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No. 50

SEMINAR ON RECEPTION FACILITIES IN PORTS

Turku, Finland
16- 19 November 1992

Reception of Ship-Generated Wastes:
Report of the Seminar on Reception Facilities in Ports
held in Turku, Finland, 16-19 November 1992

HELSINKI COMMISSION
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PREFACE

Problems related to the reception of ship-generated waste still remain in the Baltic Sea region. For that reason the Maritime Committee of the Helsinki Commission had in 1991 strongly recommended that a seminar be held on the subject, and the Commission had endorsed this recommendation at its meeting in February 1992.

The Seminar on Reception Facilities in Ports was held in Turku/Åbo, on November 16-19, 1992, at the invitation of the Ministry of the Environment of Finland. The Seminar was arranged in close cooperation with the National Board of Navigation, the National Board of Waters and the Environment, and with the Center for Maritime Studies, University of Turku, as well as with the Finnish Port Association and the Finnish Shipowners' Association.

This volume contains the Report of the Seminar and the national reports of Estonia, Finland, Germany, Latvia, Lithuania, Sweden and the Netherlands. Included are also the presentations on practical experiences in Sweden, Germany and Finland.

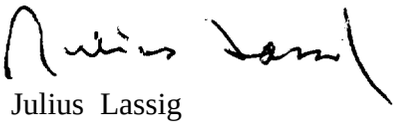
At its 14th meeting, in February 1993, the Helsinki Commission took note of the outcome of the seminar and authorized the Maritime Committee of the Commission to convene a meeting of a Working Group on Port Reception Facilities. The Maritime Committee will at its next meeting consider the outcome of the seminar and propose action as appropriate.

On behalf of the organizers of the Seminar I would like to thank the authors of the National Reports and those of other written reports, as well as all participant for their contribution to the outcome of the Seminar. I would also like to thank the Center for Maritime Studies and Mr Kaj Lundén for the excellent arrangements during the Seminar, and Ms Jaana Tamminen and Ms Kerstin Stendahl for their contribution as Seminar secretaries.

The organizers are also grateful to Dr Henk Langenberg, chairman of the working group on Reception Facilities under the Marine Environment Protection Committee of the International Maritime Organization, for his willingness to participate in the seminar.

Finally I would like to thank the Secretariat of the Helsinki Commission for their support and cooperation, and Mr Ville Savolainen for editing this report.

Helsinki, 1 June 1993



Julius Lassig
Senior Inspector
Ministry of the Environment, Finland

SEMINAR ON RECEPTION FACILITIES IN PORTS

TURKU, 16-19 NOVEMBER 16-19 1992

REPORT OF THE SEMINAR

On the invitation of the Finnish Ministry of the Environment a seminar on reception facilities for ship-generated wastes in ports was organized 16-19 November 1992. The Maritime Committee of the Helsinki Commission had at its 18th meeting in 1991 strongly recommended that such a seminar be held, and the Commission had at its 13th meeting endorsed this recommendation.

The seminar was held at the Center for Maritime Studies in Turku. The purpose of the seminar was to bring together experts from the Baltic Sea states to discuss issues as regards reception facilities in the countries bordering the Baltic Sea, identify problem areas concerning the reception of ship-generated wastes and to propose means to improve the harmonization of the system of waste reception and treatment.

The participants to the seminar included experts from Estonia, Finland, Germany, Latvia, Lithuania, Sweden and the Netherlands. Mr. Adam Kowalewski, Maritime Secretary, represented the Helsinki Commission at the meeting. Mr. Henk Langenberg from the Netherlands had been invited by the organizers of the Seminar to provide information on the Comprehensive Manual on Reception Facilities, which is under preparation in a working group of IMO's Marine Environment Protection Committee (MEPC). Mr. Langenberg acts as a chairman of this working group. Mr. Langenberg had also been asked to give a lecture on the waste reception system in the Netherlands.

The list of participants is included as Annex 1 to this publication.

Each Baltic Sea state had been asked to present a national report during the seminar in order to provide information about reception and treatment methods of wastes from ships and thus provide a background for the discussion on how to improve the implementation of the Helsinki Convention in this regard.

In addition to the national reports, presentations on special topics were reviewed by the Seminar. The programme of the seminar is attached as Annex 2, and the presentations are presented and compiled in this publication.

Included in the reports were facts on competent authorities, operative responsibility, amounts of wastes, treatment of wastes, costs related to reception and treatment of wastes, sufficiency of reception and treatment and ideas on how to improve the reception facility system. The reports raised animated discussion on a number of problematic issues, these included the question on how to reach a system corresponding to the provisions of the MARPOL 73/78 Convention and HELCOM Recommendation 10/5, bearing in mind the general acceptance of the polluter pays principle.

CONCLUSIONS

It was noted that the system of reception, transport, storage, treatment and final disposal of wastes from ships should:

- guarantee effective use of best available technology in reception, treatment and final disposal
- make use of recycling of wastes when feasible
- optimize the location and use of reception facilities with regard to more effective, cost-efficient and flexible installation.

It was recognized that there is an obvious need for developing a general Baltic Strategy for Reception of Ship-Generated Wastes. This strategy should cover all stages relating to the reception of wastes, including handling of wastes on board, the reception of wastes as such, possible storage, pretreatment, transportation of wastes, final treatment and disposal. In the discussion of the details of such a strategy the following elements were mentioned.

Technical problems on board

As the treatment costs of waste mixtures may be so high that they are prohibitive to the use of reception facilities, ships should be encouraged not to mix different types of chemicals, different types of garbage, oily wastes with detergents, etc.

The seminar concluded that there is a need for a common categorization and separation of garbage on board ships to facilitate the reception and treatment ashore.

Infrastructure in ports

It was recognized that there are areas arround the Baltic Sea where there is a lack of adequate reception and especially of treatment facilities.

The possibility of pretreatment of wastes in ports should be borne in mind in order to reduce costs of treatment of wastes.

There is a need for a detailed inventory of available reception facilities, storage and pretreatment facilities in ports.
The Programme Implementation Task Force (HELCOM PITF) should be informed on the needs for developments of port infrastructure after the inventory has been completed.

Exchange of surveillance information between ports

An active and efficient interport information system should be developed in order to enable the competent authorities to cooperate in the field of enforcing the rules of MARPOL and HELCOM, and stimulate the ships to use reception facilities.

The fee system

The goal should be to reach a moderate cost level as equal as possible for each waste category, irrespective of the administrative means to reach it. This has hitherto proved to be particularly difficult to achieve as the states have adopted varying approaches.

It was noted that at least three different fee systems exist in the Baltic Sea area (special fee, no special fee, free of charge reception). The different practices were listed in the table included as Annex 3 to this report.

High fees charged for reception of chemical, oily or other wastes in some ports together with insufficent surveillance and sanctions has caused a situation in which some ships may choose to discharge their wastes illegally into the Baltic Sea or into the North Sea. The different fee systems have also caused some undesirable transportation of wastes from one country to another.

An attempt should be made to develop the system in the way that the costs for reception of wastes should not differ too much between ports and should be neutral to competition.

Reception facilities for wastes from pleasure craft

In accordance with article 9 of the 1992 Helsinki Convention, the Contracting Parties should establish adequate reception facilities for wastes from pleasure craft.

Proposal for future activities

The seminar was informed that the Helsinki Commission intends to organize a seminar for experts from Estonia, Latvia, Lithuania and Russia on existing HELCOM arrangements. The participants noted with appreciation that one of the proposed topics for the seminar refers to the implementation of the provision on reception facilities. Mr. Henk Langenberg from the Netherlands had offered, upon invitation, to provide a lecture at the seminar.

It was proposed that a working group should be established within the HELCOM framework to deal with reception and treatment facilities for ship-generated wastes. It is important to include the representatives of the port, the shipping and the waste treatment industries in the working group, so as to take into consideration the interests of the relevant entities.

The Helsinki Commission, at the 14th meeting in February, 1994, took note of the report and asked the Maritime Committee of the Commission to consider the outcome of the seminar and propose action as appropriate.

RECEPTION OF SHIP-GENERATED WASTES

NATIONAL, REPORT OF FINLAND

Mr Markus Virtasalo
National Board of Waters and the Environment

COMPETENT AUTHORITIES IN FINLAND

1.1 Authorities associated with reception of wastes

The responsible authorities are defined in the Act and Decree on the Prevention of Pollution from Ships as described in paragraphs 1.1.1 – 1.2.3. More detailed regulations on the reception facilities will be issued as necessary by the Ministry of the Environment.

1.1.1 Oily wastes and mixtures

A port shall have adequate reception facilities for oily wastes and mixtures from ships visiting the port. Oil terminals and ports where repairs are made on oil tankers shall also have adequate reception facilities for ballast and tank washings from oil tankers using such ports.

1.1.2 Residues and mixtures containing noxious liquid substances

The owner of a port is required to ensure that the port has adequate reception facilities for residues and mixtures containing noxious liquid substances from ships loading or unloading in the port. The importer or other recipient, or exporter or other dispatcher of the liquid substance being transported shall be responsible for purchasing and using the reception facilities and for the transport and handling of the residues and mixtures so collected. The owner of a repair yard shall provide adequate reception facilities for chemical tankers coming in for repairs.

1.1.3 Garbage and sewage

For the reception of garbage and sewage, ports shall provide facilities which meet the needs of visiting ships and shall be suitable for waste management as laid down in the municipal waste management regulations.

1.2 Other authorities involved in waste management

1.2.1 The National Board of Navigation

It is the responsibility of the National Board of Navigation to restrict the passage of a ship in Finnish territorial waters when necessary in order to avoid an immediate threat of water pollution arising from weather and ice conditions or the ship's condition or too large size relative to the waters to be travelled.

A maritime inspector has the right to inspect a ship when it is in port or at anchor in Finnish territorial waters in order to investigate whether the ship has contravened the rules and regulations of the Act on the Prevention of Pollution from Ships. A maritime inspector can forbid the ship to leave, or interrupt its voyage to investigate possible violations of traffic restrictions or the act mentioned earlier or if there is a direct risk for marine pollution. A maritime inspector and coastguard and police officers have the right to take samples on board a ship and to interrupt the ship's voyage for the time needed to take a sample, in order to analyze the origin of oil or any other harmful substance found in the water.

1.2.2 The National Board of Waters and the Environment

The general supervision of the observance of the Act on the Prevention of Pollution from Ships and the rules and regulations issued under it is the charge of the National Board of Waters and the Environment and the regional administration subordinate to it. (This responsibility is without prejudice to the rights and duties of the National Board of Navigation as mentioned in 12.1).

1.2.3 Other authorities

In matters referred to in the Act on the Prevention of Pollution from Ships, the police, the defence forces, the frontier guard, the provincial governments, the customs, the roads and waterways administration and the Institute of Marine Research shall be responsible, each in its area of competence, for assistance with supervision, and for providing on request the National Board of Navigation and the oil pollution combatting authorities with the necessary assistance.

The handling of ship-generated wastes ashore is supervised and surveyed by the municipal environmental authorities. The provincial governments are responsible for the supervision of the Waste Management Act, which also concerns ports.

2 OPERATIVE RESPONSIBILITY

There are two basic patterns of reception of ship-generated wastes. The reception itself may be performed by harbour personnel or by private waste management companies. The competent authorities in ports are the port captain and the harbour service officials; some ports employ special harbour inspectors. Ship agents are also suitable contacts in many ports for arranging the reception facilities.

The ship's inquiries for the reception of wastes are usually made through ship agents or

directly to harbour service officials. In most cases the harbour service is on duty for 24 hours, and can be contacted by telephone or by VHF-radio. The ship will be informed of the proper waste discharging procedures, and facilities will be arranged. The inquiries should be made beforehand if possible. If no prior notice of the need to discharge wastes is received by the authorities concerned, arranging of reception facilities will normally require up to three hours, depending on the harbour in question.

2.1 Oily wastes

The most common procedure regarding oily wastes is to discharge them into a tank vehicle. In some harbours, also pipelines are provided for the reception of wastes. The received wastes are either directly transported for final treatment or temporarily stored into storage tanks.

At present, there are also six ports which themselves carry out pre-treatment of oily ballast water and tank washings. These oil/water mixtures are usually received into the pre-treatment facilities through a pipeline.

2.2 **Noxious liquid substances**

Noxious liquid wastes and tank washings are received in the same manner as oily wastes. If a ship is unloading noxious liquid cargo, the cargo residues and tank pre-washings are usually taken care of by the party receiving the cargo. The other responsible parties are mentioned in 1.1.2. The residues and mixtures are used by chemical companies if possible; otherwise they are transported for final treatment (see 4.2).

2 3 Garbage and sewage

Garbage containers are provided on the quayside for normal amounts of ship-generated waste of municipal waste type. These containers are always available without prior notice. Extra containers will be supplied upon request. At present, half a dozen of the largest ports in Finland require separate handling of infectious special wastes, such as raw meat and its packaging materials. In these ports, ships will be supplied with garbage sacks for such special wastes.

Ships visiting certain ports on a regular basis can agree with the port authorities that they will themselves make the necessary arrangements for garbage delivery. This relieves the ship from the waste management fee. On the other hand, the port's garbage reception facilities will then no longer be available to the ship.

The sewage tanks are emptied directly into a municipal sewer or into a tank vehicle. In the latter case, the reception is taken care of by private waste management companies.

2.4 Other harmful wastes

Other types of harmful wastes are received separately. It is prohibited to put harmful

wastes into containers for conventional garbage. Some ports have special containers for batteries, paints, solvents, etc., but usually the reception requires an additional notice to the harbour officials.

3 AMOUNTS OF WASTES

Accurate figures for the amounts of wastes received in Finnish harbours are not available. This is because so far no authority compiles statistics of received ship-generated wastes at the national level. The following figures are based on estimates gathered from port authorities. Some waste management companies have also been interviewed. Case examples of some ports can be found in appendixes 5-9.

According to the present procedure, ports are obliged to present a waste management plan to the municipal environmental authorities. The plan includes information on the quality, quantity and handling methods of wastes in their area. Ports are often obliged to present a yearly waste management report to the authorities.

3.1 Oily wastes

The 1991 estimate for the total amounts of different ***oily slops,*** such as bilge water, used lubricating oil, separation sludge and fuel system residues is 6 000 m^3 (see appendix 4). The estimated total amount of ***oil/water mixtures*** received in 1991 is 80 000 m^3 (see appendix 3).

3.2 **Noxious liquid wastes**

Noxious liquid wastes and tank washings are received by various chemical and waste management companies. So far these companies have not reported the specific amounts of wastes received, but the authorities have not actively required this information. Information on the amount of noxious liquid wastes received in 1991 was not available for this presentation.

3.3 Garbage and sewage

Estimates of the amounts of garbage received are available only from ports registering the garbage sacks delivered to ships. Other sources of information have been the waste management companies transporting the garbage. The average amount of garbage received in 1991 is 2.6 m^3 per ship visit. This average amount is based on 12 235 registered ship visits; the total number of ship visits in 1991 is 25 734. Estimates of the amounts of sewage received in 1991 are not available.

4 TREATMENT OF WASTES

4.1 Final treatment of oily wastes

Ekokem is a Finnish treatment plant for hazardous wastes. In most cases, the oily wastes are sent to Ekokem for final treatment. Exceptions are made to this practise in harbours situated near industrial facilities able to treat or utilize oily residues in an appropriate way.

The pre-treatment techniques used in harbours (described in 4.1.1) are also available at Ekokem. In addition, mechanical separation can be used. Ship-generated oily wastes are seldom pre-treated at Ekokem because the company has found the average exploitable oil content to be less than 2%. The oily wastes are incinerated in a rotating drum type kiln. Depending on the substance incinerated, the temperature is set between 900°C and 1300°C.

4.1.1 Pre-treatment of oil/water mixtures in harbours

Half a dozen ports have facilities for pre-treatment of oil/water mixtures. These pre-treatment plants employ gravitational settling and de-hydrating aided by heating, and in some cases, the use of de-emulgating chemicals. Water is extracted as efficiently as possible from these mixtures, or at least separated to a layer of its own. The oily residues are sent for final treatment elsewhere. Separated water is pumped into the sea in compliance with regulations issued by municipal environmental authorities or provincial governments. The water pumped into the sea must not contain more oil than specified; typical values range from 5 to 15 mg/l.

4.2 Final treatment of noxious liquid wastes

Wastes containing noxious liquid substances are usually received by the same party that receives the cargo. The wastes are exploited in industrial processes or treated in facilities arranged by the party in question. In cases where this is not possible, the wastes are sent to Ekokem for final treatment. Actual treatment procedures are chosen according to the results of a case by case analysis, but usually the wastes are incinerated.

4.3 Final treatment of garbage and sewage

Garbage is transported to municipal landfills. Infectious food waste, where received separately, is incinerated or buried in landfills.

Sewage is discharged into the sewer system. The consequences of this procedure are presently being investigated. Sewage received from passenger cruisers and ferries has caused problems in municipal sewage treatment plants. Such ships are usually equipped with efficient sewage collecting and processing systems. Recent studies have shown that sludge from such units is approximately 8.5 times more concentrated than conventional municipal sewage.

Solid hazardous wastes, such as batteries, empty cans of noxious substances, etc. are received separately and transported to regional collection facilities or directly to Ekokem.

5 COSTS RELATED TO RECEPTION AND TREATMENT OF WASTES

5.1 Costs caused by handling of wastes

Some port waste management costs can be presented. The following calculations are based on the exchange rate of 1 US$ = 5 FIM. The values are approximate.

The operating costs of a typical reception facility for oil/water mixtures are about 300 000 – 350 000 FIM/year (60 000 – 70 000 US$/year). A "typical" facility refers to a conventional heated settling tank. Labour costs are a dominant part of the yearly operating costs. This leaves the yearly costs virtually unchanged regardless of the volume of wastes treated. A considerable cost factor is transport and final treatment of the residue from pre-treatment (see 4.1.1).

The yearly reception and transport costs for garbage range from 150 000 FIM/year to 350 000 FIM/year (30 000 US$/year – 70 000 US$/year), depending on the port in question.

5.2 The fee system

The fee system has two main categories: The fees charged from all ships and the fees charged from ships using the reception facilities. The reception of garbage and sewage is a service included in the waste handling fee charged from all ships visiting the port, except from those ships which have an agreement mentioned in paragraph 2.3.

Other types of wastes, like oil and noxious liquid wastes, are not received as part of the port's service provided on the basis of the handling fee. Ships discharging such wastes are subject to separate fees according to the type and amount of waste discharged into the reception facilities. The fees are based on the polluter pays principle.

5.2.1 The fee for reception of garbage and sewage

The fee is based on the ship's size specified as net register tonnes (NRT). The actual fee depends on the port, but is generally from 13 p/NRT to 17 p/NRT, so that the final charge will range between 130 FIM and 520 FIM (US$ 26 – US$ 104). Every ship will be charged by the port authorities at each arrival, except ships having an agreement not to discharge wastes into the harbour service reception facilities (see paragraph 2.3). Some ports do not include the reception of sewage into the service fee, but will charge the ship separately for such reception.

5.2.2 The fees for reception of hazardous wastes

The fees for reception of hazardous wastes are based on the actual costs caused by handling and treatment of the wastes received. In most Finnish ports such wastes are handled by Ekokem or its subcontractors, and therefore the costs are based on rates decided by Ekokem. Ships using the reception facilities will be charged for the total costs of the entire procedure including reception, transport and treatment, except in cases where it has been agreed that a third party will be charged. In such cases the importer or receiver of the cargo will bear the costs. Some harbours where additional pre-treatment facilities are available make an exception for the reception costs to be paid for oil/water mixtures. These harbours determine their own rates, which have been ranging from 6 FIM/m^3 to 150 FIM/m^3 (1.2 US$/$m^3$...30 US$/m^3).

The actual rates charged by Ekokem depend on the composition of the waste. This information will be derived from an analysis carried out by Ekokem.

Labour costs for reception are not included in the rates described in paragraphs 5.2.2.1 and 5.2.2.2. The additional charge for labour ranges from 390 FIM/h to 902 FIM/h (78 US$/h – 180 US$/h), depending on the number of men needed, the day of the week and the hour of the day. The costs of ***transportation*** are included in the rates.

The rates described in 5.2.2.1 and 5.2.2.2 are valid in those 16 ports which have made waste management contracts with Ekokem (see appendix 1). For other ports, the rates are to be increased by 200 FIM/t (40 US$/t).

5.2.2.1 Oily Wastes

All shipmasters should pay attention to the fact that the list of oils given in MARPOL 73/78 is a valid reference only on board, not ashore. Care should also be taken not to mix different types of hazardous wastes. The waste reception fee is defined on the basis of the most expensive component of the waste delivered. Oily waste containing a small amount of, for example, solvents is charged as noxious liquid waste.

Oil/water mixtures: The rate depends on the water content of the mixture. Water contents exceeding 10 % bring about rates ranging from 270 FIM/t to 650 FIM/t (54 US$/t – 130 US$/t). Oil/water emulsions containing more than 95% water are rated as 1 200 FIM/t (240 US$/t). Lubricating oil containing water less than 10% and not containing heavy fuel oil will be received without charge. Mixtures containing sulphur or halogens are not charged as oil but as liquid combustible organic hazardous waste (see 5.2.2.2).

Bilge water: The rate for bilge water not containing more than 5 % oil, is 250 FIM/t (50 US$/t).

Fuel oil separation sludge: The rate for fuel oil residues, with specific gravity less than 1, is 650 FIM/t (130 US$/t). The rate for common solid or semisolid oily waste is 1 880 FIM/t (376 US$/t).

5.2.2.2 Wastes containing noxious liquid substances

A general rate for ***liquid combustible organic waste*** is 1 **200 FIM/t** (240 **US$/t**). Additional fees, like 170 **FIM/%/t** (34 **US$/%/t**) for sulphur and halogen contents, and 30 **FIM/%/t** (6 **US$/%/t**) for water content, are added to the general rate. The rates for inorganic wastes vary from 1 150 **FIM/t** to 12 000 **FIM/t** (230 **US$/t** – 2 400 US$/t).

5.2.3 The fees in industrial harbours

Industrial harbours often define their own reception fees depending on the ship, cargo and type of waste to be received. For example, Neste charges are in three price categories: 6 **FIM/m^3**, 8 **FIM/m^3** or 15 **FIM/m^3** (1.2 **US$/m^3**, 1.6 **US$/m^3** or 3 **US$/m^3**). Reception is possible only for the company's own ships or for ships carrying cargo related to the company's trade.

5.3 Subsidy system

Ekokem is subsidized by the government for transportation costs for oily wastes with 200 **FIM/t** (40 **US$/t**).

The costs of port reception facilities for oily wastes can be compensated from the Oil Damage Compensation Fund as provided in the Act on the Oil Damage Compensation Fund. The compensation can be c. 60 % of the purchasing costs.

6 SUFFICIENCY OF RECEPTION AND TREATMENT

6.1 The capacity and adequacy of reception

The most common way of receiving other than solid wastes is to arrange a tank vehicle on the spot. The required overall capacity can easily be achieved by using an appropriate number of tank vehicles.

6.1.1 Reception of oily wastes

The Ministry of Trade and Industry has issued regulations on reception capacities of oily wastes. In these regulations Finnish harbours are divided into three categories, capable of receiving 10 **m^3**, 20 **m^3** or 30 **m^3** of oily wastes, respectively. Additional requirements for the capacity of receiving oil/water mixtures have been issued for the six largest oil harbours. These requirements range from 2 000 **m^3** to 15 000 **m^3**. The largest oil and chemical ports have pipeline connections on almost every quay for the discharge of liquid wastes. According to the port authorities, the available capacity has always been sufficient for the reception of oily waters. The situation will further improve in the future, because the practise to carry ballast water in cargo tanks has nearly ceased after the introduction of segregated ballast tanks.

