

**THE DUMPING OF HYDROCARBONS FROM SHIPS
INTO THE SEAS AND OCEANS OF EUROPE**

The other side of oil slicks



- **Executive Summary**

Oil slicks caused by oil tanker accidents and the dumping of rubbish resulting from the routine operations of ships and from illegal activities, such as releasing into the sea the oil residue from bilges or oil sediments from the tank, are major sources of pollution from hydrocarbons in our oceans. Nearly half of the pollution at sea caused by crude oil, and other refined products results from international maritime traffic.

Although oil slicks have a serious impact on ecosystems due to the concentration of pollutants in a particular area, as well as wide-reaching physical and chemical effects, the magnitude of marine pollution is much more far-reaching than that caused periodically by accidents. Pollution is often caused by sources on land, through the atmosphere, rivers, or costal surface run-off that makes its way to the seabed or seawaters. However, the pollution caused by international fleets should not be underestimated.

The lack of adequate waste reception facilities in ports to deal with the waste, the great number of old vessels, whose systems are unable to treat these products on board or retain them there until they can be discharged at reception centres, added to poor surveillance systems, inadequate legislation and the lack of scruples of some individuals and companies, mean that every year, millions of tons of hydrocarbons are dumped in our oceans.

The aim of this report is to emphasise the great volume of hydrocarbons that continue to be dumped in European seas, as well as the lack of infrastructure and legislative measures to prevent it. In addition, the report examines the current situation of compliance with international and European legislation, and puts forward proposals to address existing flaws.

The report concludes that:

Regarding the transportation of hydrocarbons by sea

- Every year some 1.5 – 1.8 billion tons of crude oil are transported aboard thousands of oil tankers, amounting to 35% of world maritime transportation.
- To this must be added the 400-500 million tons of refined products such as petrol, gas-oil, fuel oil, etc.
- Europe is the main recipient of these products, receiving nearly 500 million tons of crude oil and 250-300 million tons of refined products per year.
- Moreover, European waters are on the route of many oil tankers transporting their cargo to different destinations, meaning that the total amount of crude oil passing through EU waters could well be over 1 billion tons.
- The EU needs around 6,000 fleets per year to meet its demands for crude oil, which is transported by 1,500-2,000 oil tankers.
- The Strait of Gibraltar is one of the busiest areas for maritime traffic, through which some 18,000 ships carrying hazardous merchandise pass every year.
- 81% of the world's oil tankers belong to private companies, which are not directly associated with oil companies or governments.

Regarding the dumping of hydrocarbons in the sea

- Every year some 300 oil tanker accidents occur, causing between 240,000 and 960,000 tons of hydrocarbons to be dumped in our seas.
- Illegal dumping and routine operations of vessels account for between 666,000 and over 2.5 million tons of hydrocarbons of marine pollution per year. Nearly 280,000 come from fuel and oil from other vessels which are not oil tankers.
- The Mediterranean is the sea that is most affected by this type of dumping, where some 490,000 tons are released per year.

- Every year nearly 3,000 cases of illegal dumping of hydrocarbons in European seas are reported, but it is believed that this only accounts for a small percentage of those that really occur. Between 45% and 60% of these occur in the Mediterranean.
- In spite of this, very few vessels are actually prosecuted for this reason. Only 1% of the arrests carried out subsequent to dock inspections were the result of such activities.

Regarding ship-generated waste and its treatment:

- Estimates vary as to how much waste oil is generated in Europe, but most people agree that the total amount is higher than 20 billion tons per year.
- Some oil tankers could generate some 800 tons of crude oil waste for each load transported.
- The washing of tanks on board oil tankers sailing in European waters could pollute some 12 million cubic metres of waters with hydrocarbons.
- Waste oil resulting from the use of fuel on oil tankers docking in European ports could well be beyond 160,000 tons.
- Only 7% of the vessels putting in at Rotterdam, the main European port, deposit their waste oil in the waste reception facilities.
- In the Mediterranean there are 50 waste reception centres, and only 15 of these satisfy the minimum requirements.
- In the Persian Gulf, where 50% of the world's crude oil is loaded to be transported by sea, there are very few centres for treating waste hydrocarbons, and Oman is the only signatory country of MARPOL.
- Only one OPEC member, namely Ecuador, has submitted data to the International Maritime Organisation (IMO) regarding port waste reception facilities.
- In the EU, only Germany and Greece have complied with the incorporation of the EU Directive that came into force in January 2003 to encourage waste treatment in ports and prevent dumping at sea.

The current situation in Spain:

- Spanish ports currently receive over 100 million tons of hydrocarbons, of which 70% corresponds to heavy hydrocarbons, such as crude oil, fuel oil or asphalt.
- In Spain, the transportation of heavy hydrocarbons may generate over 3.5 million tons of waste. Sludge and sediments resulting from oil transportation could, alone, amount to over 250,000 tons.
- In Algeciras, the port with the heaviest traffic of merchandise in Spain, and the fourteenth in Europe, receives at least 25% of the waste oil for its volume of traffic.
- Treatment of ship-generated waste is very poor in Spain, and little is done to prevent illegal dumping or bring to account any offenders.
- Spain has not incorporated into national law the latest EU directive on the prevention of ship-source pollution, and has yet to update data on waste reception infrastructure in its ports that it should submit to the international bodies.

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- **Introduction**

The serious environmental impact on European waters caused by oil tanker accidents such as the *Prestige*, *Erika*, *Aegean Sea*, *Haven*, *Braer*, *Betelgeuse*, *Sea Empress*, *Amoco Cadiz*, *Torrey Canyon*, *Urquiola*, etc., bears witness to the situation of hazardous merchandise transportation by sea.

