
- Livestock Terminal
- Grains Terminal
- Alumina Terminal
- Terminal for coal and iron ore
- Dry Bulk Cargo Terminal
- Liquid Cargo Terminal (Including oil terminal)

The available, berthing capacity of the port in relation to the type and size of ships normally engaged in its operation of the port, is presented in the following table:

A/A	Berths	Actual Depth (m)	Berth overall length (m)	Type of ships that are normally accommodated
1	1A	6.9	120	General Cargo
2	1	7.80	135	
3	2	9.9	165	
4	3	9.5	128	
5	4	10.5	120	
6	5	8.8	164	
7	6A	7.5	Ro-Ro ramp	Ro-Ro
8	7	9.3	151	Combinated Ro-Ro and Container
9	7A	11.2	200	Container ships
10	7B	11.7	100	
11	7C	11.8	180	
12	8A	6	45	Live stock
13	8	6.2	140	Bulk Cargo
14	9	9.1	160	Bulk Cargo
15	10	12.8	170	Bulk Cargo
16	TCH	12.4	200	Liquid Cargo
17	Petrol	13.1	220	Liquid Cargo
18	Silos	12.4	180	Bulk
19	11	12.8	200	General Cargo
20	TD1	17.2	400	Bulk
21	VNT	9	Ro-Ro ramp	Ro-Ro

A number of 20 ships, which called at the port of Koper 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 from the Masters of ships with regard to their needs to use the port reception facilities.

On average, 45% of them wished to or actually delivered oily wastes to the port. This is an indication of the good wastes collection services provided in the port as the abovementioned figure is almost close to the average rate achieved in several european ports following the implementation of the 2000/59/EC Directive.

	Container ships	General cargo ships	Bulk carrier ships	Ro-Ro Cargo ships	Tankers	Other	Total
Number of ships responded	5	5	3	1	4	2	20
Number of ships that would deliver or delivered oily wastes	1	1	2		4	1	9 (45%)
Number of ships that would deliver or delivered garbage	4	5	3		4		16 (80%)

According to the information provided in the questionnaires, seven ships were not equipped with oily water separating and filtering equipment and 4 ships were equipped with shipboard incinerators.

The volume of garbage to be delivered varied between 0.02 and 4 m^3 (on average 0.99 m^3 per ship), consisting of segregated plastic, paper products, other domestic garbage (rubbish) and mixed garbage including food wastes.

Oily wastes retained for discharge to the reception facilities consisted of oily residues (sludge), oily bilge water and other waste oils such dirty lub oils, etc. Volumes varied between 0.9 and 35 m^3. The average volume of sludge for delivery was 4.82 m^3 apparently demonstrating the relatively higher fuel consumption and engine operation loads of container ships as well as their larger sludge tanks storage capacities.

While, oily bilge water can be discharged through properly operating oil water separating and filtering equipment at sea, in accordance with MARPOL 73/78, Annex I Regulations, it was demonstrated that it can be also retained onboard either within the dedicated holding tanks of other bilge wells and finally delivered at the port reception facilities. On average, 11.8 m^3 of oily bilge water were to be delivered or delivered at the port.

C1. 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 7.0 cub. meters road tanker, a 40 cub. meters tank for reception and storage purposes and also a port based facility able to achieve tertiary treatment of collected oily bilge waters and also bilge water free of oil.

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 properly authorized by the Authority of the port, companies.

Waste oils collection is exclusively carried out alongside the piers of the port, since there is no need for collection from ships at anchor. Only a few ships (1 - 2) monthly visit the designated anchorage to proceed eventually to the port area for cargo handling or other port operations.

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.

C2. Existing Reception Facilities for garbage

It's worth mentioning that an effectively and voluntarily established, environmental management system has been operating from the Authority of the port, integrated with the whole operational system that enables the systematic identification of potential environmental problems posed from the performance of port activities, the control and mitigation of their impacts with the aim to secure the protection of the land based and marine environment.

In line with the declared environmental policy of the Authority and the implementation of the system, a waste management system was introduced in 1995 initiating a selective waste collection and management from almost all port terminals that operate in the port. In 1997 as much as 41% of all wastes were selectively collected while a specially designed quarantine

facility was provided. The construction of a Waste Handling Centre begun in the same year, the operation of which was inaugurated a year later, consisting apart from a manure storage facility with its auxiliary areas and a mechanized storage facility, also of the following:

- A composting facility, with a closed 3.420 sq. meters area and equipped with a closed leakage collection system aimed at processing of biological wastes (manur, foods remnants, etc.) into a usable compost product.

- A recycling yard, with an area of 412 cub. meters designed for the preparation of secondary raw materials for further transport to the reprocessing plant in which balling of rubbish such as parer, PE items etc., packing of styrofoam into bags and storage of these materials until their removal.

The Center has reached particularly high, separate collection levels for some items such as 32% for wood, paper 11.0%, foodstuff 10%, etc. demonstrating the admirable voluntary participation of the employees in the port, their environmental consciousness and awareness that reflects also the continuous efforts of the Authority of the port towards an effective, environmentally sound management.