In case of slops, such as used oil, bilge water or fuel system residues, capacity has not been a problem because the amounts of wastes are relatively small. These wastes are usually discharged into a tank vehicle. The overall capacity is therefore very flexible.

6.1.2 Reception of noxious liquid wastes

In cases where the ship is unloading noxious liquid substances, the reception of cargo residues and tank washings is usually arranged by the receiver of the cargo. Because the need for reception in these cases is known well in advance, the receiver has time to come up with an arrangement that suits the requirements. The options for reception are generally the same as in the case of oily waters: pipeline or tank vehicles.

If an arriving ship carries a considerable amount of noxious liquid substance residues or tank washings, which are not related to the cargo suppliers business, problems can arise. Normally the reception capacity and efficiency have proven sufficient. If the port authorities have not been informed in advance of the need to discharge such wastes, sufficient reception capacity will probably not be available. It will then take from some hours to a full day to provide appropriate reception facilities, depending on the time of day and the port in question.

6.1.3 Reception of garbage

Garbage containers are permanently available on the quayside in every harbour. Short delays have occurred when the supply of garbage has exceeded the usual rate. In such cases the time needed for providing extra capacity has been a few hours. If a ship has an unusual amount of garbage, dunnage or solid cargo residues, extra containers can be supplied in a few hours.

In the largest harbours, separate garbage sacks and bins are furnished for the reception of infectious food wastes. The sacks are delivered on board at arrival, and the bins are located beside the ordinary garbage containers on the quayside. This procedure has been considered to be sufficient, but is unfortunately not yet extensively used in the harbours of Finland. As in previous cases, the overall capacity depends on the number of containers, which is easily adjusted to meet the demand.

6.1.4 Reception of sewage

Sewage will be received into a tank vehicle or directly into a sewer, depending on the harbour. This procedure has proven to be sufficient.

6.2 The capacity and adequacy of treatment

The following considerations are based on the present supply of ship-generated wastes.

6.2.1 Treatment of oily wastes

As mentioned in paragraphs 4.1 and 6.1.1, some ports carry out pre-treatment of oil/water mixtures. Compared to Ekokem, these pre-treatment facilities have been utilized extensively. The reason for this is assumed to be the difference in the reception fees. However, the average yearly degree of usage of these facilities ranges only from 20% to 50%. The individual capacities of these pre-treatment facilities are therefore considered sufficient. From the environmental point of view these facilities are considered quite adequate, provided that the residues are sent for final treatment, and the routines are regularly inspected by the authorities concerned.

At the national level, the final treatment of oily wastes is carried out by Ekokem. Exceptions are made in cases where oily wastes can be utilized in industry. Ship–generated wastes in general are only a small part of Ekokem's work. Therefore variations in the supply of these wastes bring about only marginal changes to their routines, and will not reach the limits of capacity.

6.2.2 Treatment of noxious liquid wastes

Noxious liquid wastes, exploitable in chemical industry, are received and used by some companies. Because of the variety of substances and uses, the overall adequacy of treatment can not be judged.

Unfortunately, the research on possibilities to exploit chemical cargo residues and tank washings, has received little attention so far. The demand for such treatment, inexpensive to ships, exceeds the supply. The other possibility, final treatment at Ekokem, is scarcely used.

7 COMMENTS AND PROPOSALS

7.1 Present situation in Finland

It is difficult to estimate the adequacy of the different means of reception described. At present, the reception capacity well exceeds the supply of wastes, except in the case of garbage, where it sufficiently exceeds the supply. Based on calculations of and practical experiences from the potential need to discharge oily and noxious liquid wastes from ships into reception facilities, it can be concluded that ships are not using Finnish reception facilities for such wastes to the extent expected. One reason for this could be the fees charged from individual ships.

On the whole, the reception capacity is therefore more than adequate for the time being, but difficult to evaluate in view of possible changes of the fee system in the future.

The means of reception are developing in the direction of widespread utilization of tank vehicles as reception facilities. New pre-treatment facilities are unfortunately not being established.

7.2 Problems confronted in Finland

Present difficulties concern appropriate surveillance and sanctions and the financial burden on ships caused by the reception fees. Some cases of violations of regulations have occurred. A typical case is a discharge of noxious liquid tank washings into the Gulf of Finland during the voyage from the port of unloading to the next port of loading. Efforts are made to find solutions to these problems.

Another problem faced on board ships discharging oily residues into reception facilities, is the definition of "oil". On board a substance is found to be "oil" as defined by the MARPOL List of Oils. Ashore this residue or waste may well be, according to the

waste management company charging the ship, for example, “liquid containing solvents and other impurities”. This kind of misunderstanding and different interpretation can easily cause financial difficulties.

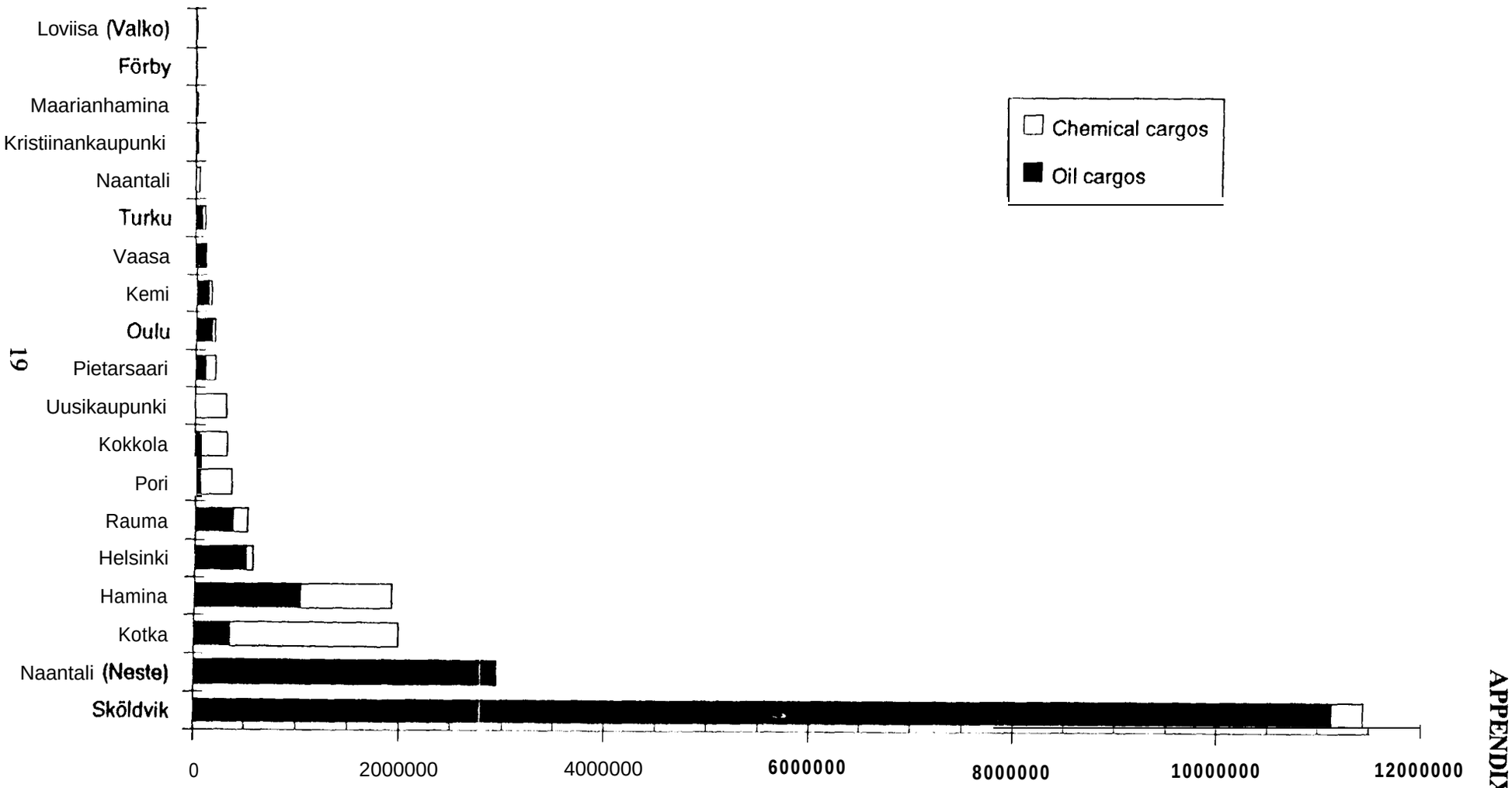
7.3 Cooperation between authorities in the Baltic Sea States.

It is a problem that ship-generated wastes are often deliberately transported out of the country instead of being delivered to reception facilities in Finland. In practise, the party assumed to receive the wastes abroad is seldom contacted. Especially in case of noxious liquid wastes, international surveillance cooperation is desirable. A simple verification of the arrival of the wastes in question would be sufficient. Provisions for this could be included into the procedures of Port State Control.

PORTS HAVING WASTE MANAGEMENT CONTRACTS WITH EKOKEM:

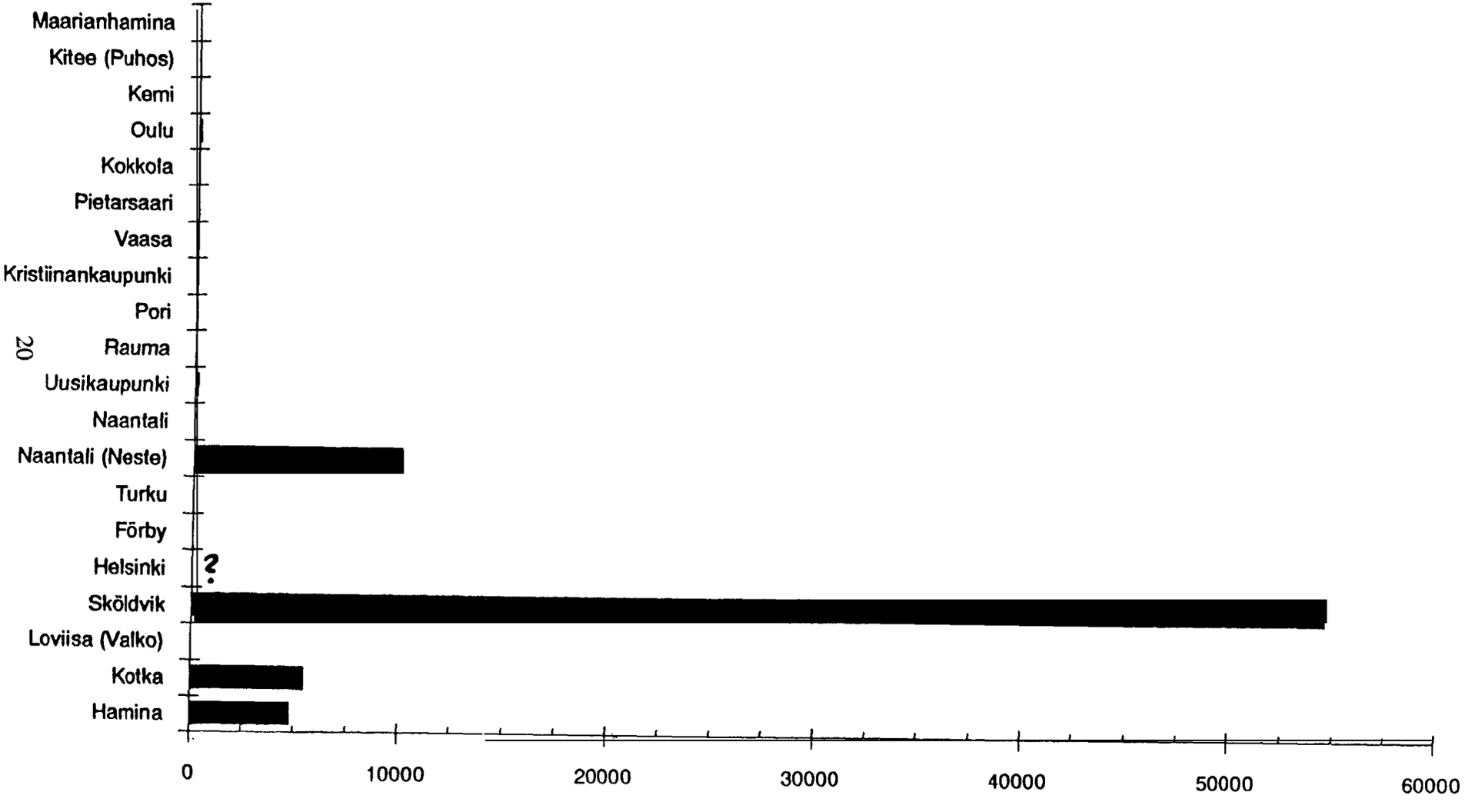
Port of Hamina
Port of Joensuu
Port of Kemi
Port of Kokkola
Port of Kotka
Port of Kristiinankaupunki
Port of Loviisa
Port of Naantali
Port of Oulu
Port of Pietarsaari
Port of Pori
Port of Raahe
Industrial harbour of Rautaruukki (Raahe)
Port of Rauma
Port of Turku
Port of Vaasa

TOTAL CARGO TRAFFIC (tons/l 991)



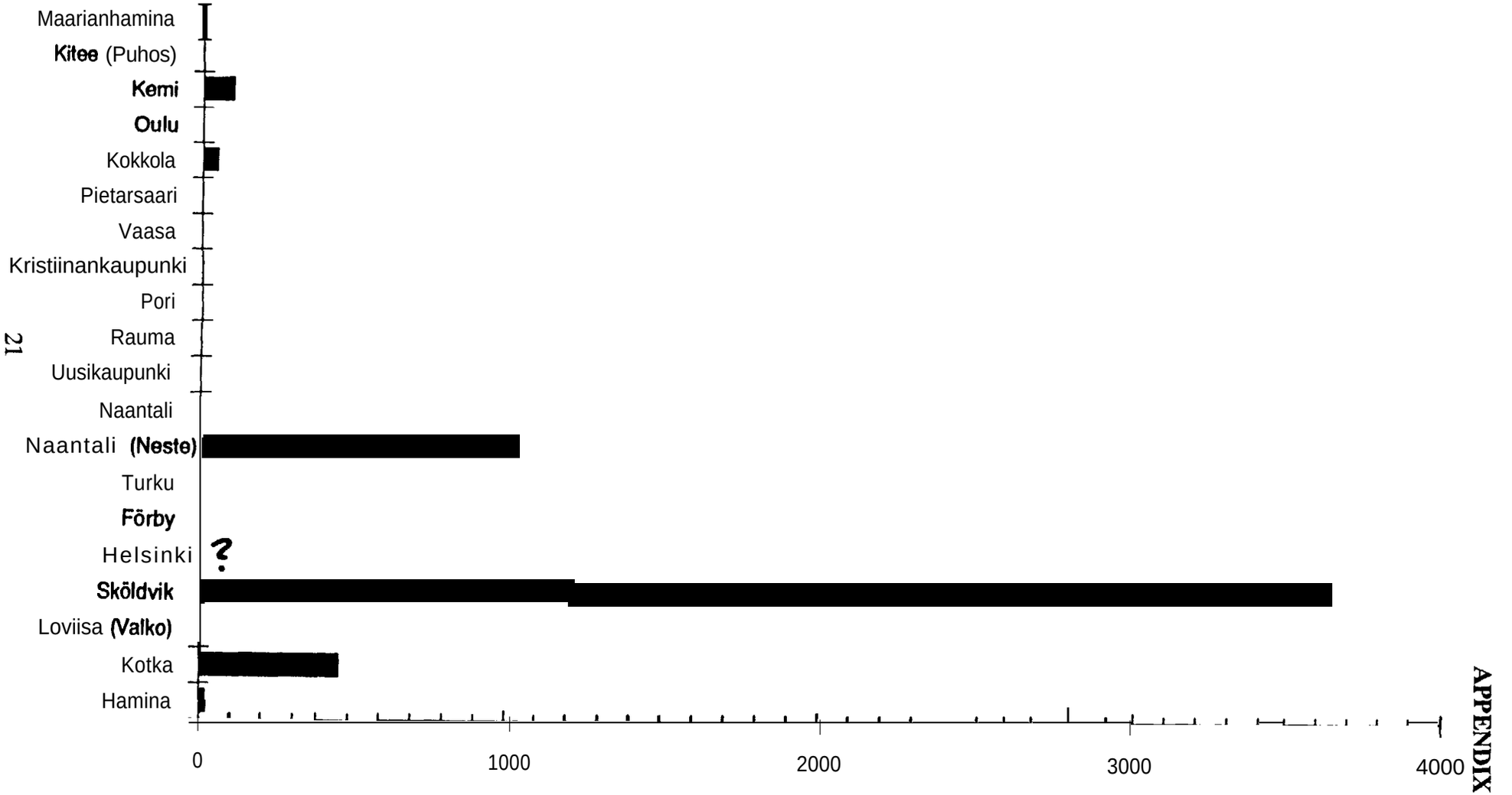
APPENDIX 2

RECEPTION OF OIL/WATER MIXTURES (m3/1991)



APPENDIX 3

RECEPTION OF OILY SLOPS (m3/1991)



APPENDIX 4

CASE **1:** **Industrial oil/chemical harbour**

TRAFFIC INFORMATION (1991):

	Arrivals:	679	
		9058591	BRT
	average:	13341	BRT
Oil cargos:		**in** 8601262	t
		out 2528219	t
		total **11129481**	t
Noxious liquid	**in**	147770	t
cargos:	out	174259	t
	total	322029	t

RECEIVED WASTES (1991):

Reception capacity of oil/water mixtures required by authorities:	15000	m3
Oil/water mixtures:	64703	**m3**
Specific gravity used in calculations:	1	t/m3
Percentage of oil cargo total:	**0,5**	%
Oily slops (bilge, **fuel system residues,etc.)**	3643	**m3**
Number of discharges into facilities:	**900**	
Average discharge (calculated):	4	m3
Discharge per BRT (calculated):	**0,40**	**dm3/BRT**
Noxious liquid cargo tank washings:	4000	**m3**
Specific gravity used **in calculations:**	**1**	**t /m3**
Percentage of noxious liquid cargo total:	**1,2**	%
Number of discharges into facilities:	100	
Average discharge (calculated):	40	m3
Garbage (municipal waste only):	1 5 0	t
Amount per ship visit (calculated):	**0,22**	**t**
¤ Solid hazardous waste:	260	**m3**
Amount per ship visit (calculated):	**0,38**	**m3**

¤ Solid hazardous wastes include in this context wastes like batteries, solid oil- or chemical wastes, solid wastes contaminated by oil or chemicals, etc...

CASE 2: **Industrial oil harbour**

TRAFFIC INFORMATION (1991):	**Arrivals:**	**316**	
Oil cargos:	in	2296313	t
	out	**656025**	t
	total	**2953138**	t
Noxious liquid cargos:	in	0	t
	out	**0**	t
	total	**0**	t

RECEIVED WASTES (1991):

Reception capacity of oil/water mixtures required by authorities:	**8000**	m3
Oil/water mixtures:	**10079**	**m3**
Specific gravity used in calculations:	1	t /m3
Percentage of oil cargo total:	0,3	%
Oily slops (bilge, fuel system residues,etc.)	**1022**	**m3**
Garbage (municipal waste only):	**70**	**t**
Amount per ship visit (calculated):	0,22	t
¤ **Solid hazardous waste:**	**15**	**m3**
Amount per ship visit (calculated):	0,05	m3

¤ Solid hazardous wastes include in this context wastes like batteries, solid oil- or chemical wastes, solid wastes contaminated by oil or chemicals. etc...

APPENDIX 7

CASE 3: All-round port with conventional and oil/chemical harbour

TRAFFIC INFORMATION **(1991):**

	Arrivals:	**1007**	
		6200955	**BRT**
	average:	**6158**	**BRT**
Oil cargos:	in	136171	t
	out	900226	t
	total	1036397	t
Noxious liquid cargos:	in	182577	t
	out	708110	t
	total	890687	**t**

RECEIVED WASTES **(1991):**

Reception capacity of oil/water mixtures required by authorities:	3030 m3
Oil/water mixtures:	**4835 m3**
Specific gravity used in calculations:	1 t/m3
Percentage of oil cargo total:	**0,5** %
Average discharge into facilities:	112 m3
Oily slops **(bilge,** fuel system **residues,etc.)**	20 m3
Discharge per BRT (calculated):	**0,00 dm3/BRT**

CASE 4: All-round port with conventional and oil/chemical harbours

TRAFFIC INFORMATION (1991):	**Arrivals:**	**1777**	
		7727769	BRT
	average:	**4349**	**BRT**
Oil cargos:	in	**79768**	**t**
	out	**270770**	**t**
	total	**350538**	**t**
Noxious liquid cargos:	in	**24342**	**t**
	out	1620726	**t**
	total	1645068	**t**

RECEIVED WASTES (1991):

Reception capacity of oil/water mixtures required by authorities:	2030 m3
Oil/water mixtures:	**5500 m3**
Specific gravity used in calculations:	**1** t/m3
Percentage of oil cargo total:	**1,6 %**
Average discharge into facilities:	**250 m3**
Oily **slops (bilge, fuel system residues,etc.**	**450 m 3**
Discharge per BRT (calculated):	**0,06 dm3/BRT**
Garbage:	3700 m3
Amount per ship visit (calculated):	**2,08** m3
Sewage:	**50 m 3**
Amount per ship visit (calculated):	**0,03 m3**

APPENDIX 9

CASE 5: All-round **port with conventional , passenger, and oil/chemical harbours**

TRAFFIC **INFORMATION (1991):**

Arrivals:	**5657**	
	81462269	**BRT**
average:	**14400**	**BRT**

Oil cargos:	in	478172	t
	out	26595	t
	total	564767	t
Noxious liquid cargos:	in	71178	t
	out	10052	t
	total	81230	**t**

RECEIVED WASTES (1991):

Reception capacity of oil/water mixtures required by authorities: **30 m3**

¤ **Oil/water mixtures:** **0 m 3**
Specific gravity used in calculations: 1 t/m3
Percentage of oil cargo total: **0,0** %
Average discharge into facilities: 0 m3

¤ **Oily slops (bilge, fuel system residues,etc.** **0** m 3
Discharge per BRT (calculated): **0,00 dm3/BRT**

Garbage: 11000 m3
Amount per ship visit (calculated): **1,94** m3

Sewage: 73000 m3
Amount per ship visit (calculated): 12.90 m3

¤ These figures represent **the information** received from port authorities. They do not contain wastes received by private waste management companies.

RECEPTION OF SHIP-GENERATED WASTES

NATIONAL, REPORT OF ESTONIA

Mr Tonu Remma
Estonian State Sea Inspection Office

RECEPTION FACILITIES IN PORTS OF ESTONIA

The Tallinn area

Oily wastes] are collected in ports, shipyards and roadsteads by five special ships, owned by two joint-stock companies, SCANTRANS and PKL, and by a ship belonging to Baltic Shipyard. The collected oily wastes are transported by these ships to Tallinn Waste Water Treatment Plant (managed by SCANTRANS) for further treatment. The total volume of the reservoirs at the plant is 4 000 m^3, and the treatment capacity is 125 000 m^3 per year. The concentration of oily substances after the treatment does rot exceed 4.5 mg/l. The effluent is discharged into the town's sewerage system.