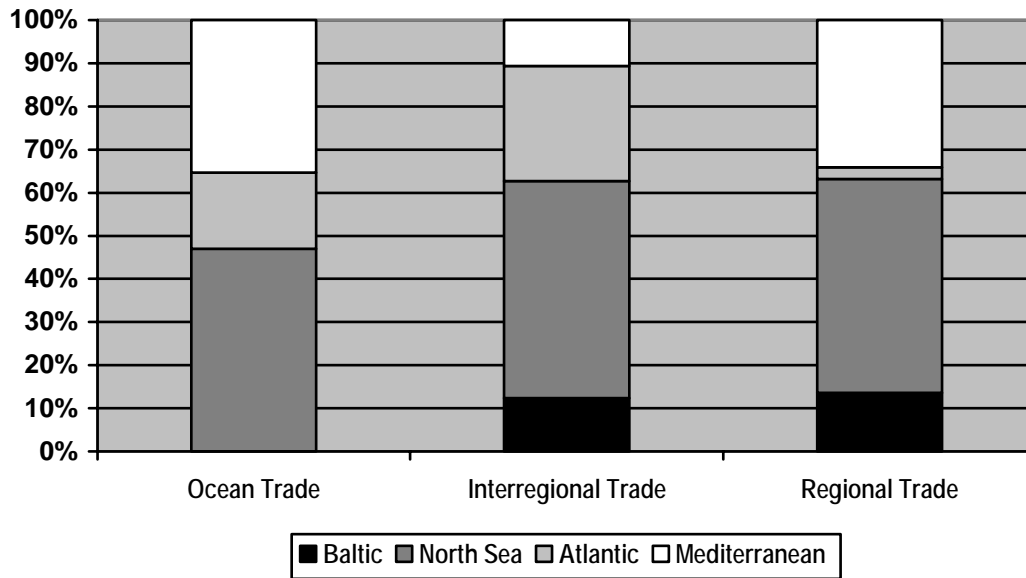
Europe depends on this form of trade route for 70% of her imports¹, which can reach up to 90% in the case of crude oil.

The global transportation of crude oil moves some 1,600 – 1,800 million tons a year, the main destinations being the European Union and the United States who are the joint recipients of more than 50%². In the case of the EU, the total amount can reach almost 500 million tons of crude oil, added to which is transportation within the EU itself of this same crude or its refined products (fuel, diesel, petrol, naphtha, benzene, etc.), all of which can result in the annual movement of over 800 million tons of hydrocarbons.

The vessels used for this trade range from small coastal tankers of under 5,000 gross registered tons (GRT), normally used for transportation between Community ports, up to super-tankers of over 120,000 GRT or the ultra-large crude carriers of more than 300,000 GRT used for transoceanic transport, encompassing other regular tankers with a wide range of tonnages filling in the gaps between the other categories. At present, 35% of world ocean transportation is in crude oil and another 10% in refined oil products³.

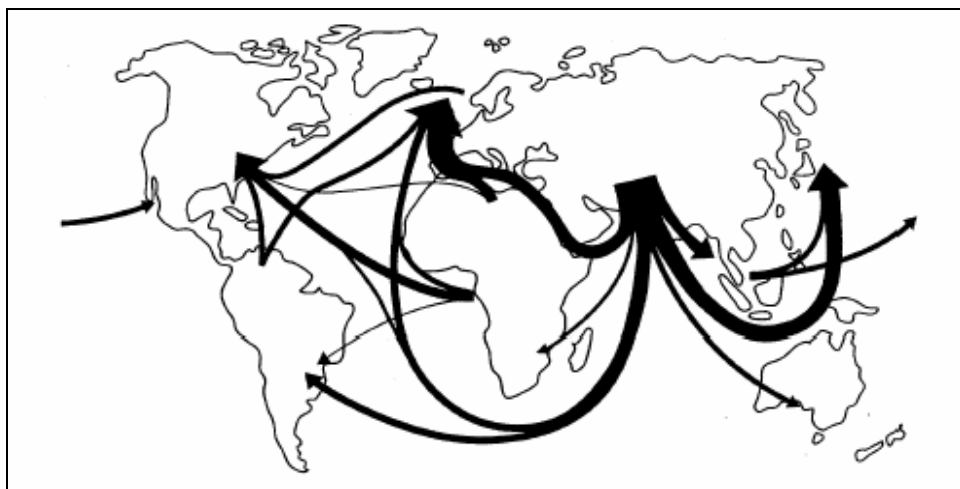
Bearing in mind that the average tonnage of an oil carrier is around 40-45,000 GRT⁴, with a crude oil load of around 80,000 tons, more than 6,000 charters per year are needed to supply the demand for crude oil in the EU. It is estimated that around 1,500-2,000 bulk carriers, liquefied gas tankers, oil tankers and chemical tankers take care of transporting these products in Europe. Each of these vessels docks in various European ports, unloading some 10-25,000 tons of crude, on average, in each reception refinery.

Maritime trade in European waters⁵



European waters are also an obligatory route for the transportation of crude oil to other countries, a case in point being the Mediterranean, which is crossed by thousands of oil tankers each year taking crude from the Persian Gulf to North America after having traversed the Suez Canal. Around 18,000 vessels loaded with hazardous merchandise pass through the Straits of Gibraltar every year⁶. This leads us to conclude that more than 1,000 million tons of oil is transiting European waters each year.

Main global trade routes of hydrocarbons.



- **Quantification of discharges at sea**

Over the past 30 years, there have been an average of 50 oil tanker accidents per year involving the spillage of more than 7 tons of crude oil and some 250 accidents of a lesser magnitude⁷, representing 12% of the total hydrocarbons ending up in the sea which could reach somewhere between 240,000 and 960,000 tons. But these figures do not include the total hydrocarbon emissions from ships, because routine operations add another 33%⁸, i.e. between 666,000 and 2,640,000 tons⁹. In other words, 2.75 times the spillage from oil tanker accidents, or between 8 and 33 times the oil spill from the *Prestige*.