Emptying of organic wastes to the composting facility

In respect of the ship-generated garbage, a properly authorized company, the means and other details of which are presented in the following table, is in charge of collecting domestic like garbage from ships. Navigable collection means, receptacles and trucks provided by the abovementioned company, ensure a timely and adequate reception of garbage upon request on a 24 hours basis.

Specialized portable mechanical sorting equipment and baling storage area

Specialized spilled oil and garbage collection vessel operated by the Harbour Master local office

The good collection service has been indicated by the response provided by the Masters of ships that called to the port during the project that demonstrated that almost 80% wished or actually delivered garbage considering the whole service as sufficient. The existing charging system is based on a daily fee depending on the gross tonnage and the number of persons onboard the ships that call to the port, as described in the following tables:

Ships' gross tonnage (grt)	**Fee ($ US/day)**
up to 500	11
500 – 1.500	13
1.501 – 5.000	15
5.001 – 10.000	17
10.001 – 15.000	19
15.001 – 30.000	21
more than 30.000	23

Number of persons onboard	**Fee ($ US/day)**
Up to 10	22
11- 25	30
26 – 45	34
each person over 45	0.5

Hire of up to a 6 cub. meters capacity, garbage container including emptying is charged additionally at 15 $US daily and 200 $US (each emptying) respectively. Fees for garbage collection from ships at anchor is charged 30% in addition.

<table>
<tr><td rowspan="2">Port

Koper</td><td colspan="4">Garbage collection capacity provided in the port (m³ per allocated means)</td><td>Description of port- based treatment of garbage collected from ships</td><td>Operational restrictions on the use of the facilities</td></tr>
<tr><td>Trucks
(used as reception and transportation means)</td><td>Navigable means
(such as barges used as reception and transportation means</td><td>Receptacles provided at the quayside</td><td>Other reception means</td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>1 Truck
(10 m³ capacity)</td><td>1 reception boat
(15 m³ capacity)</td><td>(6 m³ capacity containers)</td><td></td></tr>
<tr><td>Name, Address and other contact details of Operator</td><td colspan="2">Requirements for ships to deliver garbage</td><td>Method of final disposal</td><td>Charging system</td><td colspan="2">Other remarks</td></tr>
<tr><td>Hidro Koper Company
Address: Ferrarska 10, p.p.212, SI-6001 Koper
Tel: +386 56133000,
Fax: +38656133011
Email: hidro.koper@siol.net</td><td colspan="2"></td><td>Controlled landfilling</td><td>The existing charging system is based on a daily fee depending on the gross tonnage and the number of persons onboard the ships that call to the port</td><td colspan="2"></td></tr>
</table>

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	√	√		-	-	-	-	-	-	-	-	47.0	30	47.0	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. Address: Vojkovo nabrezje 38 SI – 6501 Koper Tel: +386 5 6656 100 Fax:+386 5 6395020 Email: portkoper@luka-kp.si Ecoles private company		Bilge water is treated through port based a DAF unit, filtering and ozonation systems. 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.	

Port: Koper
Country: Slovenia

▪ Estimates of ship-generated oily wastes and residues that could be received at the port					▪ Estimates of ship-generated garbage that could be received at the port				
Oily wastes	Dirty ballast	Tank washings	Oily bilge water	Oil residues (sludge) and other waste oils	**Garbage**	Domestic garbage	Maintenance waste	Cargo-associated waste	Total volume of garbage
Reduced daily volume *(m^3/day)*	-	-	14.3	8.6	Reduced weekly volume *(m^3/week)*	36.3	8.8	2.3	47.4
Average annual volume *(m^3/year)*	-	-	5,250	3,150	Average annual volume *(m^3/year)*	1,890	462.0	119.6	2,471.6
Maximum volume per ship/arrival *(m^3)*	-	-	25.0	20.0	Maximum volume to be received per ship/arrival (m^3) (only domestic and maintenance)				5.0

D. Conclusions & Recommendations

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 and 2.472 m^3 of garbage) was carried out by applying the principle of mandatory delivery in conjuction with the average annual traffic pattern. The daily as well as the maximum per delivery volumes of oily wastes and garbage can be easily absorbed by the currently available collection means and also the treatment and disposal facilities.

- 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 record-keeping, 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. As all local, regional or industrial waste management plans, the abovementioned one aims to provide a planning and operational framework for the reception facilities and waste management in the port of Koper for the following:

- Compliance with the national waste policy and legislation as well as with the port of Koper environmental policy

- Sufficient capacity for managing ship-generated wastes in case that changes in the maritime traffic and the infrastructure of the port might happen

- Control of technological measures by assisting in the early identification of technologies and practices that could ensure safe and environmentally sound waste management

- Economy and investment requirements that are strongly related with the cost recovery system applied by the port but also with the increasing complexity of waste issues and the standards set by the E.U. Directives for the collection, transport, treatment, recovery and disposal of waste.

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. The 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. It is rather obvious that if a combined system is to be adopted, the fee that will reflect the contribution received from all ships calling at the port of Koper, irrespective whether they actually deliver wastes or not, will definitely reduce the direct fees imposed today to the ships that actually use the 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 Minsitry 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,

- Studying the feasibility of integrating selected solid waste streams delivered by ships to the available recycling facility in the port,

- 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.