80 000 tons of oily wastes were treated by Tallinn Waste Water Treatment Plant in 1991. This year the plant has been able to use about 50 per cent of its capacity, and so far 50 000 tons of oily wastes have been treated – due to fuel crises many ships are idle, and the increased prices, especially that of energy, impede the collection and treatment. 1 500 tons of sewage was collected in 1991 (790 tons this year) – it is discharged into the town's sewerage. The costs related to reception and treatment of sewage are constantly changing (in particular, cost of energy).

At present SCANTRANS has established the following fees:
Reception of oily wastes and sewage from ships

a) alongside the pier – 156.8 EEK per ton
b) anchored in the roadstead – 196 EEK per ton.

For roadstead operations 71.1 EEK are charged per hour. During the winter period the charges increase by 25 per cent. One of the ports in Tallinn (Miinisadam) is under the control of the Russian Navy, and local authorities lack information on activities within such areas.

'This term refers to bilge water collected from ships that may be mixed with sludge

The Northern coast

The oily wastes, collected from small fishing boats, are transported by tanker cars to the Miiduranna port near Tallinn. The wastes are treated in the electric flotator owned by the joint-stock company ESMAR. About 11 m^3 of oily wastes are treated per week.

Loksa Shipyard (the Northern coast of Estonia)

The oily wastes are primarily collected into special storage tanks located on the pier, to be transported from there by tanker cars to the separating device on the territory of the shipyard (USA-4, an older type of separator removed from a ship with a capacity of 30 m^3 per 24 hours).

The concentration of oily substances in the effluent does not exceed 5 mg/l. The effluent is discharged into the sea.

Narva–Jôesuu and Toila (The North-Eastern coast of Estonia)

Two joint-ventures, VIRU RAND and TRALFLOT receive and treat oily wastes. TRALFLOT owns a waste treatment device which, however, is not in use due to its low efficiency. The oily-waters are collected into special storage tanks on the pier (total capacity 62 tons), from where they are transported by tanker cars to the Baltic Thermal Power Station to be burnt there. This year 32 tons of oily wastes have been utilized by the power station.

There are two electric flotators in Narva–Jôesuu (owned by VIRU RAND) – one is in use during the summer period, the other in winter. The daily capacity of both is 3 m^3. The concentration of oily substances in the treated waste shall not exceed 0.35 mg/l, and the water quality is controlled by laboratory measurements once a month. The joint–venture VIRU RAND has an electric flotator AK80M03 with the capacity of 1 m^3 per hour in Toila. The concentration of oily substances in the treated waste fluctuates from 3 to 8 mg/l. At present the flotator is not in use, and the collected oily wastes are transported by tanker cars to Narva–Jôesuu for treatment.

Haapsalu and the Western coast of Estonia

The oily wastes are collected by tanker cars of the joint-stock company WEST, and transported to special storage reservoirs at local ports (an old ship is used for the purpose in the port of Dirham). From the reservoirs the oily wastes are transported by tanker cars to an abandoned opencast clay pit where it is discharged (about 20 km from Haapsalu). The oily substances that have been removed from the surface in the storage reservoirs are burnt in the local boilerhouse.

The islands of Hiiumaa and Saaremaa

In Hiiumaa the tanker cars of the joint-stock company DAGOMAR collect oily wastes from ships and transport them to special storage reservoirs located on the shore. From there the wastes are transported by the tanker cars to Suur-Sadama for treatment by two electric flotators (capacity of each is 2 tons per hour). After treatment the effluent is discharged into the sea. 890 tons were treated in 1991, the plan of the current year is about 400 tons.

In Saarcmaa, oily wastes are collected from ships by the tanker cars of the joint-stock company SAARE KALUR. Having passed through mechanical filters, the waste is discharged into the sea. The oily wastes are incinerated in the local boilerhouses. There is only one electric flotator in Saaremaa (in the port of Nasva), and it is not operating at present since the administration considers the price on electricity too high.

Pärnu and the South-Western coast of Estonia

There is a waste treatment device PP-1 in Pärnu with a capacity of 2 tons per hour. At present the device is not operating. This year 282 tons of oily wastes have been transported to the refuse disposal site (last year 750 tons). There is one special collecting-ship in Pärnu. Sewage is discharged into the town's sewerage.

Conclusion

We have not been able to present the complete data, since the information we have managed to obtain is not sufficient. Estonia is at present in a transition phase, and the state is delegating some of its responsibilities to the private sector. At times it creates certain confusion. What comes to the reception and treatment of oily wastes and sewage, we intend to create such conditions that the crew of a ship would transport the wastes to the reception facilities (at present many crews prefer to discharge sewage into the sea). We also hope to learn from the experience of more advanced states and enterprises.

RECEPTION OF SHIP-GENERATED WASTES

NATIONAL REPORT OF' LATVIA

Mr Guntis Drunka
Environmental Protection Committee of
the Republic of Latvia

THE PORT RECEPTION FACILITIES IN LATVIA

The ports shall have adequate reception facilities for oily wastes and mixtures from ships visiting the port, and the oil terminals shall also have reception facilities for ballast and tank washings from oil tankers. The chemical terminals are required to have reception facilities for residues and mixtures containing noxious substances from ships loading and unloading in the port. The ports have to provide the reception of garbage and sewage.

The general supervision of the prevention of pollution from ships is the responsibility of the Environmental Protection Committee.

Baltic Marine Protection Agency, which is under the authority of the Environmental Protection Committee, has the right to inspect a ship and investigate contraventions of the rules and regulations on the prevention of the pollution from ships when
a) the ship is in a port or anchored on the Latvian territorial or inner waters or
b) the ship is in the Latvian economical zone and it is suspected of polluting.

The competent authorities in ports are the port captain and the harbour service officials. Ship agents are also suitable contacts for arranging the reception facilities. The ship's inquiries for the reception of wastes are usually made through the ship agents or directly to harbour service officials. The harbour service is on duty 24 hours per day. The inquiries have to be submitted by ship 24 hours in advance

The three major ports – Riga, Liepaja and Ventspils – have reception facilities for oil-containing water. The reception of oil-containing water and sewage is carried out by container ships, and that of garbage and oily wastes by lorry. The sewage is conveyed to municipal sewage networks, the garbage is disposed of to landfills and the oily wastes are incinerated. In the following, a more detailed discussion of these facilities is given. Note that the cost system and payments reflect the situation on September 1, 1992.

PORT OF RIGA

There are two reception facilities for oil-containing water and five container ships in the port of Riga.

Reception facility "MOS-3" in Riga marine trade port

Owner:	LSA Hanza Bunkering Ltd
Capacity:	100 m^3/day
Received in 1991:	Oil-containing water – 31 604 m^3
	Sewage – 5 194 m^3
	Garbage – 47.4 t
Cost system:	Reception of oil-containing water and sewage – included in sanitary fee
	Reception of 100 kg of garbage – $14

Technology for the treatment of oil-containing water:

I stage	Sedimentation of the oil products with heating
II stage	Physico-chemical treatment of the dirty water (60 mg/l) with $KMnO_4$

The purified water containing less than 4 mg/l of oil is directed to the municipal sewage network. The sludge is burned.

Reception facility in fishery port

Owner:	Riga fishery port
Capacity:	100 m^3/day
Received in 1991:	Oil-containing water – 35 000 m^3
	Sewage – 5 000 m^3
	Garbage – 442 t
Cost system:	Oily water from machinery spaces and sewage – 180 roubles/m^3
	Garbage – 8 roubles/m^3
	Sludge – 10 roubles/kg

Technology for the treatment of oil-containing water:

I stage	Sedimentation with heating
II stage	Sedimentation with heating
III stage	Physico-Chemical treatment with $KMnO_4$

The purified water containing less than 4 mg/l of oil is conveyed to the municipal sewerage.

PORT OF LIEPAJA

Reception facility in fishery port

Owner:	Ocean Fishery Fleet WArehouse
Capacity:	100 m^3
Received in 1991:	Oil-containing water – 10 026 m^3
	Sewage – 964 m^3
	Garbage – 3 000 t
Container ships:	2
Cost system:	Included in port taxes

Technology for the treatment of oil-containing water:

I stage	Sedimentation with heating and $KMnO_4$
II stage	Sedimentation with heating and $KMnO_4$

PORT OF VENTSPILS

Oil-containing water is received in four container ships. In the oil terminal, shore installations are used for the reception. Substances with noxious liquids are conveyed to Port Plant facility (receiving only those which are loaded and unloaded in the port).

Oil reception facility

Owner:	Enterprise "Ventspils nafta"
Capacity:	60 000 m^3
Received in 1991:	Oil-containing water – 1 126 022 m^3
Cost system:	Included in sanitary fee, except in the oil terminal

Reception facility is under reconstruction.

Technology for the treatment of oil-containing water:

I stage	Sedimentation with heating
II stage	Flotation aeration

Water with oil contamination below 12 mg/l is released directly to sea.

Reception facility of noxious liquid substances

Owner:	Port Plant
Capacity:	30 m^3/hour
Received in 1991:	9 000 m^3
Cost system:	Included in sanitary fee

Technology for the treatment of mixtures containing noxious liquids:

I stage	Neutralization
II stage	To biological treatment plant

OTHER SMALL FISHERY PORTS

Mersrags, Roja, Lielupe and Engure have reception facilities for oil-containing water with capacities of 5 m^3, Zvejniekciems with that of 50 m^3 and Pavilosta of 51 m^3. In these reception facilities the oil-containing water is treated by sedimentation and activated carbon filtration. The sewage is conveyed to municipal networks and garbage to municipal landfills.

RECEPTION OF SHIP-GENERATED WASTES

NATIONAL REPORT OF LITHUANIA

Mr Romualdas Starkus
Senior Inspector
Klaipeda Regional Agency
Lithuanian Environmental Protection Agency

MEANS OF WASTE RECEPTION IN THE PORT OF KLAIPEDA

1 AUTHORIZED ORGANIZATIONS IN LITHUANIA

The following organizations participate in the reception of oily wastes[1], sewage and faecal waters: the state sea-merchant port, the state fishing port, the state oil-exporting enterprise and municipal and other organizations.

The following organizations carry out control functions: the service of harbour master and the state sea-protecting inspection (a regional agency of the Environmental Protection Department of Lithuania in Klaipeda).

1.1 Reception of waste

1.1.1 Reception of oily wastes

The port has sufficient facilities for the reception of oily wastes from vessels visiting the port.

1.1.2 Garbage, sewage and faecal waters

There are adequate facilities for the reception of garbage, sewage and faecal waters in the port.

1.1.3 Harmful waste

Harmful waste is not received in the port.

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[1] This term refers to oily waste waters.

1.2 Organizations participating in operations connected with waste

1.2.1 Sea-protecting inspection

Sea-protecting inspector has the right to control the condition of any vessel calling in the territorial waters of the Lithuanian Republic and its compliance to the reyuircments of the international conventions. The inspector is not personally authorized to arrest a vessel. When a ship is suspected of having polluted territorial or internal waters, the inspector appeals, in written form, through the port director to the service of harbour master to arrest the vessel for 72 hours (while the ship is in the port). During this period the inspector must take samples for identification (in cooperation with the state analytical department), prepare penalty resolution and/or an action and, when required, prepare documents for a trial, since further detention of the vessel is possible only by a trial.

There is no practical possibility to arrest a ship that has polluted territorial waters and has not called in the port. This is connected with the fact that the state sea border between Lithuania and Kaliningrad region of Russia is not yet determined and territorial waters of Lithuania are not marked properly. Besides, the Lithuanian Navy, with which sea inspectors could cooperate, is not ready to carry out control of territorial waters yet.

1.2.2 The municipal department for the protection of nature and utilization of natural resources controls the use of dry waste on the land.

2 PRACTICAL WASTE TREATMENT

Waste is received by subdivisions of the state ports. A vessel's master appeals through his agent or directly to the port dispatcher. According to the ship's orders, the dispatcher sends a sewage vessel to receive oily wastes, ballast, sewage, faecal waters and garbage. The waste waters are collected in the tank of the sewage vessel, and garbage in plastic sacks (in the state sea-merchant port) or in containers (in the state fishing port) on the deck of the sewage vessel.

2.1 Disposal of wastes

2.1.1 Oily wastes from vessels moored in the state sea-merchant port are transported to purification facilities in the state oil-exporting enterprise.

2.1.2 Oily wastes from vessels in the state fishing port are directed to purification facilities of the oil-storage tank in fishing port.

2.1.3 Sewage and faecal waters are disposed of to the town sewerage.

2.1.4 Waste oil products are conveyed to the town oil-storage tank facilities for regeneration.

2.1.5 Oily rags are burnt.

2.1.6 Garbage is transported to the town dump.

3 WASTE QUANTITY

3.1 The state oil-exporting enterprise receives 800 000 t of oily wastes per year.

3.2 The oil-storage tank in the fishing port receives 100 000 t of oily wastes per year

3.3 800 000 m^3 of faecal waters is disposed of to the town sewerage per year.

3.4 150 t of used oil is directed to regeneration per year.

3.5 2 000 t or garbage is received at the town dump (rubbish of inland services included) per year.

4 WASTE TREATMENT

4.1 Oily wastes are treated only mechanically; after a period of settling these waters are directed to flotation.

4.2 Sewage and faecal waters are treated only mechanically in the town purification facilities.

4.3 Oily rags are incinerated in a Norwegian furnace on the ship.

4.4 Garbage is utilized in the town dump.

5 WASTE DUES

5.1 Ship's payments (in U.S. dollars)

5.1.1 $ 0.15 for 1 m^3 of the vessel's volume.

5.1.2 $ 2.20 for reception and purification of 1 m^3 of ballast waters.

5.1.3 $ 6.54 for reception and purification of 1 m^3 of oil-containing waters.

5.2 Expenses of the port

5.2.1 Deposit of 1 m^3 of oily wastes – $ 1.40

5.2.2 Deposit of 1 m^3 of sewage and faecal waters – $ 0.05

5.2.3 Deposit of 1 m^3 of ballast waters – $ 0.53

5.2.4 Deposit of 1 t of garbage – $ 2.00

5.2.5 Running costs for a sewage vessel – $ 30 000 per year.

5.2.6 Penalty for insufficient purification to the state water inspection – $ 8 000

5.2.7 Payment for treatment of waste in the fishing port – $ 40 000 per year.

State subsidies are not applied.

6 CAPACITY OF RECEPTION FACILITIES AND DEGREE OF PURIFICATION

6.1 The state oil-exporting enterprise receives 800 000 m^3 of oily wastes per year. This capacity is sufficient. The degree of purification is 2.9 mg/l. A fine is paid for insufficient degree of purification.

6.2 The oil-storage tank in the fishing port receives 100 000 m^3 of oily wastes per year. The capacity is sufficient. They are purified up to 6.3 mg/l and then directed to the town sewerage.

6.3 The reservoir volume is sufficient for reception of sewage and faecal waters and their disposal in the town sewerage. There is a 50 % reserve of this volume.

7 PROBLEMS

7.1 There is no possibility of receiving harmful waste, for the problem of toxic waste disposal and its treatment is not solved yet.

7.2 The degree of purification of sewage and faecal waters is insufficient, since the construction of biological purification system in Klaipeda is stopped due to lack of finances.

RECEPTION OF SHIP-GENERATED WASTES

NATIONAL REPORT OF GERMANY

Mr Uwe Carow
Ministcrium für Natur, Umwelt und Landesentwicklung
des Landes Schleswig-Holstein

THE DISPOSAL OF SHIPS' WASTES IN THE PORTS OF SCHLESWIG-HOLSTEIN

1 GENERAL

The creation of international regulations for the conservation of the marine environment generally requires national activities such as those in the Federal Republic of Germany, which is to an extent leading the way for its Baltic Sea neighbours in the field of water pollution control. Among other things, this means creating the necessary legal basis for the protection of the environment and translating it into action as well as carrying out and supporting suitable quality maintenance projects.

Projects to reduce land-based pollution are already in progress or under planning. The government of Schleswig-Holstein is also actively involved in the prevention of pollution from ships that may affect ecologically sensitive areas in the North Sea and the Baltic Sea. In cooperation with the other northern German coastal states, strategies have been developed with the aim of ensuring that oily substances, sewage and operational wastes are no longer discharged into the marine environment.

It must be pointed out that this report refers only to the cxpcrienccs in Schlewig-Holstein. The other German coastal state at the Baltic, Mccklcnburg-Vorpommern, belonged to the GDR until two years ago and is still going on in organizing the new responsibilities of the administration and especially of the harbour authorities. The data concerning the reception facilities in Mecklenburg-Vorpommern arc available in the list of MEPC/Circ. 234/Add.2.

Because marine pollution does not respect national borders, international regulations are an important prerequisite for the effective protection of the marine environment.

The principal international legal foundations for the protection of the North Sea and the Baltic Sea against marine pollution are the "Convention on the Protection of the Marine Environment of the Baltic Sea Area" (HELSINKI 1974) and the "Convention for the Prevention of Pollution from Ships" (MARPOL 1973/78).

These international conventions contain bans and measures designed to protect the marine environment against pollution by

- oil and oily mixtures (MARPOL Annex I)
- noxious liquid substances carried in bulk (Annex II)
- harmful substances in packaged form (Annex III)
- sewage (Annex IV)
- garbage (Annex V)

which can occur in the normal course of operation of ships, platforms or other constructions at sea.

42 medium-sized and large ports in Schleswig-Holstein are affected by the above conventions and their consequences for the disposal of wastes from sea-going ships. 18 ports are found on the North Sea coast (including Helgoland and along the Elbe); 24 ports are found on the Baltic Sea coast (including the Schlei and the Kiel Canal). Nine of the ports belong to the state government, 26 to local authorities and seven to the federal government.

Fig. 1 on next page shows the disposal facilities in each port.

It has not yet been necessary in Schleswig-Holstein's ports to dispose of noxious liquid substances carried in bulk (MARPOL, Annex II) or harmful substances in packaged form (Annex III). In the Port of Brunsbüttel (Elbe), bulk substances being loaded and unloaded for use by the local industry are disposed of in accordance with Annex II of MARPOL by the firms themselves when necessary.

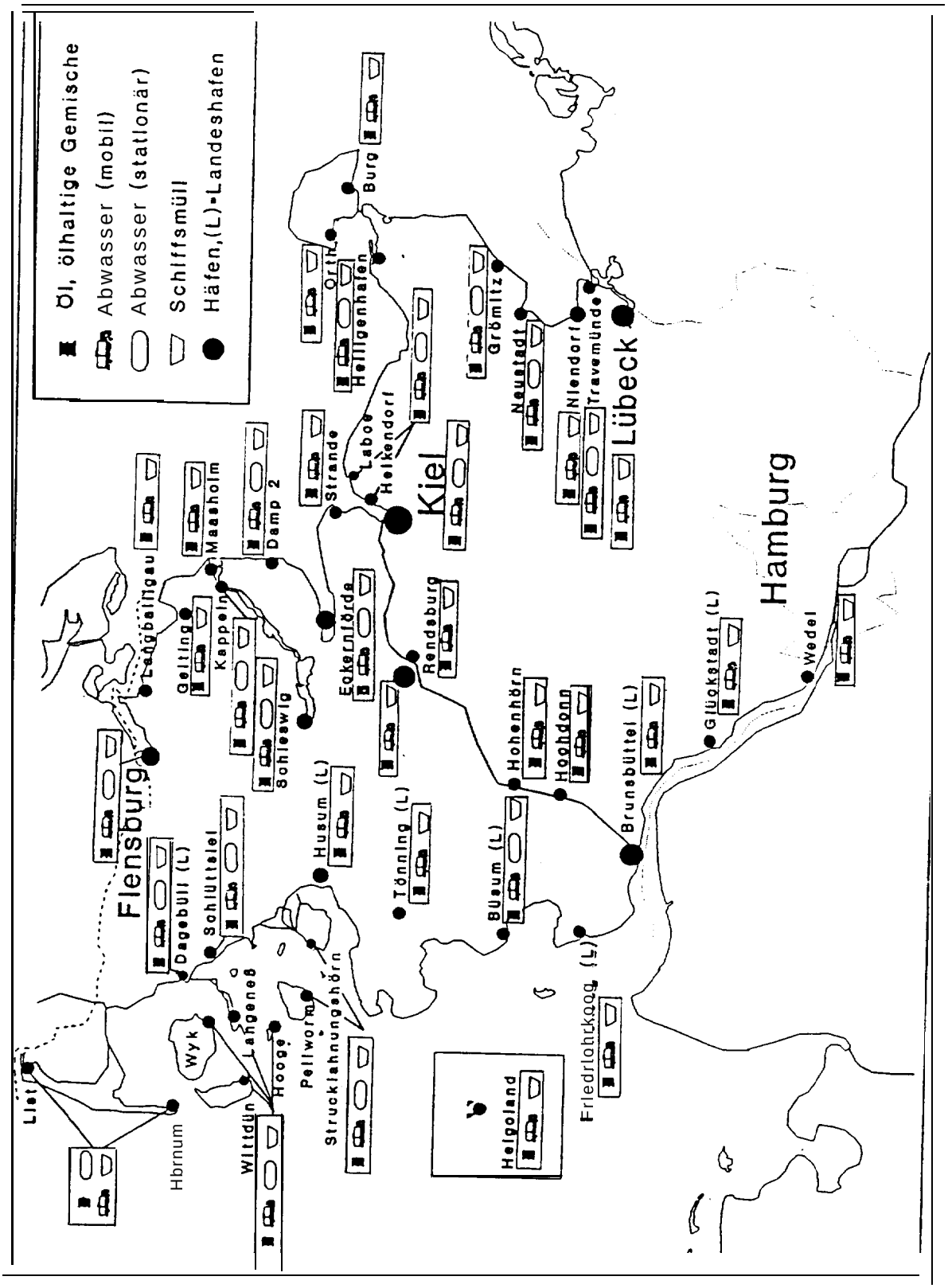
Table 1 below shows the total amount (1989) according to MARPOL, Annexes I, IV and V.

Table 1: Disposal amounts in m^3/a in 1991 (1989)

	Oily mixtures*	Sludge	Garbage	Sewage
North Sea	3 410	111	3 100	**7 500**
	630	6	2 960	**6 750**
Baltic Sea	900	760	12 600	**23 500**
	2 650	4 740	12 440	**22 650**
Total	4 310	871	15 700	**30 100**
	3 280	4 746	15 400	**29 400**

*) including oily ballast water and tank washings

Figure 1: Locations of reception facilities for ships' wastes in Schleswig-Holstein



[1]*Öl, ölhaftige Gemische = oil, oily mixtures; Abwasser = sewage; Schiffsmüll = ship garbage; Häfen = ports; L = local authority / state ports*

In Schleswig-Holstein local authorities and private sector companies accept and treat substances to be disposed of.

Nine local companies and three associations consisting of several individual companies are involved. They are distributed in the following regions: Kreis Nordfriesland, Kreis Ditmarschen/Elbe, Kreis Schleswig-Flensburg, Kiel Bight/Eckerförde, Lübeck Bight/Ostholstein.

Oily mixtures are treated locally in plants operated by the disposal companies. The final disposal of residues is carried out by the Abfallverbrennungsgesellschaft (AVG, or Waste Incineration Company) in Hamburg.

Ships' sewage is transferred to stationary reception facilities in the ports or is collected by mobile disposal units and is then fed into municipal sewage treatment plants.

Depending on local availability, ships' garbage is taken to incineration plants, waste recycling plants (e.g. cornposting) or landfill sites.