The majority of these emissions come from illegal tank washing on the high seas and from routine loading, unloading and bunkering operations. Some of the larger oil tankers can generate around 800 tons of residual crude per cargo transport¹⁰.

Even so, the data on the amount of residue that reaches the sea from tankers would not be complete without taking into consideration other emissions, such as those from bilges, used oils, oily waters and other products that also contain hydrocarbons.

Oil tankers are not the only vessels that contaminate the sea with hydrocarbons: cargo ships, fishing boats, leisure craft and warships also dump their waste, adding thousands more tons of marine pollution. Between accidents and illegal dumping of oils, bilge waters, etc., it has been calculated that hydrocarbon discharges from non-oil-carriers comes to around 280,000 tons per year.¹¹

It is believed that in the Mediterranean, 75% of the more than 650,000 tons of hydrocarbons discharged every year is a result of tanker operations¹².

In 1997, the European Union made an estimate¹³ of hydrocarbon waste generated in Europe by the transit of merchant shipping in an attempt to identify the scale of the problem and the capacity of port reception facilities.

Generation of oily waste in Europe

Zone	Cubic metres
Eastern Mediterranean	40,000
Iberian Peninsula	4,730,000
Northern Europe	8,000,000
Southern Europe	4,940,000
Scandinavia	1,370,000
United Kingdom/Ireland	3,520,000
Total	22,600,000

Taking into account the MARPOL^I guidelines concerning ship-generated hydrocarbon waste, the estimates for Europe would be:

Residue	Quantity (tons)	
	Taking into account the 500 million tons reaching the EU	With regard to the 800 million tons moved through EU ports
Water from tank washing	24,000,000	38,400,000
Crude oil residue	1,000,000	1,600,000
Semi-solid hydrocarbon residue	500,000	640,000
Total	25,500,000	40,640,000

These figures do not include other oily waste such as that coming from fuel consumption, oil consumption or bilge oils.

Intertanko¹⁴ believes that with the improvements implemented in tank washing systems (washing with oil, or "load-on-top", see later), the quantity of residue generated by an oil tanker in this process, allowing for two annual washes, is some 6,000 cubic metres. This leads us to conclude that the almost 2,000 oil tankers sailing through European waters each year would produce some 12 million cubic metres of water containing oil residue.

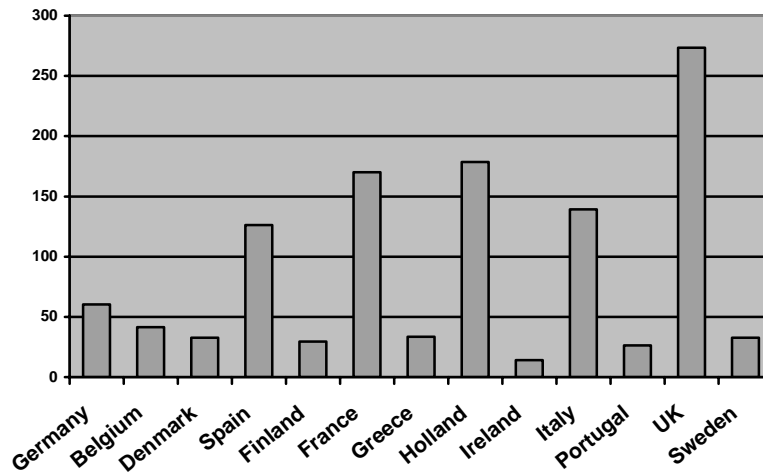
^I The IMO guidelines regarding ship-generated oily waste are as follows: in terms of the total volume of cargo in oil tankers: 4.8% of washing water; 0.2% of crude or cargo residue and 0.01 to 0.1% of semi-solid cargo residue. With regard to diesel-powered vessels: 2 to 3% of daily fuel consumption sediment.

But the hydrocarbon figures in Europe are much higher than those relating solely to crude oil. In 2001, the main EU ports received and traded in some 1,157.9 million tons of bulk liquids¹⁵, including crude oil, refined products and other non-oil-derivative chemical substances.

Main European ports by volume of maritime traffic¹⁶:

Ranking	Port/Country	Million tons
1	Rotterdam, Holland	320.0
2	Antwerp, Belgium	130.5
3	Marseilles, France	94.1
4	Hamburg, Germany	85.9
5	Le Havre, France	67.5
6	Amsterdam, Holland	64.1
7	Teesport & Hartlepool, UK	51.5
8	Genoa, Italy	50.8
9	Hull & Immingham, UK	50.0
10	London, UK	47.9
11	Trieste, Italy	47.6
12	Dunkirk, France	45.3
13	Bremen/Bremerhaven, Germany	44.8
14	Algeciras, Spain	44.0
15	Wilhelmshaven, Germany	43.4
16	Forth Ports, UK	41.1
17	Saint Nazaire, France	36.6
18	Zeebrugge, Belgium	35.5
19	Gothenburg, Sweden	33.1
20	Felixstowe, UK	31.6
21	Liverpool/Merseyside, UK	30.6
22	Barcelona, Spain	29.8
23	Venice, Italy	28.2
24	Bilbao, Spain	27.5
25	Tarragona, Spain	27.3

Traffic of bulk liquids in million tons



According to different studies¹⁷, ship-generated waste in relation to fuel consumption may be 1.5 to 2% in the case of heavy fuel and 0.5% in the case of diesel. The average consumption of a merchant ship is some 0.35 tons of fuel per GRT per year¹⁸. This would lead us to conclude that the average oil tanker would generate some 15,750 tons of waste per year as a result of fuel consumption. This means that the fleet of almost 2,000 oil tankers that sails through European waters each year would consume some 31.5 million tons of fuel and, as a result, would generate some 157,500 tons of waste in a best-case scenario.