2 THE DISPOSAL OF OILY SUBSTANCES (demonstration of the free disposal of ships' wastes).

Joint efforts to improve disposal facilities for oily substances are an important contribution towards protecting the marine environment.

The Ministers of the Environment of Bremen, Hamburg, Lower Saxony and Schleswig-Holstein, in cooperation with the Federal Minister of the Environment, thus agreed to hold a Demonstration of the free disposal of oily and chemical wastes from sea-going ships (in accordance with MARPOL, Annexes I and II). The project started on the 1st of June 1988.

The pilot project was to last three years and was intended to bring about a substantial reduction in marine pollution in the form of oil and chemical discharges from ships. This was to be done by setting up and optimizing a system of disposal facilities in German sea ports that would in the long term be practicable, environmentally harmless and economical at the same time.

Methods were also to be outlined as to how shipping could use the disposal facilities at a reasonable cost or free of charge once the three year pilot project ended.

The cost of the pilot project – up to DM 6.75 million per year was shared equally between the Federal government and the coastal states.

In accordance with the aims of the administrative agreement and the strategy developed within it, Schleswig-Holstein's Baltic Sea ports were also included in the project, although the strict Special Area regulations of the Helsinki Convention already apply to the Baltic Sea area ("Convention on the Protection of the Marine Environment of the Baltic Sea Area" of 22 March 1974). This was done to give international shipping an additional opportunity to dispose of its wastes properly while on transit journeys in the Baltic Sea area.

The 3-year pilot project was increasingly accepted by mariners on board ships based in or calling at the North Sea or Baltic Sea ports of Schleswig-Holstein, with the result that between 1 June 1988 and 31 May 1991, the following substances were disposed of legally:

– fuel residues (sludge)	8 401.40 m^3
– bilge water	8 819.10 m^3
– tank washings and ballast water	4 910.30 m^3
– spent engine room oil	268.45 m^3
– oily cargo residues	30.66 m^3

as well as a large number of skips with oily containers.

Wastes were disposed of in 2 295 instances at a cost of DM 5.5 million from state funds.

Besides the broad organizational and technical experience gained, the main findings of the project were as follows:

– All disposal contracts were carried out reliably by the companies participating in the pilot project. Ships, disposal companies and port authorities adjusted well to the disposal procedure.

– Structures and disposal patterns developed in such a way that ensured a balanced disposal service in all of Schleswig-Holstein's ports.

– After investments of about DM 770 000 in technical equipment, temporary storage and treatment technology has been improved. A more economical disposal structure has resulted.

What is remarkable is the clear increase in the number of disposal requests by local shipping in North Sea ports, in particular by fishermen and operators of passenger ferries. Because the Wadden Sea area of Schleswig-Holstein is ecologically very sensitive, this development must be viewed positively.

3 SPECIAL ASPECTS OF THE PILOT PROJECT

The emphasis of the first phase of the pilot project lay in collecting sufficient data to gain an understanding of disposal practices and volumes of disposed substances from maritime shipping and at the same time to test existing technical and organizational disposal structures.

On completion of the first phase, the necessary data and details were assessed. It was found that the foreign passenger/car ferries in the ports of Kiel and Lübeck/Travemünde had taken advantage of the free disposal of ships' wastes to an unexpectedly high degree (70 – 80 % of total costs). Before this service was introduced, these ships had disposed of their wastes within regulated schemes in their home ports.

The main result of the ferries' use of the service was that in 1989 the funds allocated to Schleswig-Holstein were exhausted at an early date. Only by obtaining an increase in funds was it possible to ensure that the free disposal of ships' wastes in the state's North Sea and Baltic Sea ports could be continued until the end of that year.

It was clear for the remainder of the project that serious problems would also arise in 1990 if the existing system of fund allocation were not changed. It had also to be borne in mind that a large share of the investments planned for the second phase had to be paid for using the available budget.

It thus became necessary to restrict the offer of the free disposal of ships' wastes to the actual target group – ships which should be encouraged to dispose of their wastes regularly and correctly.

This meant that it was no longer possible to reimburse the costs incurred passenger/car ferries on scheduled services between a Baltic Sea port in Germany and a port in another Baltic Sea state (including the Oslo service).

Considering the principle of equal treatment, the offer of the free disposal of ships' wastes was restricted to the target group originally intended – sea-going ships passing through the Kiel Canal or the Skagerrak, which before continuing into the North Sea area call at a Baltic Sea port in Schleswig-Holstein *for commercial purposes*.

Although the Association of German Shipowners (VDR) protested at the decision, it cannot be denied that the ships operating only in the Baltic Sea area merely exploited the service to save costs. Bearing in mind the Special Area regulations already in force in the Baltic Sea area, use of the free disposal service was less likely to have benefited the marine environment than the credit side of ferry operators' balance sheets.

In view of the limited funds available, the "polluter pays principle" must not be ignored – it and long-term subsidies using tax payers' money are incompatible.

To create a practicable, environmentally harmless and economical disposal system in the longer-term, the emphasis of the second phase of the project lay in investments in the ports of Kiel, Lübeck/Travemünde, Büsum and Friedrichskoog.

4 DISPOSAL OF SHIPS' SEWAGE

4.1. Passenger ferries

To avoid discharges of sewage, most of the passenger ferries based in Schleswig-Holstein's east coast ports have now been equipped with sewage tanks.

In 1986 and 1990, Schleswig-Holstein's Minister for Nature, the Environment and Development offered to pay 10 % of the costs of fitting passenger ferries with sewage tanks.

Despite appeals to skippers and shipping companies to modify their vessels as soon as possible in the interests of the marine environment and – not least – tourism, hardly any advantage was taken of the offer.

The installation of a sewage tank plus pressure pump and connecting pipes can be expected to cost between DM 10 000 and DM 70 000 depending on the tank's size (between 1 m^3 and 12 m^3).

Nevertheless, 71 % of passenger ferries in North Sea ports and 81 % in Baltic Sea ports are now equipped with sewage tanks. The reasons given by skippers and shipping companies for why the remaining ships have not yet been modified are that the necessary money cannot be raised or that there is insufficient space on board for the equipment. Especially in the case of small passenger ships, the installation of a sewage tank would cause problems with the "freeboard" limit and would lead to a reduction in the number of passengers a ship is licensed to carry.

In the North Sea coastal waters off Schleswig-Holstein, 35 passenger ferries operate on a regular basis:

- 6 ships carry 10–50 passengers,
- 22 ships carry 51–400 passengers,
- 7 ships carry more than 400 passengers.

Of these, 25 are equipped with a sewage treatment system or a sewage tank. The remaining 10 ships are not equipped with sewage tanks. Six of them carry 34 – 50 passengers; four medium-sized ones carry 100 -250 passengers.

In the Baltic Sea coastal waters off Schleswig-Holstein, 85 passengers ferries operate on a regular basis:

- 23 ships carry 10 – 50 passengers,
- 27 ships carry 51 – 400 passengers,
- 35 ships carry more than 400 passengers.

Of these, 69 are equipped with a sewage treatment system or a sewage tank. The remaining 16 ships are not equipped with sewage tanks. Four medium-sized ones carry 200 – 300 passengers; 12 ships carry fishing parties numbering 30 on average.

Parallel to the modifications carried out on board ships, Schleswig-Holstein has since 1989 provided funds to create the necessary facilities for the disposal of sewage on land.

Along the North Sea coast, mobile units for the disposal of sewage are available in 17 ports and harbours from Sylt to Glückstadt and on Helgoland. Stationary facilities are also available in 10 of these ports (see Table 2).

Along the Baltic Sea coast, mobile units for the disposal of sewage are available in 20 ports and harbours from Flensburg to Liibeck. Stationary facilities also exist in 12 of these ports and two more are planned (see Table 3).

Table 2: Stationary reception facilities for ships' sewage in the North Sea area of Schleswig-Holstein

PORT	OPERATOR	YEAR OF COMPLETION	POPULATION EQUIVALENT	COMMENTS
List/Sylt	Local	1989	40	ready
Hörnum/Sylt	Federal	1989	75	ready
Wittdün/ Annum	Local	1989	150	ready
Wyk/Föhr	Local	1989	500	ready
Dagebüll	Land SH	1991	130	ready
Schlüttsiel	Kreis NF	1990	35	ready
Hallig Hooge	Local	1991	25	ready
Pellworm	Local	1989	75	ready
Struck- lahnungshörn	Local	1990	100	ready
Husum	Land SH			deferred
Tönning	Land SH			deferred
Biisum	Land SH	1990	150	ready
Friedrich -skoog	Land SH			no need
Brunsbiittel	Land SH			no need
Gliickstadt	Land SH			no need

Local = local authority; Federal = Federal government; Land SH= Schlcswig-Holstein; Kreis NF= Kreis Nordfriesland.

No statutory basis yet exists which would ***compel*** shipowners to install sewage tanks or sewage treatment systems in their vessels. But because mobile or stationary facilities for sewage disposal now exist in almost all of Schleswig-Holstein's ports and harbours, the remaining shipowners will in the end have no choice but to modify their vessels.In the Baltic Sea area, violations of the ban on discharges or violations of discharge requirements (Helsinki Convention) are prosecuted in accordance with the "Verordnung iiber die Verhütung der Verschmutzung der Ostsee durch Schiffe vom 11. Februar 1985" (Ordinance for the Prevention of Pollution of the Baltic Sea by Ships, 11 February 1985). The Bundesamt für Seeschiffahrt und Hydrographie (BSH, Federal Maritime and Hydrographic agency) is responsible for such cases.

Annex IV (Sewage) of the MARPOL Convention has not yet entered into force, but the Federal Minister of Transport in anticipation issued an ordinance on the 6th of June 1991 which prohibits the discharge of sewage or regulates it (minimum distance from land, authorized sewage treatment systems).
The ordinance applies to ships licensed to carry more than 10 passengers in North Sea coastal waters.

Table 3: Sewage reception facilities in the Baltic Sea area of Schleswig-Holstein

PORT/ HARBOUR	MOBILE DISPOSAL	STATIONARY DISPOSAL	COMMENTS
Flensburg	yes	yes	[1]) Disposal costs contained in port charges. In general, ships must bear the costs of *mobile* disposal. This is also the case for the less expensive fees for sewage disposal into stationary facilities.
Langballigau	yes	no[2]	
Gelting	yes	no[2]	
Maasholm	yes	no[2]	
Kappeln	yes	yes'	
Schleswig	yes	yes[4]	
Damp 2	yes	yes[4]	
Eckernförde	yes	yes	
Strande	yes	no[2]	
Kiel	yes	yes	
Heikendorf	yes	yes[4]	[2]) Little need for disposal.
Laboe	yes	yes[4]	
Heiligenhafen	yes	yes[4]	[2]) *Mobile* disposal is better suited in this case because of organizational and technical reasons.
Orth (Fehmam)	yes	no[2]	
Burgstaaken	yes	planned	
Grömitz	yes	yes[4]	
Neustadt	yes	yes[4]	
Niendorf	yes	planned	[4]) In particular for pleasure crafts.
Liibeck	yes	no[3]	
Travemünde	yes	yes[4]	

Because it is necessary to further reduce pollution by sewage, it is hoped that the North Sea can be designated a Special Area as soon as possible in line with Annex IV of the MARPOL Convention.

4.2. Pleasure craft

Because it is in the interests of those who practice water sports to maintain the quality of the marine environment, the disposal of yachts' sewage in marinas has become increasingly important.

The Ministry of the Environment in Schleswig-Holstein is thus supporting a pilot project run by a number of marina operators who wish to set up land-based sewage reception facilities. In the 1992 season, practical experience will be gained of the technical and organizational requirements for the construction and operation of such facilities.

In the light of efforts to improve water quality, it is hoped that other marina operators will bc encouraged by this development to install sewage reception facilities in the interests of water sports and tourism.

Moreover, it is hoped to create an incentive to fit sewage tanks in a growing number of pleasure craft so that the use of chemical toilets with their environmentally harmful substances can be avoided.

The pilot projects in Damp, Heikendorf, Laboe, Schleswig and Wendtorf are equipped with stationary and mobile sewage suction facilities consisting of a suction head, a flexible line, a vacuum tank, a water pump, an electrical controlling device with indicator lights and a connection pipe leading into the municipal sewerage system.

When the pilot project finishes, a final report will be prepared to give detailed experiences and insights gained from the measures taken. It is expected that the report will be completed around the end of 1992.

Schleswig-Holstein contributed DM 165 000 towards the total costs of approximately DM 400 000.

The sewage from 23 000 pleasure craft with an average crew size of three along the Baltic Sea coast of Schleswig-Holstein alone presents a considerable problem for the Baltic Sea ecosystem besides other sources of pollution.

Sewage discharges into coastal waters do not only impair water quality and the stability of the marine ecosystem, but can also result in limitations in the public use of the marine environment when certain limits are exceeded (e.g. bathing restrictions).

In future, it must be ensured that sewage is no longer discharged from ships into coastal waters and that it is disposed of correctly on land.

For maritime shipping (merchant and passenger), local authorities have for some time now endeavoured to install or expand the necessary disposal facilities in sea ports. In addition, large investments have been made in sewage treatment by introducing precipitation stages within the provincial government's phosphorus programme. These measures also help reduce the input of pathogenic germs into coastal waters.

Success is only guaranteed, however, if similar efforts are made for pleasure craft. This means the provision of sewage reception facilities in marinas as well as equipping yachts with standardized sewage tanks.

Discussions with yacht owners have revealed a high degree of recognition for the necessity of sewage tanks ***– if proper disposal facilities exist in marinas.*** In this respect, the provision of land-based reception facilities must be seen as an important prerequisite for a solution to the problem.

The first step in this direction is being taken with the current pilot project entitled "Sewage disposal in marinas". The project is intended to give an insight into the technical and organizational requirements for the construction and operation of such sewage reception facilities.

Our interim findings suggest that new facilities are required in about 70 medium-sized and large marinas (50 berths plus) on the Baltic Sea coast, including the Schlei, and in about 20 marinas on the North Sea coast including the Elbe.

5 DISPOSAL OF SHIPS' DOMESTIC WASTES

Reception facilities for ships' domestic wastes are available in all Baltic Sea ports in Schleswig-Holstein (see Fig. 1). The system in which private contractors collect ships' domestic or similar wastes on behalf of local authorities has been found to be reliable and should be retained in future.

When the fourth MARPOL revision of the 12th of March 1991 came into force on the 22nd of March 1991, the North Sea became a Special Area (Annex V) in which the disposal of ships' wastes is forbidden,

Since the 1st of September 1987, Bremen, for instance, has had a strategy which involves the obligatory disposal of domestic and operational wastes from ships in its ports. Fears that the fees charged for the service would result in Bremen not being able to compete with other European ports have proven unfounded.

6 CONCLUSIONS

Because great importance is attached to protecting the seas against pollution from shipping, the aim of all national and international efforts in future must be to provide shipping with effective and coordinated disposal structures in all ports.

To this end, the north German coastal states of Bremen, Hamburg, Lower Saxony, Schleswig-Holstein and Mecklenburg-Vorpommern are also involved in a "Länder-gruppe MARPOL" (MARPOL working group) whose aim is to agree on the future development of disposal strategies and how they should be financed. Work is based on the experiences gained in the pilot projects and their results.

If the maritime shipping community continues to show such a high degree of understanding, a further major step will be made towards minimizing pollution in the North Sea and Baltic Sea.

RECEPTION OF SHIP-GENERATED WASTES

NATIONAL REPORT OF SWEDEN

Mr Pekka Piirainen
Senior Administrative Officer
National Maritime Administration

RECEPTION AND TREATMENT OF WASTES FROM SHIPS

1 AUTHORITIES ASSOCIATED WITH THE RECEPTION OF WASTES

1.1 **The** Swedish Ordinance (1979:596) on Refuse Collection states that the municipality shall collect and remove from ships oily wastes, sewage and garbage that may not be discharged into the sea.

1.2 Oily wastes

The reception of engine room wastes shall be free of charge to the ship in all Swedish ports. Oily tank washings and dirty ballast water shall likewise be received free of charge by the consignors. Therefore, the ports are usually not directly involved in these procedures.

1.3 Ballast and tank-washing water from chemical tankers

According to Swedish legislation, the consignees of the bulk chemicals shall receive dirty ballast and tank washing water from chemical tankers free of charge.

1.4 Noxious substances in packed form

There have been very few occasions, if any, where a ship had to discharge noxious wastes in packed form to shore reception facilities, and consequently there is a limited experience on such practice in Swedish ports.

1.5 Sewage

Swedish ports shall receive sewage from ships free of charge.

1.6 Garbage

Swedish ports shall receive garbage from ships free of charge.

2 OPERATIVE RESPONSIBILITY

Receivers of wastes shall be authorized by the municipality to collect and transport wastes. The collection and transportation may be performed by harbour officials or by private waste management companies.

3 THE TOTAL AMOUNT OF WASTES RECEIVED AND COSTS ENTAILED DURING 1991:

The information below does not include all Swedish ports.

	AMOUNT	COSTS
VISBY		
Annex I Oily sludge	812 m^3	501 000 SEK
Annex I		
Annex III		
Annex IV		
Annex V	1 200 m^3	320 000 SEK
GÖTEBORG		
Annex I Oily sludge	7 353 m^{3*}	3.4 million SEK
Annex II	–	
Annex III	–	
Annex IV	–*	
Annex V	9 600 m^{3*}	500 000 SEK
HELSINGBORG		
Annex I Oily sludge	855 m^{3*}	235 000 SEK
Annex II	–	
Annex III	–	
Annex IV	*	
Annex V	720 m^{3*}	292 500 SEK
LULEÅ		
Annex I Oily sludge	327 m^3	390 304 SEK
Annex II		
Annex III	–	
Annex IV	–	
Annex V	Not specified	

*) Ferries in some Swedish ports usually provide for the reception of oily wastes, sewage and garbage at their own cost. Wastes from ferries are not included in the amount of wastes received.

KÖPING		
Annex I Oily sludge	365 m^3	162 000 SEK
Annex II		
Annex III	-	
Annex IV		
Annex V	791 m^3	85 000 SEK
NORRKÖPING		
Annex I Oily sludge	221 m^3	186 609 SEK
Annex II	-	
Annex III		
Annex IV		
Annex V	1 620 m^3	83 429 SEK
OXELÖSUND		
Annex I Oily sludge	100 m^3	125 000 SEK
Annex II	-	
Annex III		
Annex IV		
Annex V	650 m^3	50 000 SEK
Scanraff LYSEKIL		
Annex I Oily sludge	-	
Annex II	-	
Annex III	-	
Annex IV		
Annex V	1 885 m^3	179 000 SEK
STOCKHOLM		
Annex I Oily sludge	755 m^{3*}	542 336 SEK
Annex II		
Annex III		
Annex IV	140 m^{3*}	47 000 SEK
Annex V	14 464 m^{3*}	504 871 SEK
SÖDERTÄLJE		
Annex I Oily sludge	140 m^3	100 000 SEK
Annex II	-	
Annex III		
Annex IV		
Annex V	Not specified	

UDDEVALLA		
Annex I Oily sludge	564 m^3	564 000 SEK
Annex II	–	
Annex III	–	
Annex IV	–	
Annex V	250 m^3	24 000 SEK
VARBERG		
Annex I Oily sludge	388 m^3	280 917 SEK
Annex II		
Annex III		
Annex IV	–	
Annex V	Not specified	
VÄSTERÅS		
Annex I Oily sludge	400 m^3	165 000 SEK
Annex II	–	
Annex III	–	
Annex IV	–	
Annex V	1100 m^3	160 000 SEK
YSTAD		
Annex I Oily sludge	60 m^3	32 394 SEK
Annex II	–	
Annex III	–	
Annex IV		
Annex V	90 m^3	Not specified

4 TREATMENT OF WASTES

Engine room *wastes* are in general collected by tank trucks of a contractor authorized to collect and transport environmentally hazardous wastes. In some ports, ships have to shift to a berth provided with a fixed facility. Such a facility usually consists of a pipeline leading to a separate shore tank for engine room wastes.

Generally, the contractor disposes of the wastes by a facility separating surplus water from the oil. However, some ports are provided with facilities for draining off water by gravimetric separators in their oil terminals. The cleaned process-water is then let out into the sea. The separators are designed to treat the different kinds of oil-contaminated waters which are usually discharged to reception facilities at oil terminals.

In some ports, the oil content of the water discharged to the sea from oil installations is regulated by the authorities. These regulations address mineral oils, and the permissible oil content in the effluent is usually 5 grams of oil per cubic meter of water (5 ppm). The discharged effluent is regularly tested, and the test results are controlled by the authorities.

In smaller ports where the effluent is not regulated, tests of the effluent are carried out rarely. However, it is known from experience that the average oil content of the processed water is usually around 40 grams per cubic meter (40 ppm).

A significant risk resulting from the use of a simple water purification method, such as the gravimetric separating, is the considerable amount of environmentally hazardous substances from e.g. lube oils that will enter the sea.

The recovered oil is sent to a "final receiver" for conversion (re-refining) or to be used as fuel when incinerating other hazardous wastes in specifically designed power production plants or in cement kilns.

Sewage – At present only passenger ferries and small passenger ships navigating the archipelagos of Sweden discharge sewage to shore reception facilities. Ports dealing with these ships are usually provided with connections to the municipal sewage system to which ships can discharge their sewage. Where this is not the case, sewage is collected by suction trucks.

From this aspect, large ferries which stay berthed only for short periods of time constitute a problem. The pumping capacity needs to be high and municipal sewage systems are normally not designed to receive such relatively large quantities intermittently.

Ships may yet discharge sewage into the sea at a distance of four or twelve nautical miles from the nearest land depending on the treatment procedures and the equipment on board. If a certified sewage purification plant is in operation, ships may even discharge process water from such a plant as blackwater while in ports.

Garbage – The ports arrange containers for the reception of garbage and place them alongside the ship. The full containers are transported to the municipality disposal plant to be processed, incinerated or used as landfill.

5 COSTS RELATED TO RECEPTION AND TREATMENT OF WASTES

The costs indicated under item 3 above include reception, transport, treatment and/or disposal of wastes and differ between ports. Some ports have to pay for the tank truck, the volume received (m^3) and the treatment, while other ports are only charged per hour of the tank truck rental.

6 SUFFICIENCY OF RECEPTION AND TREATMENT

It's difficult to give a precise estimate of the capacity and adequacy of the reception and treatment systems. The capacity of reception should not constitute a problem and merely depends on how many tank trucks or barges are available in the ports.

The reason why Sweden has chosen the free of charge principle was that ships should *not* be prompted to discharge wastes into the sea due to economical reasons.

Both IMO and HELCOM recommend that ships should be able to discharge their wastes to shore reception facilities preferably free of charge or without undue costs.

Due to the free of charge principle, Sweden "imports" wastes that should have been discharged to reception facilities in other countries which do provide the same service, but at substantial costs.

As Swedish ports now face this difficult situation, the port administrations call for measures of solidarity from neighbouring countries, since the main idea of reception facilities is to protect our common marine environment and not to challenge the economical consciousness of the ship operator.

The Law (1980:424) on Measures Against Water Pollution from Ships provides ports the possibility to increase their fees in order to cover the costs of the reception and treatment of wastes.

The Ordinance (1983:140) on Governmental Subsidy for the Reception of Oily Wastes etc. from Ships gives ports the right to receive a subsidy for the part of the costs that exceeds three per cent of the combined ship and goods dues.

Sweden encourages other countries to choose the free of charge principle for the enhancement of the protection of the marine environment as well as in order to divide the economic burden of the reception of wastes between different neighbouring countries.