Recently, the National Academy of Science (NAS)¹⁹ estimated that every year, just from tank washing, a quantity similar to that carried in the hold of the Prestige may be discharged at sea. But this estimate could be a long way short of the facts, as it assumed full compliance with the MARPOL guidelines by 90% of the vessels sailing in the world (though it did state that the total estimate was inexact due to the illegality of this practice). Let us look at two examples:

- Waste reception in port

According to the international convention for the prevention of marine pollution by ships (MARPOL), signatory countries should adopt the necessary measures to ensure that their ports and harbours are equipped with waste reception facilities, whether waste is generated from the cargo being transported or from routine vessel operations. The convention details various distinctions depending on the type of waste, with Annex I setting out those relating to hydrocarbons.

MARPOL also establishes that the port in which the unloading takes place must take responsibility for monitoring the waste discharged by ships as well as providing measures for its reception and treatment. It is prohibited for the vessel to discharge at sea and it must retain waste on board until it arrives at the reception port, as well as keeping an oil-record book which records the type of waste generated and the ports in which discharges have been carried out. In this way, port authorities can ascertain the vessel's requirements and the time that has elapsed since the last waste discharge.

In view of the large quantity of waste generated by ships, particularly those that transport crude or heavy oils, the amount of waste needing to be received and treated in Europe *should* exceed 20 million cubic metres per year. However, data from port authorities regarding their reception facilities would seem to demonstrate that only a tiny volume of the waste that *should* be treated is ending up in their facilities.

In 2001, in answer to a question put by Euro MP Eric Meijer²⁰, the EU Commissioner for Transport, Loyola de Palacio, recognised that only 7% of ships docking in the port of Rotterdam (Holland), which accommodates the greatest movement of merchandise in Europe, discharged their waste in the facilities set up for this purpose. In the case of water and oil mixtures from the machine room, it was estimated that barely 1% was discharged, and only 3% in the case of diesel residue. In addition, over the past year two of the port reception facilities in Holland have been closed, one in Rotterdam and the other in Amsterdam²¹, due to the lack of waste for treatment and the high costs involved in keeping them open.

Regrettably this is not an isolated case. We can corroborate that in the leading Spanish hydrocarbon reception port, Algeciras, the situation is much the same.

In 2003, the Ministry of Public Works reported²² that one year after setting in motion the Special Surveillance Plan for the Bay of Algeciras and the new European Directive for controlling ship-generated waste having entered into force, the total volume of oily waste received in the port facilities was some 200,000 cubic metres, when according to EU estimates, as it occupies fourteenth position in terms of traffic volume in Europe²³ and receives almost 4% of its oil²⁴ the port should be absorbing more than four times this amount in oily waste alone.

Another question, put by Euro MP Marie Isler Béguin²⁵ in 2002, demanded a response from the Commission in view of the alarming situation in the Mediterranean, where it is estimated that every year some 600,000 tons of oil are discharged as part of the “routine operations” of the ships plying the sea.

The case of the Mediterranean is particularly worrying. On the one hand, its unique oceanographic conditions make it especially vulnerable to pollution, so MARPOL has declared it a “special area” along with the Baltic, the Black Sea, the Red Sea, the Persian Gulf, the Gulf of Aden and the Antarctic (and more recently the North Sea/North East Europe zone), with the result that it enjoys more stringent protection in terms of discharging polluting substances from ships.

A report by the European Commission²⁶ underlines the fact that the waters of the Mediterranean are especially vulnerable to illegal discharges, as in this zone there are only 50 reception facilities for hydrocarbon waste and, of these, only 15 exceed the minimum capacity requirement standards.

For all these reasons, the EU countries, especially those of the Mediterranean, must take particular care and be especially stringent in demanding that waste is unloaded into adequate reception facilities in port areas. Even more so when it is well known that the ports of the Persian Gulf, towards which many of the oil tankers crossing the Mediterranean are headed, do not have the proper facilities for reception of these

residues²⁷, which increases the danger of ships dumping illegally at sea to be able to arrive at cargo termini “clean” and without any waste reducing their cargo capacity²⁸.

This is particularly relevant in the case of chartered tanker-carriers that dominate the market, given that nowadays 81% of oil tankers plying the world trade routes belong to private enterprises “not associated” with oil corporations or governments²⁹.

Thus far from finding ourselves in an optimum situation with regard to preventing the dumping of hydrocarbons at sea, we still do not know what is happening to the millions of tons of waste which are not being discharged in the reception facilities of European ports. Some of this waste is “legally” discharged, some is incinerated and some is reused or recycled, but even so the figures do not tally up with the millions of cubic metres of oily waste, used oils and oil residue that do not appear in this stocktaking.

It is difficult to believe that they are being discharged in the ports of origin, where it is well known that the availability of this kind of facility is inadequate, so we have to assume that a large proportion ends up in the oceans.

- **Illegal tank washing and dumping of oily waste into the sea**

Another of the most evident examples of how far we still are from proper management of hydrocarbon waste is the regular and illegal practice of dumping the waste from tank washing at sea.

The optimistic declarations of the main international organisations for the prevention of marine pollution, the European Commission and the main oil tanker associations on the drastic reduction in dumping by tankers into the sea do not appear to be reflected in recent research.

In the Baltic, following some 5,000 hours of airborne surveillance per year, between 500 and 700 illegal discharges a year were detected which leads us to believe that the number of emissions must be much higher than those observed during airborne surveillance³⁰. Added to this are the almost 700 illegal emissions detected in the North Sea following some 3,500 hours of flying³¹. In other words, an illegal discharge has been detected for every 7-8 hours of flight. To be specific, 390 illegal discharges were detected in the Baltic and 596 in the North Sea in 2001.

Regrettably there are no similar airborne surveillance programmes in other European waters so the actual number of illegal discharges made each year is unknown. Meanwhile, it is believed that illegal dumping of hydrocarbons must be much higher in non-monitored zones, which seems to be borne out by the estimates of hydrocarbon emissions in the Mediterranean, as the ships are well aware of the areas with the greatest supervision and avoid committing any infractions in them. Even so, a study carried out in 1999 which analysed satellite photographs detected 1,638 illegal emissions in the Mediterranean³².

From 1996 to 1999, the European Union co-financed a three-year project to test out three of the zones that are regarded as particularly critical in terms of the illegal dumping of hydrocarbons³³, namely the entrance to the Baltic Sea, the southern part of the North Sea/east of the English Channel and the Gulf of Leon in the Mediterranean.

Once again, satellite photographic proof showed that the Mediterranean was the biggest dumping ground, with 45% of those captured. In addition, it was proved that the majority of illegal dumping takes place at night to make it even more difficult to identify the offenders.

The European Commission believes that “only a small proportion of illegal discharges from ships are detected and only a handful of these end up being taken to court³⁴”. Also, in 1990 the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP)³⁵ pointed out that it was difficult to assess the effectiveness of international conventions for the prevention of marine pollution, but underlined their importance and the need to comply with them because, if not, the sea would be threatened on an annual basis by between 8 and 10 million tons of oil from tank washings and ballast waters.

- The situation in Spain

Spain lies on the two main oil access routes in Europe. On the one hand there is the Atlantic and Cantabrian zone, one of the major sea routes into and out of Europe. This is plied by vessels going to and coming from America, Africa, Asia and Oceania, and it also serves as a transit zone between the ports of northern and southern Europe. Meanwhile, the waters of the Mediterranean are an obligatory route for oil tankers going to and from the Suez Canal and trade between southern Europe and other ports from all over the world.

Spanish Ports (hydrocarbon traffic in tons)

Port	Crude oil	Fuel	Diesel	Petrol	Asphalt	Other	Gas	Natural Gas	Total
A Coruña	4,870,500	987,000	551,200	356,500	0	525,200	172,200	0	7,462,600
Algeciras	11,187,000	3,968,900	1,487,700	1,158,500	0	560,800	662,000	30	19,024,930
Alicante	0	5	0	10	2,700	3,800	3,600	160	10,275
Almería	0	0	720,000	194,300	76,400	65	0	0	990,765
Avilés	0	2,450	0	0	0	0	0	0	2,450
Balearic Is.	0	310,900	599,200	615,100	100	97,200	26,500	0	1,649,000
Barcelona	550	260,000	2,217,100	1,319,500	80	103,000	92,200	4,704,600	8,697,530
Bilbao	7,379,900	1,825,700	2,264,000	604,000	30	518,300	187,600	0	12,779,530
Cádiz	20	8,400	2,800	20,400	56,700	10,600	10	15	98,945
Cartagena	10,974,800	408,400	1,050,000	245,400	3,700	531,200	637,900	2,971,400	16,822,800
Castellón	4,515,200	168,900	1,381,400	1,138,100	0	0	70,400	0	7,274,000
Ceuta	0	554,200	229,800	20,000	400	2,300	3,000	30	809,730
Ferrol	350	737,000	208,000	0	0	81,500	0	0	1,026,850
Gijón	100	138,600	709,400	161,500	95,400	0	355,300	0	1,460,300
Huelva	4,595,500	617,500	527,800	388,300	131,700	327,600	157,800	2,475,700	9,221,900
Las Palmas	2,390	1,991,200	1,550,900	718,500	2,500	38,800	40,400	400	4,345,090
Malaga	0	0	0	0	650	1,000	0	0	1,650
Marín	0	0	0	0	0	0	5	0	5
Melilla	0	21,000	38,100	20,600	250	1,100	2,200	0	83,250
Pasajes	0	0	176,800	85,100	0	0	0	0	261,900
Santander	0	0	72,000	20,500	0	82,200	14,800	65	189,565
Seville	40	0	0	0	300	12,000	96,400	0	108,740
Tarragona	8,277,000	1,798,200	848,000	357,400	0	3,260,000	1,328,500	0	15,869,100
Tenerife	4,001,200	1,714,600	1,285,000	1,217,400	132,500	47,500	61,800	0	8,460,000
Valencia	910	98,500	666,400	245,000	45,800	29,600	10,000	0	1,096,210
Vigo	0	0	0	0	0	25,900	0	50	25,950
Vilagarcía	0	133,000	51,500	8,600	0	71,100	0	0	264,200
Total	55,805,460	15,744,955	16,637,100	8,894,710	549,210	6,330,765	3,922,615	10,152,450	118,037,265

Spanish ports register 12% of maritime trade movements in Europe, with some 354 million tons per year. In terms of oil, this figure comes to around 120 million tons per year. Of these, little more than half is represented by crude oil, the remainder being made up of fuel-oil, diesel, petrol and other derivatives³⁶.

The member countries of the International Marine Organisation (IMO) and signatories of MARPOL are committed, through Annex I and its Rulings, to providing waste reception facilities in their ports. In addition, in accordance with Directive 2000/59/EC, the countries of the European Union are obliged to set up these facilities to prevent marine pollution.

European facilities in compliance with Annex I of MARPOL:

Country/ports	Reception facilities					
	Dirty ballast water	Tank washing	Oily mixtures with chemical content	Sludge and sediment from tank cleaning	Bilge waste	Residue from fuel-oil refining
Germany/56	36	30	12	19	56	45
Belgium*	N/A	N/A	N/A	N/A	N/A	N/A
Cyprus/1	1	1	1	1	1	1
Croatia/4	3	3	-	1	4	1
Denmark/63	35	39	45	43	62	51
Spain/30	6	6	30	30	30	30
Estonia/2	2	2	2	2	2	2
Finland/29	6	6	23	6	29	29
France/31	15	13	4	7	12	8
Georgia/1	1	1	-	-	1	-
Greece/14	9	9	2	4	10	8
Holland/14	8	8	3	7	11	14
Ireland/19	10	10	9	9	10	10
Iceland/7	1	1	-	-	7	7
Italy/47	30	27	11	18	29	25
Latvia/2	1	2	-	-	2	-
Lithuania/1	-	-	-	-	1	1
Malta/1	1	1	1	1	1	1
Norway*	N/A	N/A	N/A	N/A	N/A	N/A
Poland/2	2	2	1	2	2	2
Portugal/4	4	4	-	-	4	-
UK/100	68	65	59	46	63	97
Russia/21	9	7	-	6	21	8
Sweden/51	18	17	8	13	50	49
Turkey/25	13	13	4	9	19	2
Ukraine/11	3	3	-	1	11	2

* Both Belgium and Norway have provided information on over 60 facilities, many of which are mobile in the case of Belgium, which fulfil the criteria of Annex I of MARPOL, but do not specify the type of treatment available or have a different format to that required by the IMO.