The wastes received should correspond to the amount of wastes produced and collected during the voyage from the last port of call.

The wastes should not contain other substances such as solvents, detergents, chlorine or PCBs. These should be treated separately.

Sweden is of the opinion that garbage should be separated at least into the following categories:

a) dry garbage – combustible, such as oily rags (which more often is regarded as garbage rather than a MARPOL Annex I waste),
b) dry garbage – non-combustible,
c) environmentally hazardous garbage, such as leftovers of solvents and paints, batteries, accumulators, fluorescent lamps etc.,
d) garbage posing a risk to health or life, such as medicine residues and used bandage and sanitary wastes,
e) bulk garbage.

RECEPTION OF SHIP-GENERATED WASTES

NATIONAL REPORT OF THE NETHERLANDS

Mr Henk Langenberg
Ministry of Transport, Public Works and Water Management

SHORE RECEPTION FACILITIES IN THE NETHERLANDS

1 Introduction

The aim of this paper is to describe the reception and further processing of wastes from sea-going vessels in the Netherlands. We should, however, be aware of the fact that wastes from ships are not the only source of pollution in ports. Pollution causing environmental damage in ports may be of different origins. Not only local industry and shipping cause impediment and damage by pollution, but also in many ports, situated in the estuary of a major river system, polluted material from upstream industries, municipalities and shipping contributes to the total amount of wastes which may be found principally in the marine environment.

Most ports in the Netherlands are situated in an estuary. Therefore, we have to dredge the harbours in order to maintain their guaranteed depths. Dredged material (silt) which has been severely polluted shall not be dumped into the sea, but special storage has to be provided for it. Thus, it is very important for the Netherlands to minimize the amount of polluted silt, both from the environmental point of view and for financial reasons.

This paper deals with pollution from ships only. Basically, the logistic elements of the waste reception and treatment will be dealt with here in relation to the appropriate laws and regulations which form the basis of the environmental enforcement in ports.

But first we take a brief look at the sources of wastes on ships. Any vessel has a wide variety of potential pollutants (harmful substances) on board, such as cargo, bunkers, stores etc. Each of these potential pollutants may generate waste material in the due course of operation. Bulk liquid cargo will generate oily and chemical residues after cleaning of the cargo and bunker tanks, bunkers may produce sludge during purification, leakages in and cleaning of engine rooms may generate bilge water and residues from stores, and packing material may form garbage. In order to prevent pollution of the marine environment from ships by dumping of harmful substances, or effluents containing such substances, MARPOL was established. To achieve this aim, MARPOL contains 5 annexes, in which detailed regulations on handling five main groups of harmful substances on board ships and their dumping into the sea are given.

Three of these Annexes have been implemented in Dutch legislation:

Annex I:	mineral oils
Annex II:	liquid noxious substances carried in bulk
Annex V:	garbage

These Annexes specify the circumstances in which dumping of harmful substances is prohibited and the guidelines for the provision of adequate facilities for the reception of residues at ports.

The term “adequate” calls for a more detailed explanation. Different sources of pollution should be checked in order to determine the need and the adequacy of reception facilities in port.

Ship related sources from which harmful substances may enter the water as a result of ship’s operations are:

- any ship disposing of fuel oil residues and oily bilges
- any ship disposing of garbage
- tanker operations where harmful substances are dumped as a result of tank cleaning procedures and ballasting operations
- ships other than tankers during ballasting and fuel tank cleaning, and the dumping of the ballast and washing
- chemical tankers with residues and mixtures of noxious liquid substances which have been handled in port and are required to be discharged to reception facilities

The term “adequate” may be defined as follows:

1. That as a minimum, the capacity of reception facilities at cargo unloading, loading and repair ports shall be capable of receiving those residues and mixtures which are handled within that port and are required to be discharged to reception facilities;

2. that the capability of reception facilities shall meet the needs of ships using that port and

3. that arrangements, needed to permit the discharge of residues and mixtures without causing undue delay to ships, are made between the ship and the reception facility, such as a prior notification of the substances and quantities expected for discharge and of the equipment required for discharge.

2 Competent authorities

The system of reception facilities has a double legal basis in the Netherlands. In the first place, there is what I shall call the MARPOL legislation. This is in fact the translation of the Convention into the Dutch legal system, and it includes the obligation to provide for adequate reception facilities. In the second place we have the Law on Chemical

Waste, which sets rules for the logistic chain of receiving, storing, transporting and processing chemical waste, including final disposal.

Both laws have been combined in a government decision called: “Waste from ships”. In this document, the basic principles of the reception system for wastes from ships have been laid down.

The first principle is that the polluter pays.

The second principle is what we call the suitability principle. This suitability principle contains the following elements:

1. The system should guarantee continuity. A responsible economic and technical functioning of the system will be of paramount importance for a continual process chain in general and for a continual reception of waste material in particular.

2. Disposal procedures: optimal environmental treatment methods and recycling have to be promoted, and reduction of quantities and harmfulness of wastes and their responsible treatment must be accomplished.

3. Capacity and location: treatment capacity has to be harmonized with the delivery of harmful substances, and optimal locations of reception facilities have to be introduced.

The third principle is that the system should be operated by private enterprises.

In order to enable these principles to be operational, all reception facilities are licensed by the government.

In practice the system works as follows: The Directorate-General of Shipping and Maritime Affairs of the Ministry of Transport, Public Works and Water Management has designated 36 Dutch ports to provide for reception facilities for wastes from ships. All 36 have to provide for reception facilities for oily waste and garbage. Of these ports, eight have the obligation to provide for reception facilities for residues of noxious liquid substances transported in bulk as well.

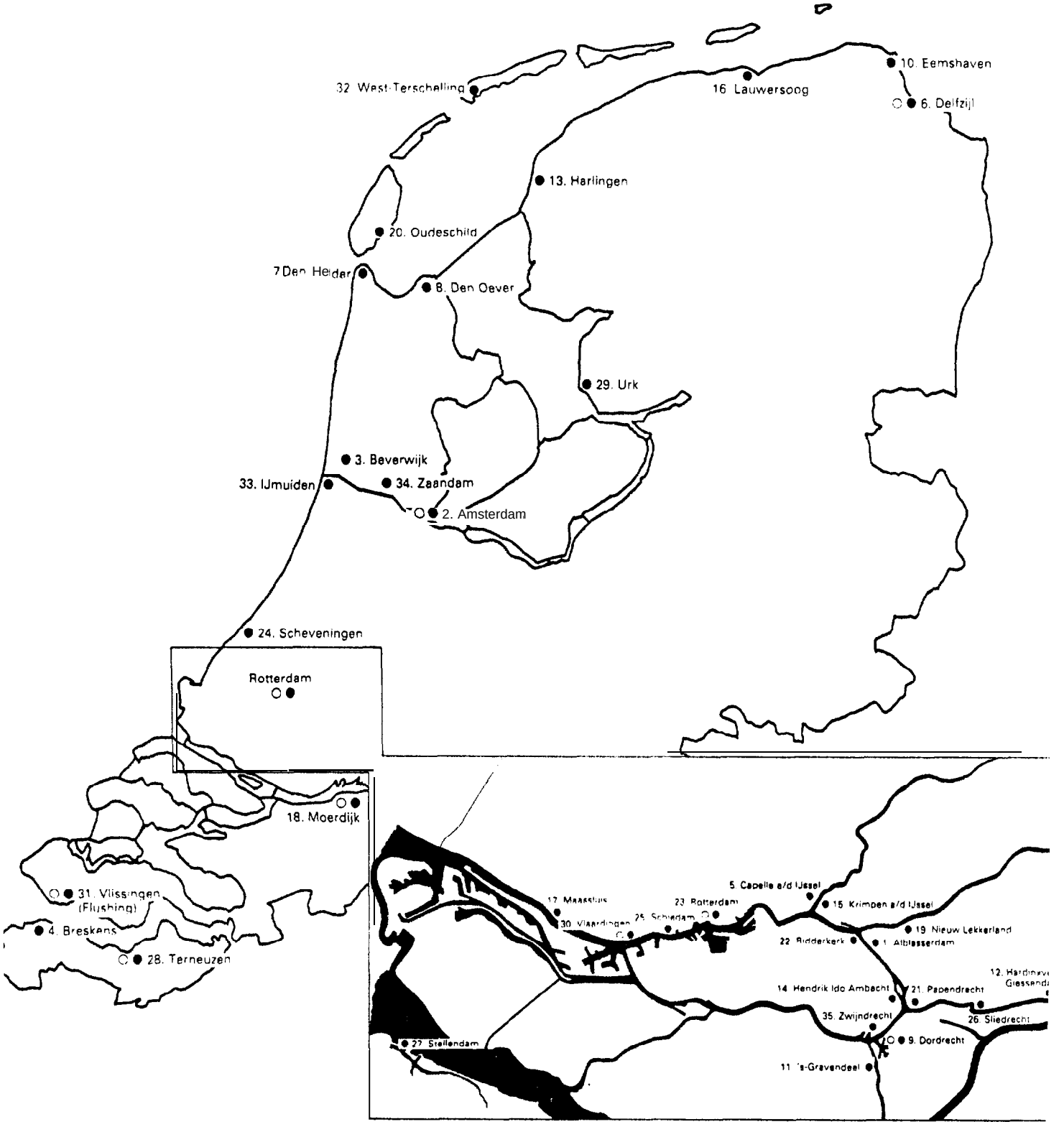
The way how the ports have to provide for the facilities is also laid down in this law: they must designate persons who are capable of receiving, storing, transporting or processing the wastes. The port authorities may only designate persons who have a license for ship-generated waste, based on the Law on Chemical Waste.

It is forbidden to discharge wastes from ships to persons who have not been designated to operate a port reception facility.

Of course other laws are also involved: e.g. the Law on the Quality of Inland Waters, setting rules for the effluent of processing plants.

Maw: Forts with reception facilities

● = oily wastes and garbage (MARPOL Annexes I and V)
o = noxious liquid substances (MARPOL Annex II)



The Netherlands Shipping Inspectorate is responsible for the enforcement of MARPOL. In practice, a great part of this responsibility has been delegated to the Port Authorities

3 Operative responsibility

According to Dutch Law, port authorities are, as we have seen, entitled to lay down regulations on the use of reception facilities in the Port Bylaws. These regulations have been used as a model for the bylaws of all Dutch Ports. The bylaws stipulate the conditions under which the Port Management will designate facilities to receive both oily and chemical wastes and garbage.

Five categories of facilities will be eligible for designation under certain conditions, provided that these facilities are licensed under the Law on Chemical Waste. In fact this is a list of the different types of facilities that are in existence in the Netherlands today.

The first type consists of terminals with loading and unloading facilities for liquid bulk cargoes and ship repair yards. These companies may only receive those substances that are included in their chemical waste permit and have been handled during cargo and repair operations, respectively, by that particular company.

The second type are companies that are exclusively or primarily involved in the collection, storage, treatment, processing and disposal of all harmful substances from ships. These companies must have permanent premises ashore and include the ship cleaning stations.

The third type are companies with mobile collecting facilities for liquid wastes, such as barges and trucks, which do not possess any permanent premises ashore and have a permit for collection and delivery under the Law on Chemical Waste that obliges them to deliver their wastes to a company of the second type.

The fourth type are companies with permanent premises for the reception, processing and disposal of garbage and residues of dry cargo.

The last type are companies with mobile collecting facilities for garbage and residues of dry cargo which are obliged to deliver these wastes to the companies of the type four.

4 Amount of wastes

Recently, an evaluation report of the system in the Netherlands has been published. Based on this report, a good estimate of the amount of wastes discharged to reception facilities can bc given.

MARPOL Annex I:	750 000 m^3
MARPOL Annex II:	50 000 m^3
MARPOL Annex V:	20 000 m^3

At this moment, a survey of the relation between ship characteristics and waste amounts is being carried out, but it is not yet possible to give concrete figures on the correlation

between the ship type and size and the amount of wastes discharged to reception facilities. In any case, we already know that there is also a strong relation between who owns the ship and the amount of wastes delivered to reception facilities. It has also been established that only between 5 and 10 % of the ships entering Dutch ports use the reception facilities. More information will be available in the next few months.

5 Treatment of wastes

Six treatment plants for ship's wastes are in operation in the Netherlands. They all use basically the same methods for treating wastes delivered to them.

In most cases, the water is processed by dissolved air flotation units or inflated air flotation and skimmers after storage in tanks for separation. After that the water is treated by a biological installation.

The rest product, mainly oil, is used as a fuel substitute for the reception facilities themselves, or it is burned in special incineration plants.

For chemical waste, roughly the same process, when applicable, is used.

There are two different types of processing for garbage. Either it is transported to landfills or burned in special treatment plants.

6 Costs related to reception and treatment of wastes

In the Netherlands, the costs caused by reception, transport, treatment and disposal of wastes are strongly influenced by the fact that the price to be paid by the ship is formed on a free competitive market. However, this market is controlled by regulations. A very important factor in this field are the regulations on the effluent of reception facilities, because they have a high impact on the techniques that can be used in the facilities.

As an indication of the costs involved in the use of the reception facilities, the following tariffs should give a good example.

For oily wastes (mixtures of oil and water, not contaminated by e.g. detergents), a ship has to pay about DFL 50 per ton. For chemicals, the tariff may vary from DFL 50 per ton to DFL 700 per ton when the waste material must be burned.

The fee system in the Netherlands is a direct payment by the ship to the reception facility.

However, government subsidies play an important role in the investments in the necessary infrastructure. In total an amount of DFL 35 000 000 has been paid by the government as subsidies for investments in port reception facilities.

7 Sufficiency of reception and treatment

For this purpose it is important to look at the capacities of collection and processing.

The estimated capacity for collection of oil and chemical waste is approximately 700 000 tons annually.

The processing capacity is estimated to be 2 million tons per year for Annex I and Annex II.

On the basis of this figures, we can draw the conclusion that the capacity for collecting is adequate. The capacity for processing is far too great. That is why most processing plants also process land-based industrial wastes.

PORT RECEPTION FACILITIES FOR SHIP-GENERATED WASTE

PRACTICAL EXPERIENCES

Per H Olson
SafePorts AB
P.O. Box 37
S-386 21 Färjestaden
Sweden

Introduction

Mainly two international conventions lay the foundation of the reception of wastes in Swedish ports. One is the Helsinki *Convention*, which has been established by the Baltic Marine Environment Protection Commission (HELCOM), who represents the Baltic Sea states and works for the preservation of the environment of the Baltic Sea. The other one is ***the International Convention for the Prevention of Pollution from Ships of 1973 with Protocol of 1978 (MARPOL 73/78)***, drawn up by the United Nation's body the International Maritime Organization (IMO).

The conventions regulate among other things what kind and quantities of wastes ships may discharge into the sea taking into account the environmental sensitivity of different sea areas, how ships shall be equipped to be allowed the discharges, etc. The conventions also stipulate that reception facilities for wastes that are not allowed to be discharged overboard shall be available in ports without undue delay to the ships.

Five annexes are attached to the MARPOL Convention, each one dealing with its own kind of waste:

Annex	Refers to	Globally in force
I	oil	2/10 1983
II	noxious liquid substances in bulk	6/4 1987
III	noxious substances in packed form	1/7 1992
IV	sewage	not yet
V	garbage	31/12 1988

A sixth annex regarding noxious solid substances in bulk is currently under discussion at IMO.

The Helsinki Convention uses the same classification of wastes as MARPOL, but the discharge regulations have been in force for several years for all the different kind of wastes. This is also reflected in the Swedish legislation, which announces the same demands as the conventions do. Reception facilities must therefore be at hand for all kind of wastes that has to be discharged in Swedish ports.

As can be seen from the table above, some of the annexes have been in force for quite some time now and there is still a considerable lack of reception facilities in the world. There are, of course, a number of reasons for this but the most important one lies in what to do after the wastes have been collected. It may seem fine to have reception facilities, and it works fairly well in ports in highly developed countries, because they have the facilities available to treat the wastes. But in the rest of the world the situation is different. Reception facilities are costly to build, people do not know how to run them and they are not acquainted with the special safety regimes governing the reception of wastes with regard tocertain kind of ships andcargoes. But most important, ports can not just collect the wastes and store them. If they should do that they would very soon end up with an enormous environmental problem apart from a lack of cargo handling spaces. Subsequently, reception facilities are not built in these parts of the world. Ships have to keep their wastes onboard until they reach a port where they can get rid of them in a lawful way or discharge them overboard in an unlawful. This creates a very big problem to the ships apart from the environmental problem the convention was supposed to solve, because, as there are no alternatives, the wastes are dumped. Additionally, ships don't have the space onboard to store wastes should they later on come to a port with a reception facility — which most of them never will. It would also be very expensive to haul wastes around the seas.

To raise money for building reception facilities is, of course, quite a problem of its own. I will not address that one, but there are ways. To produce guidelines and train personnel on how to run the facilities is another, but there are consultants who would be very happy to help out. IMO is also preparing a manual on reception facilities. I have seen the draft, and to my mind this will be a really useful aid to the ports containing a lot of practical advice. And it is the practical matters that counts — the world i full of theoretical papers on most everything. The third problem, how to deal with the wastes collected, is the big one and therefore I would like to say a few more words about that.

The countries we are talking about usually don't have any waste management systems. Garbage is often dumped outside the cities on big dumps where thousands of people are looking for something useful. Sewage is let out into the sea and oily wastes may not be treated in any other way than draining away the water. They are then used for heating purposes and exhaust gas cleaning is out of the question; it costs too much.

What we Westerners often regard as being needed is to introduce an environmental consciousness among the people in these countries and to convince their governments of the advantage of waste management. This is something that is not easily done. Environmen-

tal consciousness is something people can afford in developed, rich countries, but if people are hungry and poor they certainly can't, they have other priorities.

Thus it is not enough to spend money on reception facilities. The perfect solution to the problem of wastes would be to find a way to achieve a positive return in monetary terms from the wastes collected, but we do not live in a perfect world so I am afraid that this cannot be done. There are papers on recycling of oil showing that this should even be profitable. I very much doubt it. Ship generated oily wastes are very contaminated. They shall have to be rerefined, a process which has to be done in special plants as ordinary oil refineries usually don't take these oils into their ordinary streams. They could easily upset the processes and even harm the installations. If not thoroughly treated they will still contain contaminants which pollutes the air when the oil is burnt. But oily wastes do give some return though not a profit because the can be reused in one way or another. Other wastes will cost more to get rid of as they don't give any return at all.

The intention with this paper is to give some practical advice on reception and treatment of ship generated wastes keeping costs down. It is also meant to encourage ports who are planning reception facilities to start building them but not to forget the importance of a proper treatment of wastes received. I have often enough met the misconception that ship generated wastes are something mysterious that have to be dealt with in a very special way, but that must not be so.

The different categories of wastes

Oily wastes

Oily wastes that have to be discharged to shore reception facilities may for practical reasons be divided into two parts, namely engine room wastes and oily ballast and tank wash waters.

Engine room wastes consist of sludge, which is the residual products of fuel oils and lubricating oils, oily bilge water, oily rags, etc.

The sludge usually only contains a few per cent of water and is often very thick and difficult to pump, while the bilge water from engine room spaces usually consists of just a few per cent of oil.

Ballast water is the water a tanker has to take onboard to upkeep the stability when empty of cargo or with only a little cargo in its tanks. Modem bigger tankers are equipped with segregated ballast tanks, from which follows that the ballast water will not be contaminated by oil and therefore may be discharged into the sea. A tanker usually has to take onboard ballast in the range of about 1/3 of its deadweight.

Tank wash water arises from the washing of tanks. Tank washing is undertaken when another kind of cargo that is not compatible with the previous one is to be loaded, when tanks have to be gas free prior to repairs or maintenance or when people have to enter tanks for inspection purposes. A common practise for crude oil tankers is to wash with their cargo if they do not need to be gas free.

Discharge regulations

Water with a low oil content may be discharged into the sea under certain conditions stipulated in international conventions or national legislation. It is not within the scope of this paper to deal with these regulations but ports shall have to be familiar with them to be able to calculate the size of reception facilities.

Responsibility for reception

As oil is usually loaded in refinery ports and ships then have to get rid of their dirty ballast or tank cleaning waters when they arrive at these ports the problem is really not so big. Refineries are usually equipped with oily water separators to clean their own oil contaminated storm water. These separators can, of course, also handle oily water from ships. It is merely a task of conveying the water from the ship to a magazine where it can

be stored until it run through the separator. The technique is simple and well known.

To overcome the high costs of using these facilities, the best way, in my mind, would be to let oilcompanies loading tankers be responsible for providing the reception facilities. That should even be done free of charge to the ships. The shippers will in any way have to pay for the discharged water, so why not let them take care of it right from the start? They will then do what they can to keep costs at a minimum and hopefully also be efficient. In this way port authorities will not be involved, which also will keep costs down andefficiency up.

Engine room wastes, like sludge and oily bilge water, have on the other hand to be received by port authorities, as these kind of wastes arise in all kind of ships. Engine room wastes could also be processed in refinery separators, even if this is not the best way of doing it. Lube oils contain harmful substances that will pass an ordinary gravimetric separator, but it all depends on what equipment one may afford to invest in. Due to economical restrictions one may not be able to go for the best possible solution at once. It would, however, be better to do it this way than not to do anything at all and end up with the engine room wastes going overboard.

Quantities to be expected

Sludge from onboard separators (fuel oil and lubricating oil)	0.5 — 1 m^3/day
Oily bilge water when bilge water separators are not used (bilge water separators are compulsory for other ships than tankers above 400 GRT, for tankers above 150 GRT)	2 — 3 m^3/day
Waste oils from engines and bilges	0.5 — 1 m^3/day
Oily ballast water from tankers not fitted with segregated ballast tanks	30% of DWT

Reception and treatment

Engine room wastes could be collected by tank trucks or barges belonging to a contractor who is authorized to collect and transport environmentally hazardous wastes or by the port authority. In some ports ships have to shift to a berth with a fixed facility. Such a facility usually consists of a pipeline leading to a special shore tank for engine room wastes.

Surplus water should be drained away before the wastes are sent to a processing plant to save transportation costs. If there is an oil terminal in the port the problems should be as good as solved as this terminal also should have an oil separator to handle its stormwater,

etc. The clean water is then let out into the sea. If an oil separator is not available it may be economically advantageous to store the oily water in a tank and when enough has been collected ship it to another port that has such a separator.