Since 1998, the year in which these data were submitted, very few European governments have updated their information. Those who have include Germany, Russia, Denmark, Croatia and the United Kingdom. The latter has provided extremely extensive information, which includes over one hundred new ports with reception facilities. What is surprising is that a port as important as Gibraltar does not feature on any of these lists.

Spain has been a member of the IMO since 1962 and of MARPOL since 1984. In 1998, MARPOL published the list of waste reception facilities in ports³⁷ in compliance with Annex I in terms of oil residue and oily waste. In the case of the Spanish government, the following information was provided on ports with reception facilities:

Port	Reception facilities					
	Dirty ballast water	Tank washing	Oily mixtures with chemical content	Sludge and sediment from tank cleaning	Bilge waste	Residue from fuel-oil refining
Bilbao	Yes	Yes	Yes	Yes	Yes	Yes
Pasajes	No	No	Yes	Yes	Yes	Yes
Santander	No	No	Yes	Yes	Yes	Yes
Avilés	No	No	Yes	Yes	Yes	Yes
Gijón	No	No	Yes	Yes	Yes	Yes
Ferrol	Yes	Yes	Yes	Yes	Yes	Yes
A Coruña	Yes	Yes	Yes	Yes	Yes	Yes
Vilagarcía	No	No	Yes	Yes	Yes	Yes
Marín	No	No	Yes	Yes	Yes	Yes
Vigo	No	No	Yes	Yes	Yes	Yes
Huelva	Yes	Yes	Yes	Yes	Yes	Yes
Algeciras	Yes	Yes	Yes	Yes	Yes	Yes
Tenerife	Yes	Yes	Yes	Yes	Yes	Yes
Las Palmas	No	No	Yes	Yes	Yes	Yes
Almería	No	No	Yes	Yes	Yes	Yes
Garrucha	No	No	Yes	Yes	Yes	Yes
Carboneras	No	No	Yes	Yes	Yes	Yes
Águilas	No	No	Yes	Yes	Yes	Yes
Cartagena	No	No	Yes	Yes	Yes	Yes
Valencia	No	No	Yes	Yes	Yes	Yes
Alicante	No	No	Yes	Yes	Yes	Yes
Burriana	No	No	Yes	Yes	Yes	Yes
Sagunto	No	No	Yes	Yes	Yes	Yes
Gandía	No	No	Yes	Yes	Yes	Yes
Castellón	No	No	Yes	Yes	Yes	Yes
Palma	No	No	Yes	Yes	Yes	Yes
Ibiza	No	No	Yes	Yes	Yes	Yes
Mahón	No	No	Yes	Yes	Yes	Yes
Barcelona	No	No	Yes	Yes	Yes	Yes
Tarragona	No	No	Yes	Yes	Yes	Yes

According to information that the IMO had in September 2002, it appears that only six ports had waste reception facilities for tank washing. It is noticeable that neither Tarragona nor Cartagena, two of the major hydrocarbon reception ports, feature in this particular column. Since that time, Spain has not notified any changes to the MARPOL facilities in its ports, unlike other countries such as the United Kingdom, Germany, Denmark and even non-EU members such as Croatia, Slovenia and Russia, who have all increased the amount of information provided to the IMO and the number of facilities available for the ships docking in their ports³⁸.

Despite the fact that the EU is one of the reception zones with the greatest number of port facilities to comply with the requirements of international agreements, the situation is still very far from being considered ideal due to the huge volume of trade in hydrocarbons. Various researchers have denounced this situation and the lack of cost/benefit studies on the management (or non-management) of these residues³⁹.

In the first few months of 2003, the European Commission notified⁴⁰ Belgium, Denmark, Spain, France, Finland, Holland, Ireland, Italy, Portugal, the United Kingdom and Sweden of their lack of compliance by failing to assimilate Directive 2000/59 on port reception facilities for ship-generated waste in their respective national legislations. Only Germany and Greece had complied with their commitment within the established deadlines. Both the European Parliament⁴¹ and the European Economic Social Committee⁴² condemned this situation in July and October in the same year respectively, warning that this large-scale failure to comply with the Directive could encourage ships to carry out their discharges at sea.

Much of this residue is not completely made up of hydrocarbons but consists of mixtures of oil and water in very different percentages. However, if we use the scale on which the OCDE bases its statistics⁴³, assuming that 0.35% of the total cargo transported by one of these ships adheres to the bottom and sides of the tanks, we would be talking about some 252,000 tons of hydrocarbon waste in Spain and between 1.7 and 2.8 million tons of waste in Europe from this source.

Another of the ways in which hydrocarbon-contaminated residue enters the water is by ballast water. Oil tankers may transport up to 25%-30% of their cargo capacity as ballast water to increase navigational safety when the tanker is empty.