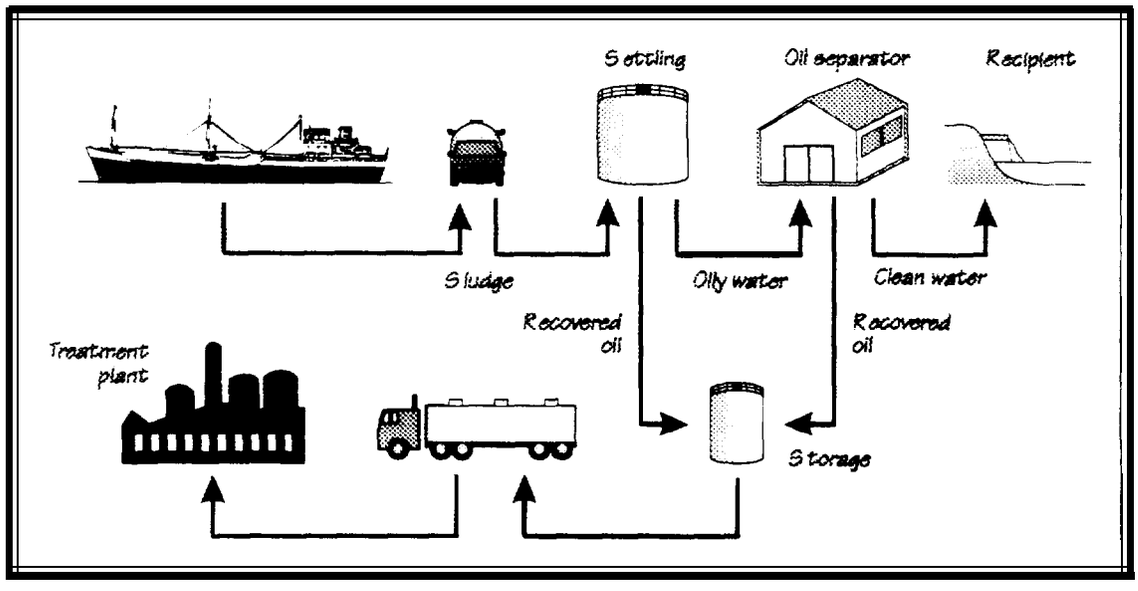


Fig. I. Engineroom wastes **from** *the ship to final processing*

There are many different kind of separators on the market and new ones seem to be developed all the time. A short presentation follows hereunder. To decide on which one to go for one first of all has to see how clean the effluent has to be taking into account existing and anticipated authority demands. Then, of course, the costs and the amounts of water the separator shall handle must be looked at. It usually pays to perform the cleaning in several steps. The first step should then be a simple separator with large capacity going down to the more refined methods needed to achieve the desired result.

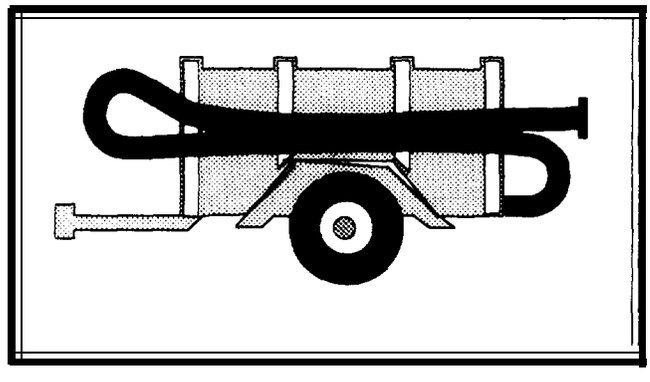


Fig. 2. Small mobile tank for the reception of sludge

Oil separators

In this section follows a short description of the most common oil/water separators and what results one can expect from them. New constructions are constantly being marketed but one should thoroughly investigate their performances before buying as new separators

are seldom tested for the difficult mixtures found in an oil terminal or brought ashore from ships.

Tanks/lagoons

The simplest form of separation takes place in gravity separators, which can be of many different kinds. They all work on the principle is that water and oil will separate with time.

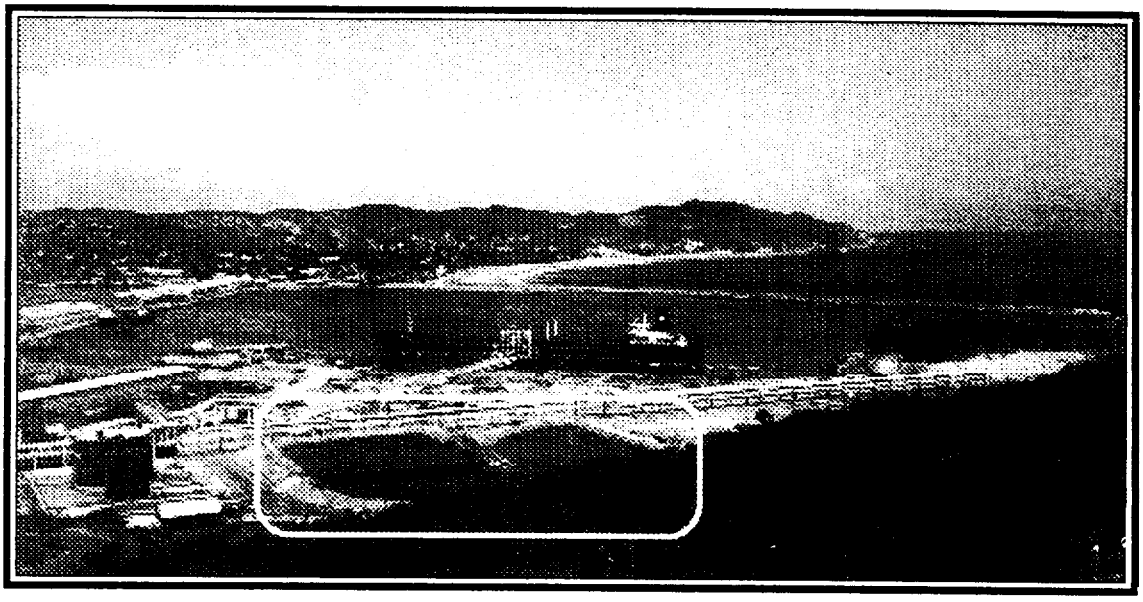


Fig. 3. Refinery port with lagoon for oillwater separation

Most commonly tanks and lagoons (ponds) are used. The lagoons are not to be recommended, especially not in hot climates, as they are open to the air and substantial amounts of hydrocarbons will be ventilated to the atmosphere. Figures 3 and 4 show such a lagoon in a Central American refinery port. As the air temperature was well above 30 °C the stench of hydrocarbons in the downwind nearby city was considerable. Please also observe the patches of oil on the water in the last basin before the sea (fig. 4).

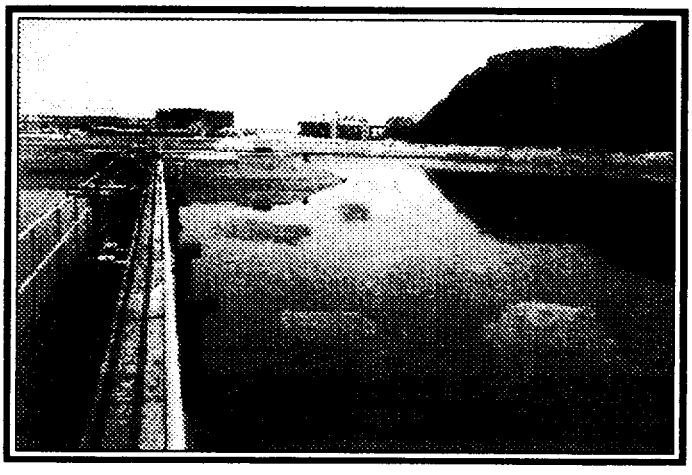


Fig. 4. Lust step in oillwater separation lagoon. Note patches of oil on the water.

Settling tanks are goodmeans by which to make the first separation. Oil should regularly be drained away, because if the oil layer gets too thick hydrocarbons will dissolve in the water. The water should be run through a better grade separator before being let out into the sea. A better result will be achieved from a high

and narrow tank than a low and broad one.

The effluent concentration of oil will at best be 50 ppm (parts per million).

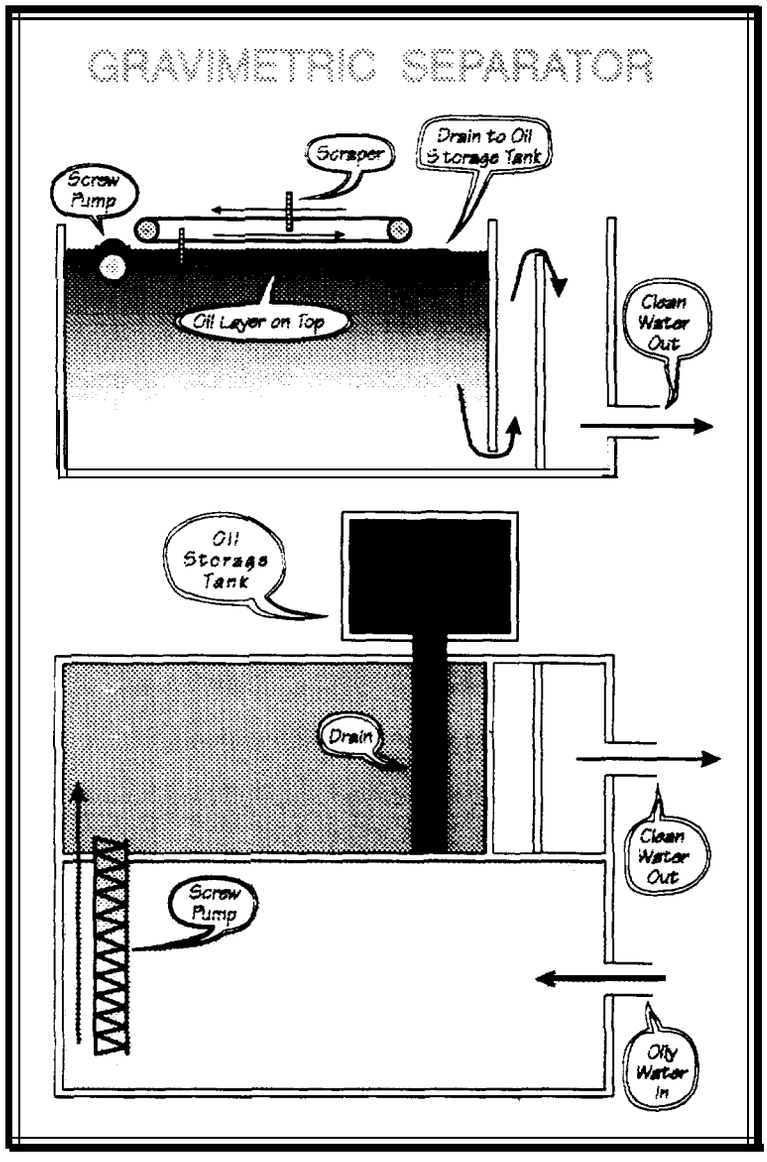


Fig. 5. ***API separator***

API Separators

The API (American Petroleum Institute) separator also works on the principle of gravity. The oil rises to the surface where it is removed by a skimmer into a separate tank. Fig. 5 explains the principle. Please observe that the water/oil should be moved by a pump that gives the least agitation possible. Usually screw pumps are used for this purpose.

The effluent concentration of oil varies depending on the substances contained in the water, but an "ordinary" oil port water should be down to 40 ppm. If easily separated oils are handled the effluent concentration may be as low as 5 ppm or even less.

Parallel Plate Separators

The parallel plate separator works very much like the API separator but a pack of tilted parallel plates are inserted in the unit to make the separation faster and more efficient. The principle behind the plates is that they increase the coalescence surface area and reduce the distance oil droplets have to rise to be separated.

A drawback is that the plates require frequent cleaning to remove oily residues sticking to them.

The effluent concentration of oil also varies here — easily separated oils will, of

course, give a better result. As an average the concentration after treatment of "ordinary" oil port waters should, however, be about 30 ppm.

Flocculation/floatation plants

To facilitate for the floatation of the oil chemicals are first added to the oily water to make the oil flocculate. By letting small air bubbles rise through the water from the tank bottom the flocks will rise to the surface where they will gather into a dense sludge which then can be removed by scrapers. The chemicals can be recovered and reused.

Flocculation/floatation plants are technically complicated and expensive to build and to run. Their efficiency is very high and they can remove dispersions and emulsified oils from the water.

The oil concentration in the effluent is usually less than 5 ppm.

Centrifugal separators

Centrifugal separators have been used many years onboard ships to clean fuel and lubricating oils from contamination as well as separatingoil from the water. Their capacities are usually too low for oil port applications and the effluent concentrations of oil may vary considerably. A Norwegian invention, the "Clearwater separator", however claims to have overcome this. The company manufacturing the separator, Merlin Teknologi A/S, is now developing a separator with a capacity of 100 m3/h and an effluent concentration of oil less than 5 ppm. Fig. 6 shows such a separator with a capacity of 15 m3/h.

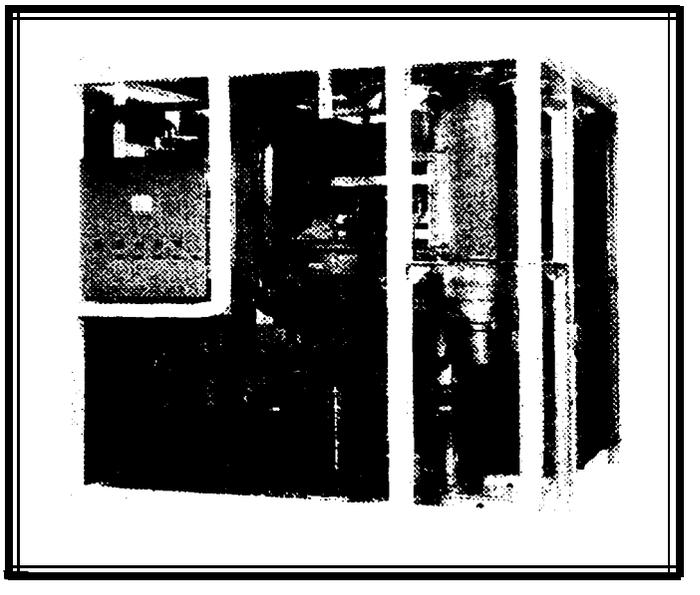


Fig. 6. The "Clearwater" separator from Merlin Teknologi A/S, Kristiansand, Norway

Biological separation

Biological treatment may well be suitable for removing soluble components of the oil after initial treatment in any separator having a high effect or after successive treatment in conventional separators. The micro organisms are, however, sensitive to chemicals and other impurities and a great care should be taken not to get any such substances into the bio ponds.

Effluent concentrations of less than 1 ppm could be achieved.

Filters

Like biological treatment filters also need an initial cleaning of the water as they otherwise may clog by lumps of oil, sludge or silt.

There are many different kinds of filters on the market. The principle of oil removal is by absorption or adsorption and coalescence of the filter media. Several filters should be in operation at the same time so that backwashing can be performed without halting the stream.

Some of the most common filters are loose media filters, which normally use a bed of sandorcrushed granular material such as coals. The fibrous media filters use materials such as fibreglass usually in the form of replaceable elements or cartridges.

Coalescence filters utilize an electrostatic effect in addition to filtration. Their effect is usually very good.

Activated carbon filters give an excellent effect but are expensive and cannot be backwashed.

Problems encountered in reception and treatment

The reception of tank washing and ballast waters seldom brings about any problems. Ports will, however, not build reception facilities for these waters in depots only receiving oil cargos and distributing them by other means of transportation than tankships. In a very few circumstances oil has to be loaded in such ports. There are, nevertheless, several ways of overcoming the problems associated with the ballast water. One option is to charter tankers with segregated ballast tanks. Another is to discharge the ballast water through a product pipeline into an empty shore tank. The water may then be drained through the oil port's separator to the sea. A third alternative is to discharge the ballast water to another tanker, which brings it to a port that has a ballast plant.

A bigger problem to the ports are detergents often found in bilge water and other oily waters from engine rooms as the oil will not separate in ordinary gravimetric separators. Ports could end up with considerable treatment costs which not can be recovered from the ships causing the problems. It is therefore prudent to let ships sign a declaration on the contents of these waters and if they contain detergents or other foreign substances advise the ship of the additional cost of reception and treatment prior to the discharge.

A third problem that deserves attention is that of residues from oils with a density close to or above 1.0. These can not be separated in ordinary gravimetric separators, which are the most common ones.

Special port regulations

To facilitate for the reception ports should enter the following into their regulations:

- Ships should give a 24 hours advance notification;
- Discharge should preferably take place during ordinary working hours of the port;
- Ships should have an adequate pumping capacity (e.g. 5 m^3/hour);
- Ships should be equipped with international couplings.

Ballast and tank wash water from chemical tankers

Chemical carriers are usually equipped with segregated ballast tanks. They therefore very seldom have to discharge ballast water in ports.

To reduce the effects of aggressive chemicals and to make stripping and subsequent cleaning more efficient the tanks are very smooth, usually coated or made of stainless steel. To further reduce products left in the tanks after unloading chemical carriers are equipped with special stripping appliances.

The discharge regulations for tank wash water from chemical carriers are rigorous. Prior to leaving port after unloading the tankers usually have to accomplish a prewash which makes the remaining quantities of chemicals so small that the main wash water can be discharged into the sea. Each ship has her own manual, which, among other things, describes how the washing procedures shall be undertaken with regard to the chemicals the ship has carried.

The amounts of prewash water that have to be discharged to reception facilities are usually small enough to be collected by tank trucks with chemical resistant tanks. Best would be to let the consignees arrange the reception because they usually have access to suitable transportation and have the means to deal with the tank cleanings as they probably also would get the same wastes from their own operations. They may even be able to use the residues in their own production plants.

The safety and environmental consciousness is usually very high onboard chemical carriers as it is in most chemical ports.

Special port regulations

To facilitate for the reception ports should enter the following into their regulations:
- Ships should give 24 hours advance notification;
- Discharge should preferably take place during ordinary working hours of the port:
- Ships should be equipped for “efficient stripping”;
- Ships should be equipped with international couplings.

Noxious substances in packed form

Noxious substances in packed form may have to be taken care of in ports. What we are talking about is what commonly is called“dangerous goods” that has escaped its packing or packings that are defective and the goods therefore has become a hazard to the ship and its crew.

When a ship arrives at the unloading port the problem is usually not so big as there is a receiver of the goods. The receiver should then also take care of the spilled substances or the defect packings. Special care should, of course, be taken when unloading and handling the damaged goods and very often this has be done by specialists.

If the ship arrives at another port there may, however, be problems. The goods may be difficult to reach without shifting other cargo in the hold and the costs may be very high. As there is not any receiver of the goods the port authority shall have to provide for its removal and destruction.

Special port regulations

To facilitate for the reception ports should enter the following into their regulations:
- Ships should give 24 hours advance notification;
- Discharge should preferably take place during ordinary working hours of the port;
- Substances should be brought ashore in tightly closed and permanently marked receptacles;
- Declaration of contents should accompany receptacles.

Sewage

The annex is as yet only in force in some special areas. On the whole, only passenger ships — usually passenger ferries — navigating the coastal waters of these areas need discharge sewage to shore reception facilities. Ports handling such ships may then have connection points on the quays where these ships berth to the municipal sewage system.

When this is not the case, sewage could be collected by suction trucks for treatment in the municipal plants.

When dealing with passenger ferries their short time in port may create a special problem. The Jumping rates have to be high and the municipal piping systems are often not constructed to swallow these quantities in the short time available.

Discharge criteria

In the Baltic Sea, which is an area where annex IV of the MARPOL 73/78 is enforced, ships may discharge sewage into the sea four or twelve nautical miles from the nearest land depending on their treatment equipment. If an approved purification equipment is used, ships may even discharge sewage while in ports. The large ferries do, however, for reasons of their environmental image which has a big commercial significance, discharge to the shore.

Quantities to be expected

	Liters per person per day	
	Conventional system	Vacuum system
Sewage (black water)	70	25
Sewage and grey water	230	185

Special port regulations

To facilitate for the reception ports should enter the following into their regulations

- Ships should give a 24 hours advance notification;
- Discharge should preferably take place during ordinary working hours of the port;
- Ships should have adequate pumping capacity;
- Ships should be equipped with international couplings.
- Pressure in pipe-line or hose may not exceed 0.6 MPa (6 kp/cm^2).

Garbage

Garbage generally consists of
- ordinary household waste,
- waste from cargo holds such as dunnage, wire slings and plastic sheets (coverings),
- non-harmful cargo waste. that is cargo waste which does not come under any other annex;
- engine room waste which does not come under any other annex;
- discarded medicine and used bandage; and
- discarded fishing nets, ropes, etc. from fishing vessels.

Garbage will probably be the waste that in the future will create most of the problems both to ships and to ports. Today almost all kinds of garbage except plastics, synthetic fishing nets, ropes made out of man made fibres and the like may be discharged into the sea. Under certain conditions, I should add.

Fig. 8. Carriage with two garbage containers, one for combustible garbage and one *for non-combustible,* ***to be moved by truck to rhe ship's side in the Port of*** *Gothenburg,* ***Sweden. Please note the platform with protective railing on the right hand side.***

I am quite sure, that the discharge of garbage will become more restricted in the future. Governments will prohibit discharges in their territorial waters, more and more areas will become "special areas", etc. My guess is that discharges outside special areas also will become more restricted. Apart from this, the coastal traffic already has todischarge most of its garbage to shore reception facilities in accordance with the requirements of the convention.

Some "household" garbage like food wastes, some cargo associated wastes andinfectious wastes from sick-bays should not be disposed of in dumps or landfills as diseases and foreign vermin may be spread. These wastes should preferably be incinerated. However, I do not think that the incinerators should be owned and run by the port authorities. They are costly to build and complicated to operate. They also need a constant flow to work well. The ports will probably not receive enough to feed them, so they should serve the communities around the ports as well as the ports themselves. They should probably be operated by special companies at a non-profit basis.

Incinerators also need a lot of fuel, and some of this may consist of the sludge and other waste oils ports have received from ships. Plastic needs incineration under high temperatures. Three to ten times more combustion air is needed to overcome sooting. There may be problems with hydrochloric (HCl) and hydrocyanic (HCN) acids. Exhausts from the incinerators should, of course, be cleaned.

The second best thing to do with this kind of garbage if incineration is not feasible is to deposit it in a safe place and spread limestone over it.

Garbage that does not need incineration or other complicatedmeans of processing may be used as landfill. It should be noted that longropes, wires and fishing nets are very difficult to handle by grabber cranes or caterpillars. They behave like endless snakes. Wires could entangle caterpillar treads and it could take days to free them.

Separation of garbage

As different kind of garbage has to be handled and processed in different ways. ports will in the future require the garbage to be separated prior to discharge. The problem is. however, that the convention does not say anything about separation. Some ports already have this requirement, and I have noticed that different ports then have different separation criteria. They depend very much on the handling and processing techniques oi the port communities' processing plants.

If something is not done very quickly we may end up with a situation where ships are required to separate their garbage in a different way for almost every port of call. Of course, ships can not meet these requirements, and the garbage will subsequently be discharged into the sea.

What is needed is first of all an international arrangement on garbage separation onboard ships. Shipowner and port associations should take part in the creation of this. Processing plants shall then have to comply with it.

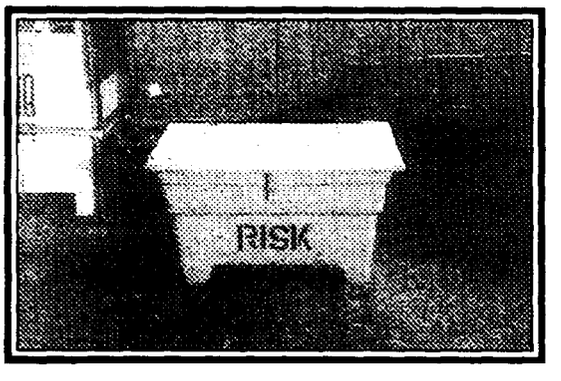


Fig. 9. Containerfor wastes with special risks, like infectious materials and medicine residues in the Port of Gothenburg, Sweden

Secondly, ships need storage compartments for the garbage. When new ships are constructed this should be thought of in order that ample space can be set aside onboard.

The separation itself is alesserproblem. Different kind of wastes arise in different parts of the ships and this fact could be used. Garbage that has to be taken ashore should at least be separated into the following categories:

a) combustibles;
b) non-combustibles:
c) environmentally hazardous substances, like leftovers from solvents andpaints,oily rags, batteries, accumulators and fluorescent lamps; and
d) infectious materials and medicine residues.