Estimated oily waste generated in Spanish ports as a result of the transportation of heavy hydrocarbons⁴⁴:

Port	Total heavy hydrocarbons	Washing water	Oily waste	Semi-solid waste	Total residue
A Coruña	5,857,500	281,160	11,715	5,857	298,732
Algeciras	15,155,900	727,483	30,311	15,155	772,949
Alicante	2,705	129	5	2	136
Almería	76,400	3,667	152	76	3,895
Avilés	2,450	117	5	2	124
Balearic Is.	311,000	14,928	622	311	15,861
Barcelona	261,130	12,534	522	261	13,317
Bilbao	9,205,630	441,870	18,411	9,205	469,486
Cádiz	65,120	3,125	130	65	3,320
Cartagena	11,386,900	546,571	22,773	11,386	580,730
Castellón	4,684,100	224,836	9,368	4,684	238,888
Ceuta	554,600	26,620	1,109	554	28,283
Ferrol	737,350	35,392	1,474	737	37,603
Gijón	234,100	11,236	468	234	11,938
Huelva	5,344,700	256,545	10,689	5,344	272,578
Las Palmas	1,996,090	95,812	3,992	1,996	101,800
Malaga	650	31	1	1	33
Marín	0	0	0	0	0
Melilla	21,250	1,020	42	21	1,083
Pasajes	0	0	0	0	0
Santander	0	0	0	0	0
Seville	340	16	1	1	18
Tarragona	10,075,200	483,609	20,150	10,075	513,834
Tenerife	5,848,300	280,718	11,696	5,848	298,262
Valencia	145,210	6,970	290	145	7,405
Vigo	0	0	0	0	0
Vilagarcía	133,000	6,384	266	133	6,783
Total	72,099,625	3,460,773	144,192	72,093	3,677,058

These estimates do not include bilge waste or the consumption of oils and fuel, etc., nor do they include waste generated by transportation of other oil derivatives such as petrol, diesel, benzene, etc., which means that this estimate simply aims to give a general and very conservative overview of the amount of waste generated by trade in hydrocarbons and the lack of control thereof.

As can be seen from the table above, just counting the residue from heavy hydrocarbon cargo transportation, the quantity of waste generated in Spanish ports exceeds 3.5 million tons per year. Assuming that in a best-case scenario the amount of waste received by port facilities is 25% (see example of Algeciras), we have to accept that we do not know where almost 2.8 million tons of oily waste is ending up.

Regrettably, the Port Authorities do not collate any data on waste reception amongst the activities detailed in their annual report, which makes it impossible to know the true scope of treated waste. However, knowing the data relating to the movement of merchandise in some of the main European ports, it is obvious that these figures are a very long way from being acceptable.

- Prosecuting offenders

Fundamental elements in the fight against marine pollution are the measures available to governments to seek out and prosecute the violators of international agreements.

Systems for detecting illegal dumping in Europe⁴⁵:

Country	Satellite	Aircraft						Other		
	CSA	SLAR	IR/UV	MWR	LFS	FLIR	Camera	SOED	OED	Visual
Denmark	X	X						X	X	X
Finland		X	X					X	X	X
Sweden		X	X	X		X	X	X	X	X
Germany		X	X	X	X		X	X	X	X
Norway	X	X	X	X			X	X	X	X
Portugal		X	X	X			X	X	X	X
Holland	X	X	X	X			X	X	X	X
UK	X	X	X	X			X	X	X	X
Italy								X	X	X
France								X	X	X
Spain									X	X

SCA = Combined satellite and aircraft surveillance	FLIR = Frontal infrared detection
SLAR = Lateral aircraft radar	Camera = Photos/videos from aircraft
IR/UV = Infrared/ultraviolet detection	SOED = Special hydrocarbon detection system
MWR = Microwave radiometer	OED = Hydrocarbon detection system
LFS = Laser fluorosensor	Visual = Visual detection

In the case of Europe, the northern countries are equipped with much more efficient equipment than the southern ones, the latter of whom base a great deal of their work on the visual identification of offenders which offers extraordinarily scant opportunities for effective application.

Regrettably, many of the biggest world crude oil producers are not members of international conventions for the prevention of marine pollution by hydrocarbons and do not provide information on what reception facilities they have available. This is the case in the Persian Gulf, where not one single country has provided the IMO with information on this type of facility, despite the fact that it is the area where some 50% of the oil used throughout the world is loaded.⁴⁶

Amongst the major crude oil producers, only Ecuador, Brazil, Mexico, Norway, the United Kingdom, Russia and the United States have provided information on the status of their ports with regard to compliance with Annex I of MARPOL, while Saudi Arabia, Venezuela, Iran, Iraq, Kuwait, Oman, Bahrain, the UAE, Algeria, Nigeria, Indonesia, Qatar, Libya and the Gabon have not. The only OPEC country to provide any information has been Ecuador.

Despite these inadequacies in the MARPOL agreement, at the last meeting of the IMO Committee for the Protection of the Marine Environment not one single document was presented relating to the shortage of port reception facilities⁴⁷.

The lack of information on reception facilities for residue generated by the transportation of crude oil or refined products, as well as waste resulting from the use of fuel and oil, is a serious shortcoming when it comes to effectively enforcing the MARPOL regulations for preventing marine pollution by hydrocarbons.

With this information, one would hope that accusations and arrests for violation of the MARPOL convention would engage the majority of inspections carried out by administrations. However, the number of infractions picked up by the Paris MOU inspectors⁴⁸ based on Annex I of MARPOL were 4,875 in 2000, 5,116 in 2001 and 4,421 in 2002, which represent 7.2%, 7.4% and 6.4% respectively in terms of the total infractions registered over these years. More recently, of the 119 vessels detained in September 2003, only 5 were found guilty of failing to comply with Annex I of MARPOL.

If we look at the information provided by the IMO on the results of vessel inspections in terms of contravening MARPOL, we can see that only 1.1% of the vessels inspected worldwide were detailed or were refused access to port⁴⁹, figures that demonstrate that the majority of illegal dumping is still being carried out with total impunity and going completely unnoticed.