Discharge criteria outside special areas

- Plastics including synthetic ropes, fishing nets and plastic garbage bags:
prohibited

- Floating dunnage, lining and packing materials:
>25 ***miles off*** shore

- Paper, rags, glass, metal, bottles, crockery and similar:
> 12 ***miles*** *off* ***shore***

- All other garbage including paper, rags, glass, etc. comminuted or ground:
> 3 ***miles off shore***

- Food waste not comminuted or ground:
> 12 ***miles off shore***

- Food waste comminuted or ground, able to pass through a screen with mesh no larger than 25 mm:
> 3 ***miles off shore***

Discharge criteria within special areas

- Plastics including synthetic ropes, fishing nets and plastic garbage bags:
prohibited

- Floating dunnage, lining and packing materials:
prohibited

- Paper, rags, glass, metal, bottles, crockery and similar:
prohibited

- All other garbage including paper, rags, glass, etc. comminuted or ground:
prohibited

- Food waste not comminuted or ground:
  > 12 *miles off* **shore**

- Food waste comminuted or ground, able to pass through a screen with mesh no larger than 25 mm:
  > 12 *miles off shore*

Quantities to be expected

The estimated generated quantities of garbage are

Food wastes:	1.4 to 2.4 kg/person/day
Household refuse:	0.5 to 1.5 kg/person/day
Cargo associated wastes (break bulk):	1 ton of waste per 123 tons of cargo

Special port regulations

To facilitate for the reception ports should enter the following into their regulations:
Ships should give a 24 hours advance notification if ordinary garbage containers can not be used;
Discharge should preferably take place during ordinary working hours of the port:
food wastes should be adequately packed.
wastes posing a risk to health or environment should not be discharged into garbage containers;
wastes posing a risk to health or environment should be delivered ashore in tightly closed and permanently marked receptacles;
declaration of contents should accompany receptacles containing wastes posing a risk to health or environment.

Safety and Practical Aspects

The safety of ships and their crew, port installations and the people working in the ports as well as all other installations, housing areas, etc. and the people living or otherwise staying in the vicinity of ports is of an uttermost importance. The discharge of wastes should therefore be subject to the same safety regimes as other activities in ports. This means for instance that wastes shall not be handled at the same time as hazardous substances are being loaded or unloaded to and from tankers or when dangerous goods is being handled on general cargo berths.

In addition to the information given in this chapter, please also see the last chapter of this paper "Environmental Stations".

Oil Ports

- Food wastes should be tightly wrapped and could be put into closed garbage containers with lids, placed on the jetties. Signs "Not for oily wastes" should be displayed on these containers.

- Other household refuse (cardboard boxes, bottles, tins) should be put into separate garbage containers with lids, placed on the jetties. Signs "Not for oily wastes" should be displayed on these containers.

- Oily rags, oily scale, paints and solvents should be but into tightly closed drums. Contents should be permanently marked. Never to be left on jetties (risk of self combustion).

- Drums containing waste oil from small ships should be tightly closed and petmanently marked with contents.

- Ports may have to provide receptacles for waste oils from small ships as the amounts these ships generate often enough are so small that they are carried ashore by hand.

- Special platforms with coamings should be arranged to keep spills from entering the water. Rainwater should be drained "by hand" after they have been established free from oil.

- Trucks should never be allowed on jetties when tankers are loading or unloading oils, gases or chemicals.

- Barges should never be allowed alongside tankers loading or unloading oils, gases or chemicals.

General Cargo and Container Ports

Berths for Coastal and Inland Vessels (smaller ships)

☞ Food wastes should be tightly wrapped and could be put into closed garbage containers with doors, placed at the quays. Signs “Not for oily wastes” should be displayed on these containers.

☞ Other household refuse (cardboard boxes, bottles, tins) should be put into separate garbage containers with lids, placed on the quays. Signs “Not for oily wastes” should be displayed on these containers,

☞ Cargo associated wastes (dunnage, pallets, cardboard, wire straps, plastic sheets) are often so bulky that special transportation must be arranged.

Note: When large amounts of plastic is not separated from other garbage, the mixture should be treated as if it was all plastic.

☞ Oily rags, paints and solvents should be but into tightly closeddrums. Contents should be permanently marked. Drums *should* ***not*** be left on quays (risk of self combustion or leakage).

Wastes from Ocean-going Vessels (larger ships)

☞ Trucks or barges arriving at a preset time or at call should have separate compartments or holds for

- food wastes,
- household refuse,
- cargo associated wastes (dunnage, pallets, cardboard, wire straps, plastic sheets),
- engine room and maintenance wastes (oily rags, paints, solvents, dead cats).

Financing the reception and treatment

When discussing reception facilities financing is, of course, an important matter. The "free of charge principle" is something that often is recommended. Sweden has implemented the "free of charge principle", which means that ports shall receive all kind of ship-generated wastes free of charge to the ships but may cover the costs by raising their harbour dues. The reason for Sweden to choose the free of charge principle was that ships should not be deluded to discharge wastes into the sea by economical reasons. Fees included in harbour dues make ships more willing to use facilities they already have paid for.

The following piece of text may seem to be an argumentation against the "free of charge principle", but pros and cons should be accounted for to aid those who wants to implement the principle. If the reader should come to the conclusion that costs are devastating I would also like to remind her or him that a clean environment has a price that in this case in the future will seem low. It may be cheaper to pay for the reception of ship-generated wastes than to clean up beaches and sea areas not to mention the damage these wastes may cause to the flora and fauna of the seas.

Swedish ports strongly oppose to the free of charge principle. They say that the shipping community thereby transfers the operational costs of the ships to the ports.

Before going any further I should, however, explain that although all but a few Swedish ports are owned by their respective communities or the communities hold a major part of the shares in case the ports work as limited companies. Practically all of them have to live on their own incomes — very few ports are subsidized by the tax-payers.

Ports believe that the reasons to maintain the "free of charge principle" are not valid any longer. The principle was founded more than twenty years ago and the environmental consciousness onboard ships is much better nowadays while at the same time the surveillance of the territorial waters has become much more efficient. In addition, ships' officers and crews do not have the same interest in the economy of the ships that they had twenty years ago. One wi!! not take the risk of being sentenced for an uniawful discharge just to save a relatively small amount of money for the shipowner. The costs and inconvenience of discharging to a reception facility are so big that the costs of the reception and treatment are comparatively small. Additionally, the ship owners, ports say, have already made good for these cost when calculating the costs of the freights as they are charged if discharging wastes in other countries.

The ports notice that due to the free of charge principle Sweden also imports wastes that otherwise should have been discharged to reception facilities in other countries.

As was mentioned above, in Sweden ports may increase their harbour dues to cover the costs of the reception and treatment of wastes. This is, however, not so easily done as competition between Swedish ports and ports on the Continent and between ships and other means of transportation is very high. If Swedish ports become too expensive goods will be loaded and unloaded in continental ports and trucked to and from Sweden and that would indeed not be beneficial for the environment.

Moreover, ports assert that it is against the common sense of uprightness that one party should see to that another party does not fail its obligations.

When it comes to engine room wastes a number of problems have been encountered. Very often ships want to discharge quantities which are in no proportion whatsoever to the length of the journey from the last port of call or to what the ships under normal operational conditions would have produced.

In the first case, this is due to the fact that ships keep their engine room wastes onboard if they are to call at a Swedish port, as the discharge is free while in other countries they axe charged. The only exceptions in our neighbourhood are Danish and some German ports. It is a well known fact that ferries sailing to Finland almost invariably discharge their engine room wastes in Swedish ports.

As to the proportions of what ships produce under normal operational conditions ports have made the observation that ships often enough neglect the maintenance of equipment that could reduce the amounts of wastes and thereby get larger quantities to discharge to the shore. As the reception is free, this may be economically advantageous to the ships. As an example on such equipment bilge water separators may be mentioned. Ships have found it more profitable to keep the bilge water onboard for subsequent discharge in ports than to maintain their separators.

There are also instances of ships wanting to discharge wastes that have not been produced onboard. A Swedish port had a visit of naval ships from another country some years ago when a tanker belonging to the visiting navy brought in a full shipload of oily wastes that had been collected in her base over a period of time. Another port tells about supply vessels to oil rigs in the North Sea wanting to discharge waste oils from the rigs free of charge.

In order to protect themselves from too large quantities of oily wastes and wastes containing substances that should not be found in normal engine room wastes, which will make them difficult and expensive to treat, some ports have entered the following regulations into their bye-laws:

1. The wastes shall have been produced during the voyage from the last port of call under normal operational conditions of the ships.

2. The wastes shall not contain foreign substances such as solvents, detergents, chlorine or PCB.

3. The waste shall be of a limited quantity (which varies between different ports according to what kind of traffic they have).

The ports will receive also these wastes but the ships have to pay the extra costs they thereby cause.

To conclude, I am sure that the “free of charge principle” would work well in Swedish ports if all the other ports, at least in Europe, also implemented this principle. As this would cost a lot of money to these countries I, however, believe that it will not be done within a foreseeable future, but I would like remind the reader that a free reception may cover the costs of cleaning up beaches and sea areas or the costs of damages to the marine life caused by ship’discharges.

Environmental Station

The Environmental Station is recommended for use in commercial ports serving small ships where the crew can bring wastes ashore across the gang-way, fishing ports and marinas.

General

The Environmental Station should be placed in the vicinity of berths. One Station could serve several berths.

The Station shouldconsist of at leastone garbage container with lids, a tank fordisposal of oily wastes, drums for discarded paints, solvents and rags and a box for discarded lead batteries (accumulators). It should also have platforms where crew can put drums.

The platforms should be made of steel to be mobile or concrete (asphalt will dissolve from oils, solvents and acids) if fixed. They should also have 20 centimetre high coamings to contain possible leakage from drums.

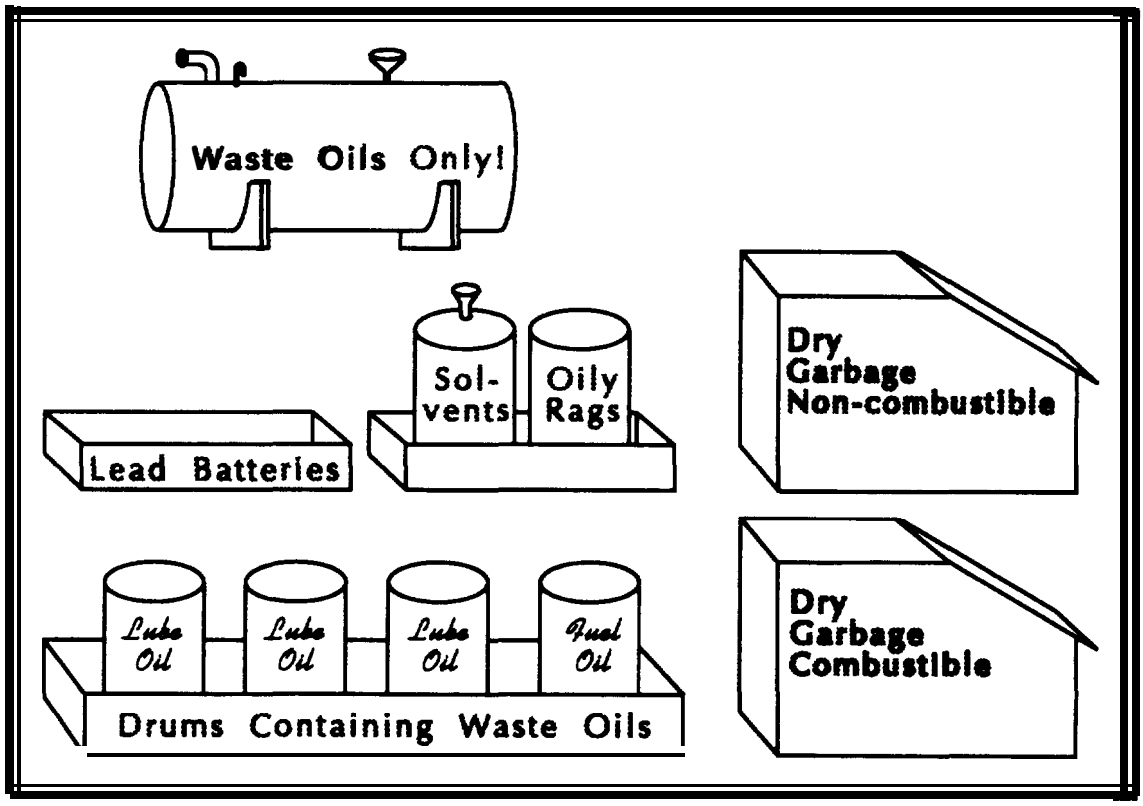


Fig. 10. ***Environmental Station***

Containers and platforms should be marked with their intended use and nothing else should be permitted to be put into them. Marking should be in national language and in English.

Oily wastes, solvents, etc. should be delivered in tightly closed receptacles in good conditions and marked with their contents.

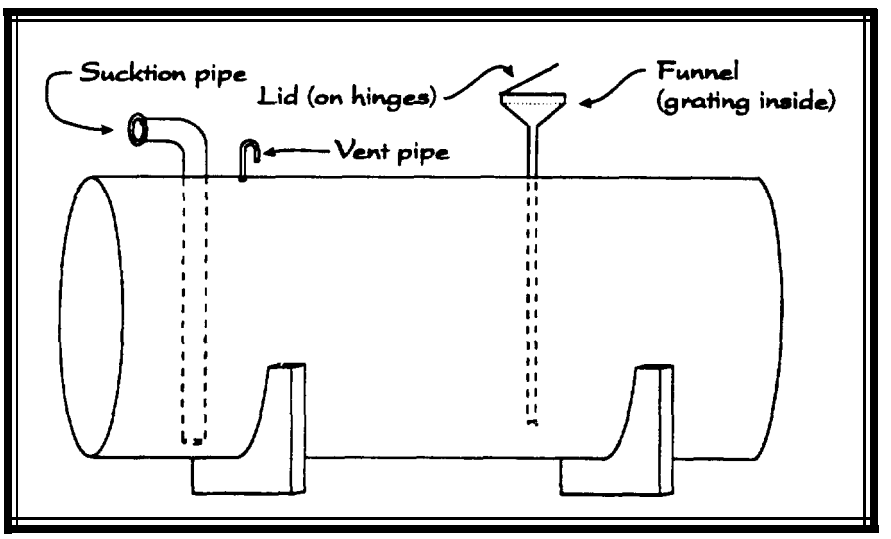


Fig. Il. Sketch of tank for a few cubic *metres of oily wastes*

For smaller quantities of oily wastes a tank of a few cubic meters should be provided (fig. 11). The tank should have a fixed funnel at the top. Inside the funnel there should be a grating to prevent oily rags or other debris from entering the tank. The funnel should have a lid and be provided with a pipe ending just over the bottom of the tank to prevent free fall and splashing of low flashpoint substances which could give rise to static electricity with a subsequent risk of explosions inside the tank.

Dry garbage containers are to be used for food and other "household" wastes and be closed to prevent birds and animals from using them as their larder. Bigger containers for cargo associated wastes, like dunnage, plastic covers, wires and ropes should be brought to ships on request and should be of "open top" type.

Fishing ports

In fishing ports open top containers should be provided at the Environmental Station for the discharge of fishing nets and ropes. Also these containers should be marked accordingly.

Marinas

Marinas for pleasure crafts should be provided with Environmental Stations. The marina should then provide receptacles for the discharge of waste oils and solvents.

Ropes could be discharged into the same garbage containers as “household” wastes as quantities of discarded ropes are small.

THE REGULATED DISPOSAL OF SHIPS' WASTES IN BREMEN

Mr Uwe Carow
Ministerium fiir Natur, Umwelt und Landesentwicklung
des Landes Schleswig-Holstein

THE FREE HANSA TOWN OF BREMEN

Since September 1, 1987, Bremen has regulated the disposal of ships' wastes. The new regulation involves the obligatory disposal of both domestic and operational wastes by ships in Bremen's ports and follows the "polluter pays principle", i.e. the disposal costs are borne by the producer of the waste.

Because disposal costs are shared by all ships, the willingness of ships' crews to dispose of their household and similar rubbish in ports is strengthened. Disposal costs are paid for by charging cost-covering fees that are included in the port schedule of fees and are levied from every ship at the same time as port dues.

1 Fee model

The system of fees includes domestic and similar wastes as defined by the law on waste. Fees are calculated according to ships' tonnage which, as experience has shown, is generally proportional to the size of the crew.

After an initial period lasting from 1.9.1987 to 31.8.1988, the model was adapted to fit requirements and on 1.1.1989 a new fee system was introduced. Refuse collection in Bremen and Bremerhaven now costs:

for ships		
a) up to 300 GRT	for 1 dustbin	DM 13.90
b) from 301 to 500 GRT	_ " _	DM 15.30
c) from 501 to 1,000 GRT	_ " _	DM 25.20
d) from 1,000 to 1,600 GRT	for 2 dustbins	DM 50.40
e) 1,600 to 5,000 GRT	for 4 dustbins	DM 100.80
f) greater than 5,000 GRT	for 6 dustbins	DM 151.20

The cost of collecting further dustbins is DM 13.75 each. For inland waterway vessels, DM 13.20 is charged for each dustbin requested.

Inland waterway vessels are not subject to the regulated disposal of ships' wastes. In their case, disposal must be requested. Further exceptions to the regulated disposal of ships' wastes are tugs, port authority vessels and other ships which tie up at their own port facilities, at shipyards or in the fishing port in Bremerhavcn, provided that these

areas are covered by the local authority waste disposal service and the ships can have their rubbish collected by it.

2 Waste disposal

Shortly after a ship arrives, a waste disposal company supplies a sufficient number of 120 1 plastic rubbish bags in Bremen or dustbins in Bremerhaven for the storage of kitchen scraps. The number of rubbish bags or dustbins provided depends on the ship's tonnage and is calculated for an average-sized crew and two days' stay in port.

The waste disposal company collects the used rubbish bags or dustbins before the ship leaves or provides for new ones if the ship stays in the port for more than two days. The ship's crew assists in moving the used rubbish bags or dustbins back to land. The master of the ship signs a receipt showing the number of rubbish bags or dustbins taken on board and removed after use.

The disposal company provides for a daily service – including Sundays and public holidays – between 8 am and 5 pm when a disposal team is always on call. If required, service is provided outside these hours.

The rubbish is generally taken to the incineration plant in Bremen or Bremerhaven, but it can be taken to other plants when necessary. The disposal company holds back domestic wastes that have obviously been mixed with hazardous wastes and informs the port authority immediately.

3 Regulations **for inland waterway vessels**

When an inland waterway vessel arrives in a port, it is given a 120 1 plastic bag to store a fortnight's rubbish. The service costs DM 13.20. In some areas, the skipper must buy an officially approved rubbish bag which is to be left sealed at given pick-up points after use.

The port authority is to be informed about the times of arrival and departure. Assistance shall be given to the disposal team when it comes to collect the used rubbish bags. The skipper signs a receipt to confirm that the rubbish has been collected.

In the case of operational wastes, the same regulations apply as for sea-going ships.

4 **Disposal of operational wastes, cargo residues, dunnage etc.**

Rubbish that is not of a domestic nature, such as cargo residues, dunnage and tarpaulins, is to be disposed of before a ship departs, although that does not fall within the regulated disposal of wastes. The ship master must ensure that operational wastes are transferred on land before the ship leaves. The master must make the necessary arrangements himself or use his agent, when ordering dustbins, hiring cleaning contractors and fixing the time for the collection of rubbish etc. These activities are

carried out by private companies. All rubbish is collected, provided that an advance notification is given early enough (4 – 6 hours beforehand).

Problematic refuse must often be dealt with. It is composed of unknown substances and might have to be treated as hazardous waste. Difficulties arise here, if the cost of disposal cannot be easily estimated. An estimate can often be given only after the refuse has been analyzed in municipal laboratories. By then, however, the source ship may already have left the port.

THE PILOT PROJECT ON OILY WASTES

MARPOL I

Mr Uwe Carow
Ministerium für Natur, Umwelt und Landesentwicklung
des Landes Schleswig-Holstein

FINAL REPORT on the Demonstration of the Free Disposal of Ships' Wastes in the Ports of the Federal Republic of Germany in Accordance with MARPOL, Annex I

The experiences gained during the demonstration of the free disposal of ships' wastes in German ports in accordance with Annexes I and II of the MARPOL Convention can be summarized as follows:

The demonstration revealed the weak points of conventional disposal strategies. Investments by the German coastal states ensured that they could be eliminated. The investments were subsidized and the disposal costs assumed by the scope of the demonstration ("Offer of free disposal").

In the sea ports of the Federal Republic of Germany, 14 100 disposal operations took place between June, 1988, and May, 1991, in accordance with MARPOL, Annex I. Around 400 000 m^3 of oily mixtures and residues were disposed of at a cost of about DM 31.6 million. A state-by-state analysis shows the following figures:

STATE	NUMBER	AMOUNT m^3	COST (DM)
Bremen	3 153	58 000	7 350 000
Hamburg	6 001	300 000	16 240 000
Lower Saxony	2 650	20 500	3 300 000
Schleswig-Holstein	2 295	22 500	4 760 000

The amounts to be disposed of annually in accordance with Annex I have increased from about 52 000 m^3 of engine-room residues in 1988 to about 80 000 m^3 in 1990. An increase from about 61 000 m^3 to around 75 000 m^3 has likewise been recorded for amounts of waste cargo.

The only port to offer free disposal of chemical slops in accordance with MARPOL, Annex II, was the port of Hamburg. The cost of disposing of 600 m^3 of slops in 21 instances totalled to DM 202 000.

Rcccption and treatment facilities in accordance with Annex II of MARPOL were available in the port of Hamburg. Their capacity was adequate for all oily residues and

mixtures from the German coastal states to be accepted, treated and disposed of using the best available technology.

In order to improve disposal facilities and regional infrastructure, investments of about DM 3.95 million were made. Of this, both Federal and Länder governments provided subsidies worth some DM 1.4 million. The investments amounted to:

DM 0.34 million in Hamburg,
DM 1.07 million in Lower Saxony and
DM 2.54 million in Schleswig-Holstein.

After the initial difficulties in the demonstration, disposal procedures in all the ports now function smoothly.

As a result of the demonstration, there arc now suitable disposal facilities for ships' wastes in every sea port, and there is a sufficient capacity in all areas to dispose of oily mixtures and residues.

Compared with the operating costs, port dues and other voyage costs, the cost of the disposal of ships' wastes is very low for properly managed and operated ships.

Possible methods of payment in the future should ensure that ships are not charged for the disposal costs they incur individually. Rather, port dues should be increased and the disposal costs included in them so that disposal costs are borne by all ships calling at a port.

Staff size of the authorities handling the disposal of ships' wastes is insufficient and must be increased.

Despite a fall in the number of oil pollution incidents, it can be proved that the German Bight continues to be polluted to an unacceptable degree by residues from fuel separation processes on board sea-going ships. Such pollution can be attributed to the use of bottom products from conversion processes; this inferior-quality fuel is sold for a very low price especially in Europe because of the high market share of low-boiling mineral oil products there.

On a large number of sea-going ships, not all disposal facilities, equipment and practices meet the requirements of proper environmental protection. Between 5 and 10 % of ships have obvious technical defects in their disposal facilities; only a small number of ships play a significant role in polluting the sea and special measures could be considered for these "problem ships".