- **Conclusions**

The IMO makes it obligatory to keep hydrocarbon waste on board, whether this is generated from tank washing, bilges, engines, etc., until it can be discharged in a port reception facility for waste treatment in accordance with Annex I of MARPOL. To do so, oil tankers and the majority of merchant ships must have holding tanks for this kind of residue until they can reach port.

Some of the crude oil residue generated by tank washing has been reduced by means of the technique known as “load-on-top”, which consists of diverting the tank-washing water to special transfer tanks reserved for this purpose which allow the water and crude oil to separate due to their different densities and weight, the crude staying in the upper part of the tank and the water in the lower so it can then be discharged, retaining the remainder (even so, this water can still retain concentrations of polluting hydrocarbons). In this way, when the ship reaches the loading port, the cargo is loaded on top of the residue which is then unloaded along with the rest of the cargo at the reception refinery.

Another technique for reusing the residue from heavy hydrocarbon transportation is washing out the tanks with oil. Instead of using water, washing with crude uses the cargo itself to remove accumulated residue and thus the contamination of thousands of cubic metres of water is avoided and the oil can be discharged leaving hardly any residue. But these techniques are still not widely employed, and there are some refineries that refuse to accept residue mixed with cargo, even to the point of signing contracts with oil carriers that clearly stipulate they will not accept the “load-on-top” technique.

The IMO has laid down regulations governing the permitted discharge of hydrocarbons, which can only be carried out when it is to safeguard people working at sea or for reasons of navigational safety, or when the discharge consists of oily waters from the engines with hydrocarbon levels lower than 15 ppm. Likewise, it rules that hydrocarbon emissions must be made a long way from the coast (at least 50 miles) and while the ship is sailing, bearing in mind that it may not discharge more than 30 litres per mile travelled and that the total discharge may not exceed 1/30,000 (or 1/15,000 if the tanker was built before 1980) of the cargo.

In other words, the total “permitted” emissions of all crude oil tankers around the world should, in a worst-case scenario, come to around 120,000 tons of hydrocarbons, or between 33,000 and 53,000 tons in the case of Europe, something quite difficult to achieve when the sludge and sediment from cargo alone produce between 5.6 and 6.3 million tons of residue around the world, and between 1.75 and 2.8 million tons in Europe.

In the international agreements for preventing hydrocarbon pollution there are a series of inadequacies which need to be rapidly rectified:

- There is a generalised failure to comply with the MARPOL regulations, partly due to the need to specify exactly *what* are regarded as “adequate” port reception facilities, as this term is not properly defined in the Convention.
- The IMO and other world forums dedicated to preventing pollution should be working to rectify the absence of many of the leading crude oil producers as signatory members of the main international conventions such as MARPOL.
- International cooperation is necessary to prosecute offenders, as many of these emissions take place in international waters and occasionally by ships flying the flags of countries that are not signatories of international agreements, creating a major legal loophole.
- A clear definition is required in national and international legislation with regard to the roles and responsibilities of the country under which the ship is registered, the shipping company, the chartering company and the captain.
- The EU should promote collaboration between states to compensate for the scarcity of measures to monitor contraventions and the illegal dumping of oil and oily water at sea. At the same time it should dedicate a budget to this undertaking, to include satellite and airborne surveillance as well as monitoring and analysis systems that will enable offenders to be identified and taken before the courts.
- There is a need to establish genuine guidelines on the generation of waste and reliably assess the amount of waste dumped at sea. There are no reliable estimates on the generation and dumping of hydrocarbons and oily water. All conjectures on the amount of waste generated give rise to different and incongruous figures.

The solution to these problems consists in coordinating the demands of the different collectives involved: ship owners and captains complain about the high cost of treating waste and the loss of time that can be entailed by this process; port authorities say that the facilities do not always belong to them and hence they do not have any authority over many private port installations, which in some ports can represent 80% of port traffic⁵⁰; and waste treatment companies say that insufficient government support and the lack of residue delivered by ships makes their operations completely unfeasible from an economic point of view.

The new EU directive⁵¹ tries to rectify some of these inadequacies and encourage waste to be delivered to the port facilities provided for this purpose. One of the more innovative measures entails charging a fee to all vessels mooring in European ports regardless of whether they discharge their waste or not, with the aim of encouraging the discharge of all sediment and polluted waters. But the effectiveness of this legislation and the level of compliance with it have yet to be corroborated, apart from which there are still other unresolved issues.

In 1993, the European Commission put forward a new Directive⁵² to improve marine surveillance in the zones of heaviest oil tanker and hazardous goods traffic, but it never got round to being passed by the Council. Once again, the Commission has recently submitted another proposal⁵³ to increase monitoring of compliance with international conventions to prevent hydrocarbon pollution, which includes establishing sentences for offenders.

- **Proposals for the future**

- Support for the proposal for a new Directive from the European Commission with the aim of establishing criteria for taking punitive action against the transgressors of international conventions for the prevention of marine pollution by hydrocarbons.
- Putting into operation a surveillance system that uses the most advanced possible methods to monitor and detect illegal hydrocarbon dumping at sea.
- Updating the lists of port reception facilities for treating waste included in Annex I of MARPOL and fully collaborating with the IMO.
- Inclusion of the companies and shippers responsible for illegal oil dumping at sea on a blacklist which disqualifies them from working in the EU or receiving any kind of subsidy.
- Strict monitoring of the logbooks relating to the discharge of waste in port.
- Establishing economic sanctions on EU countries that do not provide adequate waste reception facilities in line with Annex I of MARPOL and which do not comply with European Commission Directives.
- Definition of what exactly are deemed to be “adequate” facilities and which ports are obliged to provide them.
- A European agreement on the definition of the type of penal and criminal sanctions that should be administered to transgressors of international agreements.
- Review of the emission limits authorised by MARPOL and the establishment of a timetable for their total elimination.
- Creation of a watchdog group reporting to the IMO to go on board oil tankers to verify compliance with MARPOL regulations.

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