In the past, business interests in shipping were usually given priority over environmental concerns. The rapid increase in the incidences of pollution by oily residues from fuel separation processes since the end of the 1970s illustrates this. If we wish, in the short term, avoid a situation in which business interests again take priority over environmental protection, port dues should contain a supplementary fee for the disposal of ships' wastes in German ports.

MEASURES OF CONTROL UNDER MARPOL 73/78 RELATING TO THE HANDLING OF NOXIOUS LIQUIDS IN FINNISH PORTS

Mr Hannu Lappalainen
MARPOL Surveyor in Kotka District
National Board of Navigation

Good Morning Ladies and Gentlemen,

I am very grateful to the organizers of this meeting for their invitation to speak to you today. I am doing so as a Marpol surveyor appointed by the National Board of Navigation.'

1 Marpol 73/78 / Annex II

Annex II of the International Convention for the Prevention of Pollution from Ships 1973/78 (Marpol 73/78) and its further amendments by the International Maritime Organization (IMO) consist of regulations for the control of operational discharges of noxious liquid substances carried in bulk by ships and for the minimization ot their accidental discharges. Operational discharges refer to discharges of noxious liquid substances or water contaminated by them which are a result of cargo tank and pipeline washing, deballasting of unwashed cargo tanks or other residues or discharges of contaminated water from cargo pump room bilges.

In Annex II the noxious liquid substances are divided into four categories: A, B, C and D, according to the degree of hazard a substance poses to the marine environment.

It is prohibited by Regulation 5 of Annex II to discharge category A, B, C and D substances of ballast or tank washings or other residues or mixtures containing these substances into the sea, except when certain conditions are satisfied. These conditions are specified in Regulation 5 and to a limited extent in Regulation 8 in Annex II. They include such parameters as the speed of the ship, the depth of water, the minimum distance from the nearest land, the maximum concentration of the substance in the ship's wake or the dilution of the substance prior to discharge, the need to affect the discharge below the waterline and the maximum quantity of substance per tank which may be discharged into the sea.

For the purpose of Annex II the Baltic Sea and the Black Sea are so called special areas. In other words, due to recognized technical reasons in relation to their oceanographic

[1]The opinions or assertions herein are the private ones of the writer and are not to be construed as reflecting the official view of the National Board of Navigation.

and ecological condition and to their peculiar transportation traffic these areas require the adoption of special mandatory methods for the prevention of sea pollution by noxious liquid substances.

2 Surveys under Annex II

Based on Regulation 8 of Annex II, the Finnish national Board of Navigation has nominated and authorized special surveyors, usually referred to as Marpol surveyors, for the purpose of controlling the implementation of regulations of Annex II.

According to the Finnish national legislation the owner of a chemical tanker or his agent shall notify the local maritime authorities prior to the ship's arrival in port for unloading noxious liquids of categories A, B or C and call the Marpol surveyor to carry out the inspection. All possible costs caused by the survey are on the ship's account.

As the surveys are limited exclusively to the ships unloading category A, B and C liquid chemicals, the major part of the handling of noxious liquids and oil products in Finnish ports are outside the control of Marpol survey.

I want to emphasize that it is the shipowner, not a surveyor, who takes the initiative for the Marpol survey. The Marpol surveyor cannot carry out the survey on the ship unless he is expressly requested to do so by the shipowner.

3 Cleaning cargo tanks and residue discharge procedures in the Baltic Sea area

After the completion of unloading, the cargo tanks are cleaned for the next cargo. The most common cleaning method is washing. Ventilation procedures may be used for cleaning provided that the vapour pressure of the substance is high enough, more than 5000 Pa at 20°C when a substance of category A, B or C is in question. The procedures to be followed are set out in Appendix C to the Standards in Annex II and apply identically to all substances.

After the completion of unloading category A and B substances and high viscosity and solidifying C substances, and before the ship leaves the port, the cargo tanks shall be prewashed by rotary jet machines and the effluent therefrom shall be discharged to a shore reception facility. However, the ship's captain may retain the slops of non-viscous or non-solidifying substances of category B on board to be carried and discharged into the sea outside the Baltic Sea area.

The liquid chemicals carried on chemical tankers are usually very sensitive to the contamination of previous cargoes and other materials. For example, the maximum allowable amount of lead which is always contained in mogas is usually only 50 ppb. Even a negligible amount of sodium hydroxide may contaminate the whole cargo of acetone. Also chlorides and sulphur compounds are usually serious contaminants to all liquid chemicals.

As a consequence of the severe requirements of cleanliness of the cargo tanks prior to loading, the prewash is not an adequate cleaning method by itself, but the tanks should continue to be washed to commercial requirements.

Based on my own experience, the slops generated from a commercial wash are never discharged to the shore reception facilities, but are discharged directly into the sea or retained on board for a later discharge into the sea. In either case, the parameters mentioned above relating to the conditions of discharge must be complied with.

The commercial wash lasts at least for one hour, and it is not infrequent, e.g. after unloading lub oil, that the time needed for washing is longer, even 4 – 6 hours. On chemical tankers the consumption of water of rotary jet machines varies usually from 10 to 20 m^3/hour. From this data one can estimate the amount of slops generated from the tank washing.

The appropriate disposal of slops on shore which takes also the handling and transportation costs into consideration is extremely expensive. The amount of slops produced from the prewash after unloading a cargo of phenol or styrene monomer may be 10 – 30 m^3. The disposal of these slops at Ekokem hazardous waste disposal plant in Riihimaki costs 50 000 – 100 000 FIM. The freight of styrene monomer from Holland to Finland is some US$ 25 per tonne. So the disposal charges of slops generated from the prewash only may be a major part from and even equal to the gross freight of the whole cargo!

4 Proposals and conclusions

In conclusion, I would draw attention to the following aspects concerning Marpol surveys in Finland:

(A) In order to control the amount of slops retained on board, Marpol-surveys should also be performed in ports of loading, especially on those ships which both unload the previous cargo and load the next cargo within Hamina – Porvoo district. Because of the shallow water and the proximity of land, the possibility of the discharge of category A, B and C slops into the sea is very limited. It is not infrequent that a ship is not fitted with special slop tanks, and the cargo tanks are used also as slop tanks when needed. The carriage of slops, of course, reduces the ship's cargo capacity.

It is a common tendency on board to get rid of slops as soon as possible. For instance, acidic slops are very corrosive to tank coating material, and even stainless steel coating is liable to pit corrosion in the acidic environment. Styrene monomer tends to separate from water, and is liable to polymerization reaction. Polymerized styrene clogs the lines and valves.

(B) Category D substances and oil products should be included in the scope of Marpol survey. It is not so infrequent that a ship, after unloading sodium hydroxide belonging to category D at Summa terminal near Hamina, calls in Hamina or Kotka for loading her next cargo. I have never heard that caustic soda slops would have been discharged in shore reception facilities

in Finland, although especially in the wintertime, under the prevailing difficult ice conditions, the ships use routes through the archipelago from Hamina up to Isokari and avoid going to the open sea.

The oil products carried on tankers are included in the list of oils in Annex I, and they are outside the scope of Marpol survey in Finland. It can be said that there is no environmental control of the ships loading and unloading oil products, especially as far as handling of oily slops is concerned. No mandatory prewash of the cargo tanks is required when unloading oil products. Many oil products are severe marine pollutants. According to the provisions of Annex I of Marpol Convention, it is absolutely prohibited to discharge oily slops generated from the cargo handling into the Baltic Sea.

Oil products are usually serious contaminants to succeeding chemical cargoes. Therefore, after the discharge is completed, the remnants from the cargo tanks must be removed by washing. The following products after which the tank cleaning is very laborious and time consuming can be mentioned as examples:

- lub oils;
- lub oil additives (e.g. various grades of lubrizol);
- hydrocarbon mixtures (fuel oil, diesel oil etc.) when the next cargo is alcohol;
- mogas.

The lub oil additives are classified as chemicals and they belong to the scope of Annex II. According to the provisions of Annex II, the tanks should be prewashed after the completion of unloading. In some Finnish ports, an additive called Lubrizol has been unloaded occasionally. The remnants must not be washed with water but with gas oil which is usually provided by the shipper at the port of loading. Marpol Convention, however, recognizes only water wash with rotary water jets. After the completion of the gas oil wash there is usually still great deal of residues of lubrizol in tanks. The gas oil used for the washing is delivered back to shore, but the slops generated from the subsequent water wash which usually lasts for hours are always retained on board and the method of their final disposal is outside the scope of Marpol survey.

Lead is a very serious contaminant for the succeeding cargoes. The maximum amount of lead allowed in the liquid chemical cargoes is usually only 50 ppb per weight. In so called unleaded gasoline the limit for metallic lead is usually 0.003 g lead in one litre of gasoline which equals to 4 000 ppb per weight with the density of gasoline of 0.75 g/cm^3. Consequently, the tanks should be washed after the cargo of unleaded gasoline, if the next cargo is sensitive to lead, as the case is with most chemicals and hydrocarbon mixtures.

(C) According to Regulations 8(6)b and 8(7)b of Annex II, the ship's master has the right to retain prewash slops on board for subsequent discharge

into the sea outside the Baltic Sea area. It is worth noticing that Annex II does not define the period by which the ship has to leave the Baltic Sea for discharging the slops. Is it so that the ship has to leave the Baltic Sea during the next trip or perhaps sometime during the next coming year?

It is really naïve of the environmental authorities to believe that the ships would retain and carry slops from the coast of Finland to the North Sea for discharge!

(D) After completing of unloading viscous substances or substances with a high melting point, the tanks should always be prewashed, and it should be compulsory for the ship to discharge the slops to shore.

According to Annex II, phenol, for instance, is not a solidifying substance, if its temperature is more than 10°C above its melting point, i.e. +40.9°C. So when the unloading temperature of phenol is over +50.9°C and the ship fulfills the efficient stripping requirements, the master is not obliged to discharge slops to shore, but he can retain them on board e.g. for subsequent discharge into the North Sea.

The so called efficient stripping tests are carried out by means of water. The results are not, however, applicable to phenol or to any solidifying or viscous substance. Especially in the wintertime, when the surface of the liquid in the ship's tank is below the heating coils during the unloading and the cargo cannot be heated any more, the temperature of the cargo decreases very quickly. If it is necessary for the vessel to have bottom ballast tanks full e.g. for stability reasons, cold seawater in ballast tanks decreases efficiently the temperature of the cargo tank bottom and that of the cargo itself. It is obvious that in this case the ship is not capable of emptying her cargo tanks and associated piping to the required residue quantity levels. The amount of cargo residue of a solidifying substance in the cargo tank on the completion of unloading is difficult to determine. It can be obtained reliably only by comparing the B/L figures with the outturn figures.

It has happened that the total amount of remnants of phenol after the completion of unloading from two cargo tanks has exceeded 35 tonnes, although the discharging temperature was over +51°C and the ship fulfilled the efficient stripping requirements.

As mentioned above, the cost of the disposal of chemical slops is extremely high. In the case of illegal discharge of slops into the sea, the possible fines imposed are very small compared with and have no relation to the benefit derived from the violation of provisions of Marpol Convention. According to the Finnish law, the ship cannot be sued for any infringement of the law. It is the ship's master who is sued, if the ship violates the local laws. In practice it seems to be impossible for the Finnish authorities to get a foreign captain to the court in the case of a violation of an environmental law. It seems to be so that if the shipowner does not appreciate his public image, there is no reason to pay any attention to the Regulations of Marpol Convention, when the ship is on the

Finnish territorial waters. Because of the poor control, the possibility of being caught from committing an environmental crime is really insignificant.

The attitude of Finnish politicians and authorities to the development and implementation of Marpol Convention and the national legislation involved therein is rather indifferent. Only few are even aware of the contents of the convention.

The present Marpol survey organization has very little to do with the protection of the marine environment. A very interesting question is, what we have achieved by establishing a Marpol survey organization. In my opinion, by founding this organization a new tax was created and levied on the shipowners whose ships carry category A, B and C substances. For the time being, the main aim of Marpol Convention which should be (and which can be read on the first page of the Convention) *"**the** desire to achieve the complete elimination of intentional pollution of the marine environment by oil and other harmful substances and the **minimization** of accidental discharge of such substance"* depends entirely on the good will of the shipowners and charterers, but in no way on the government environmental organizations.

ANNEX 1

LIST OF PARTICIPANTS

ESTONIA

Mr. Tonu Remma
Estonian State
Sea Inspection Office
Marja 4 D
EE-0006 Tallinn

telephone: +7-0142-538297
telefax: +7-0142-471408

FINLAND

Mr. Seppo Aspelund
Turku and Pori Local Government
Environment Protection Office
P.O. Box 22
SF-20801 Turku

telephone: +358-21-661668
telefax: +358-21-661866

Mr. Kristian Brotherus
Finnish Port Association
Toinen linja 14
SF-00530 Helsinki

telephone: +358-O-7712276
telefax: +358-0-7530474

Mr. Henrik Hellman
Oy Silja Line Ab
P.O. Box 880
SF-00101 Helsinki

telephone: +358-0-1804482
telefax: +358-0-176303

Ms. Eliisa Irpola
National Board of Waters and
the Environment
P.O. Box 250
SF-00101 Helsinki

telephone: +350-0-6951229
telcfax: +350-06951326

Captain Tom Joutsia,
Harbour Master
Port of Turku Authority
Linnankatu 90
SF-20100 Turku

telephone: +358-21-674121
telefax: +358-21-674125

Mr. Juha Komsi
Port of Helsinki Authority
P.O.Box 193
00141 Helsinki

telephone: +358-O-17333442
telex: 124913 PHA-SF
Telefax: +358-O-17333232

Mr. Juha Kääriä
City of Turku,
Environmental Protection Office
Linnankatu 61
SF-20100 Turku

telephone: +358-21-623111
telefax: +358-21-303518

Mr. Risto Laiho
Maritime College of Rauma
Suojantie 2
SF-26100 Rauma

telephone: +358-38-37721
telefax: +358-38-3772222

Mr. Hannu Lappalainen
MARPOL Surveyor in Kotka District
National Board of Navigation
Jollapolku 4
SF-48310 Kotka

telephone
home: +358-52-604325
office: +358-52-15140

Mr. Julius Lassig
Ministry of the Environment
P.O. Box 399
SF-00121 Helsinki

telephone: +358-0-1991252
telex: 123717 (ymin sf)
telefax: +358-01991399

Mr. Aapo Latvalahti
National Board of Navigation
Vuorimiehenkatu 1
SF-00140 Helsinki

telephone: +358-0-1808249
telefax: +358-0-1808500

Captain Olli Leino
Port of Naantali Authority
Satamatie 13
SF-21100 Naantali

telephone: +358-21-755398
telefax: +358-21-751727

Mr. Jarkko Lindroos
Port of Naantali Authority
Satamatie 13
SF-21100 Naantali

telephone: +358-21-755384
telefax: +358-21-751727

Mr. Magnus Nyström
National Board of Waters and
the Environment
P.O. Box 250
SF-00101 Helsinki

telephone: +358-0-6951391
telex: 126086 (vyh sf)
telefax: +358-0-6951381

Mr. Ilkka Pelli
Neste OY Shipping
P.O. Box 29
SF-02151 Espoo
telephone: +358-0-4501
telex: 126162 nshipsf
telefax: +358-0-4504777

Mr. Juhani Puolanne
National Board of Waters and the Environment
P.O. Box 250
SF-00101 Helsinki
telephone: +358-0-6951291
telefax: +358-0-6951381

Mr. Osmo Purhonen
Turku Water and Environment District
P.O. Box 47
SF-20801 Turku
telephone: +358-21-661792
telefax: +358-21-661730

Mr. Kari Rahja
Port of Naantali Authority
Satamatie 13
21100 Naantali
telephone: +358-21-755377
telefax: +358-21-751727

Ms. Kristiina Rainio
Turku and Pori Local Government Environment Protection Office
P.O. Box 22
SF-20801 Turku
telephone: +358-21-661657
telefax: +358-21-661866

Mr. Sakari Salonen
Ekokem Oy Ab,
Hazardous Waste Treatment Plant
P.O. Box 181
SF-11101 Riihimaki
telephone: +358-14-7151
telex: +358-14-715300

Ms. Mat-jut Taipaleenmaki
City of Naantali
Tullikatu 11
SF-21100 Naantali
telephone: +358-21-755111
telefax: +358-21-853060

Mr. Markus Virtasalo
National Board of Waters and the Environment
P.O. Box 250
SF-00101 Helsinki
telephone: +358-0-69511
(personal: +358-0-177930)
telefax: +358-O-6951381

Mr. Tony Öhman
SF Line
P.O. Box 166
SF-22101 Mariehamn
telephone: +358-28-27751/27000
telefax: +358-28-16977

GERMANY

Mr. Uwe Carow
Ministerium für Natur, Umwelt
und Landesentwicklung des
Landes Schleswig-Holstein
Grenzstrasse 1-5
D-2300 Kiel 14

telephone: +49-431-219346
telex: 292290
telefax: +49-431-219239

Mr. Falk von Seck
University of Rostock
Institut für Verkehr und Logistik
Schröderstrasse 23
Rostock, O-2500 Germany

telephone: +49-381-37241

LATVIA

Mr. Guntis Drunka
Environmental Protection Committee
of the Republic of Latvia
Water Protection Department
Peldu Street 25
228282 RIGA

telephone: +7-0132-212108/
212721
telex: 161180 (bitec su)
telefax: +7-0132-228159

LITHUANIA

Mr. Romualdas Starkus
Senior Inspector of the
Klaipeda Regional Agency of the
Lithuanian Environmental
Protection Department
Birutes Str. 16
Klaipeda, Lithuania

telephone: +7-01261-52327
telefax: +7-01261-17106

SWEDEN

Mr. Peter Norberg
Swedish Environmental Protection
Agency, Section for Transport
S-171 8.5 Solna

telephone: +46-8-7991000
telefax: +46-8-292382
telex: 11331 (environ s)

Mr. Per Olsson
Consultant
Safe Ports AB
P.O.Box 37
S-386 21 Färjestaden

telephone: +46-485-39311
telefax: +46-485-39312
mobile: +46-10-2931845

Mr. Pekka Piirainen
Senior Administrative Officer
National Maritime Administration
S-601 78 Norrköping

telephone: +46-11-191000
telefax: +46-11-239934

THE NETHERLANDS

Mr. Henk Langenberg
Ministry of Transport, Public Works
and Water Management
P.O.Box 5817
2280 HV Rijswijk
The Netherlands

telephone: +31 70 3955534
telex: 31040 DGSMNL
telefax: +31 70 3996274

HELSINKI COMMISSION

Mr. Adam Kowalewski,
Maritime Secretary
Helsinki Commission
Mannerheimintie 12 A
SF-00100 Helsinki

telephone: +358-0-602366
telex: 125105 (hlcom)
telefax: +358-O-644577

FOR THE ORGANIZERS OF THE SEMINAR

Mr. Kai Lunden
Center for Maritime Studies
University of Turku
Malminkatu 5
SF-20100 Turku

telephone: +358-21-6335821
telefax: +358-21-304185

Ms. Kerstin Stendahl
Ministry of the Environment
Division for International Affairs
P.O. Box 399
SF-00121 Helsinki

telephone: +358-0-1991476
telefax: +358-0-604934

Ms. Jaana Tamminen
Advisory Board for the Marine
Environment
Ministry of the Environment
P.O. Box 399
SF-00121 Helsinki

telephone: +358-0-1991249
(personal: +358-0-4513457)
telefax: +358-0-1991399
(personal: +358-0-4513454)

ANNEX 2

PROGRAMME

Monday, 16 November 1992

11.45	Rendezvous in the lobby of Scandic Hotel Turku
12.00	Opening of the Seminar on board MS Silja Festival
12.10 – 14.00	Luncheon hosted by Oy Silja Line Ab
14.00 – 15.30	Presentation of the waste management of MS Silja Festival
15.30 – 17.30	Presentation of the waste management of the Port of Turku; Captain Tom Joutsia, Harbour Master, Port of Turku Authority

Tuesday, 17 November 1992

09.00 – 10.30	Presentation of National Reports Finland, Estonia, Latvia and Lithuania
10.30 – 11.00	Coffee
11.00 – 13.00	Presentation of National Reports and discussion Germany, Sweden
13.00 – 14.30	Lunch break
14.30 – 15.30	Seminar presentations Dr. Henk Langenberg: – IMO Manual on Shore Reception Facilities; – The Dutch PPM Control System
15.30 – 16.00	Coffee
16.00 – 17.30	Seminar presentations – Port Reception Facilities for Ship-Generated Waste – Practical Experiences; Per H Olson, SafePorts AB, Sweden Ekokem Oy Ab; Sakari Salonen
18.00	Buffet Supper hosted by the Ministry of the Environment of Finland at the Center for Maritime Studies

Wednesday, 18 November 1992

09.00 – 10.30	Seminar presentations	
		National Report of the Netherlands; Dr. Henk Langenberg, Ministry of Transport, Public Works and Water Management of the Netherlands
		Mr. Uwe Carow; The regulated disposal of ships' wastes in Bremen
10.30 – 11.00	Coffee	
11.30 – 13.00	Seminar presentations	
		Mr. Ilkka Pelli / Neste Shipping
		Mr. Uwe Carow / Ministerium für Natur, Umwelt und Landesentwicklung des Landes Schleswig-Holstein; The pilot project on oily wastes / MARPOL I
		Measures of Control under MARPOL 73/78 relating to the handling of noxious liquids in the Finnish Ports; Mr. Hannu Lappalainen, MARPOL Surveyor in Kotka District
13.00 – 14.30	Lunch break	
14.30 – 15.00	Seminar presentation	
		Mr. Juha Komsi/Port of Helsinki Authority
15.00 – 15.30	Team work	
15.30 – 16.00	Coffee	
16.00 –	Team work	

Thursday, 19 November 1992

09.00 – 10.30	Conclusions and decisions
10.30 – 11.00	Coffee
11.00 – 12.00	Conclusions and decisions continued Closing of the seminar

RESPONSIBILITY AND FEE SYSTEMS FOR RECEPTION OF SHIP-GENERATED WASTES IN THE BALTIC SEA COUNTRIES

Nov.92

COUNTRY	SLUDGE & BILGE WATER	OILY BALLAST WATER & TANK WASHINGS	BULK CHEM. SLOPS & TANK WASHINGS	SEWAGE	GARBAGE
DENMARK	Port Authority Harbour dues	Port Authority Harbour dues	Port Authority Harbour dues	Port Authority Harbour dues	Port Authority Harbour dues
ESTONIA	Port Authority incl. in sanitary fee				
FINLAND	Port Authority Fee	Port Authority Fee	Consignee** No fee	Port Authority Fee	Port Authority Fee
GERMANY 1)	Port Authority No special fee syst.	Port Authority No special fee syst.	Port Authority No special fee syst.	Port Authority No special fee syst.	Port Authority No special fee syst.
LATVIA	Port Authority incl. in sanitary fee *	Port Authority incl. in sanitary fee *	Port Authority incl. in sanitary fee *	Port Authority incl. in sanitary fee *	Port Authority incl. in sanitary fee *
LITHUANIA	Port Authority Fee	Port Authority Fee		Port Authority incl. in sanitary fee	Port Authority incl. in sanitary fee
POLAND					
RUSSIA					
SWEDEN	Port Authority Harbour dues	Consignee No fee	Consignee No fee	Port Authority Harbour dues	Port Authority Harbour dues

1) Baltic Sea ports of Schleswig-Holstein and Mecklenburg-Vorpommern

* In most cases

** or consigner, importer or exporter