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Provision of adequate reception facilities in Nigerian ports and oil terminals

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THE PROVISION OF ADEQUATE RECEPTION FACILITIES IN NIGERIAN PORTS AND OIL TERMINALS

by

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A paper submitted to the faculty of the World Maritime University in partial satisfaction for the award of a

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The contents of this paper reflect my personal views and are not necessarily endorsed by the World Maritime University.

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List of Abbreviation

AED:	African Economic Digest Magazine.
BOTAS:	Boru Hatlari Ile Petrol Tasima A.S.
CBT:	Clean Ballast Tank.
CEC:	Commission of the European Communities.
CLC:	International Convention on Civil Liability for Oil Pollution Damage.
CNA:	Clean Nigeria Associates.
COW:	Crude Oil Washing.
DWT:	Deadweight Ton.
FAO:	Food and Agriculture Organization.
FEPA:	Federal Environmental Protection Agency.
FOT:	Federal Ocean Terminal.
FUND:	International Convention on the Establishment of an International Fund for Compensation.
GRT:	Gross Registered Tonnage.
ICS:	International Chamber of Shipping.
IGOSS:	Integrated Global Ocean Station System.
IMDG:	International Maritime Dangerous Goods Code.
IMO:	International Maritime Organization.
INTERTANKO:	International Association of Independent Tanker Owners.
IOC:	Intergovernmental Oceanographic Commission.

IOPP:	International oil Pollution Prevention Certificate.
LDC:	Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter.
LOS:	The Law of the Sea Convention.
MAPMOPP:	Marine Pollution Monitoring Programme.
MARPOL:	The International Convention for the Prevention of Pollution from Ships, 1973 as Modified by the Protocol of 1978 relating thereto.
MEPC:	Marine Environmental Protection Committee.
MSC:	Maritime Safety Committee.
MSCM:	Million Standard Cubic Metres.
NET:	Net Registered Tonnage.
NPA:	Nigerian Ports Authority.
NNPC:	Nigerian National Petroleum Corporation.
OILPOL:	International Convention for the Prevention of Pollution of the Sea by Oil 1954 as Amended in 1962, 1969.
OPEC:	Organization for Petroleum Exporting Countries.
PPM:	Parts Per Million.
PSC:	Port State Control.
ROPME:	Regional Organization for the Protection of Marine Environment.
SBT:	Segregated Ballast Tank.
SCF:	Standard Cubic Feet.
SDR:	Special Drawing Rights.
SIDA:	Swedish International Development Aid.
SOLAS:	Safety of Life at Sea.
TCIP:	Tin Can Island Port.

UKWAL:	United Kingdom West African Line.
UNDP:	United Nations Development Programme.
UNEP:	United Nations Environment Programme.
USD:	United States Dollar.
USNAS:	United States National Academy of Science.

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DEDICATION

This works means a lot to me and it is dedicated to my parents Nkem and Georgiana Okwuosa.

$1.66 Billion smuggling

Abstract

The MARPOL Convention was adopted almost 17 years ago. Its main objective is to reduce pollution of the marine environment from ships.

Nigeria is yet to accede to the Convention and has done little or nothing to assist ship owners to reduce operational discharges of waste into the ocean.

Hence, this project. In the hope that MARPOL 73/78 and its subsequent Amendments will soon be acceded to, by the government of Nigeria, the aim of this study is to assist government functionaries to establish adequate reception facilities for ships using Nigerian ports and terminals without causing them undue delay, as is contained in the Convention.

In the Introduction of the project, a brief summary of the present situation and of the ultimate objective of the project is given.

Chapter 1 contains general information on Nigeria, including petroleum production and export by ships since oil was discovered in commercial quantities.

In Chapter 2, an overview of the International Maritime Organization (IMO) and the major International Conventions dealing with marine pollution for which IMO is the depository is provided.

Chapter 3 highlights the provision of adequate reception facilities in ports and oil terminals, as contained in

the Guidelines published by the Marine Environment Protection Committee (MEPC) of IMO.

Chapter 4 deals with ports, terminals, ship repair yards, jetties and maritime traffic of Nigeria.

In Chapter 5, the reception facilities required in Nigerian ports and oil terminals are discussed.

In Chapter 6, the possible establishment of reception facilities in Apapa, Forcados and Bonny is examined and some recommendations are given.

Chapter 7, ends the study with a Conclusion.

Introduction

The Law of the Sea Convention (LOS), defines marine pollution as "the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazard to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of seawater and reduction of amenities".

The main causes of pollution by vessels are mainly operational and accidental pollution. Accidental pollution makes the big news - Torrey Canyon (1967), Amoco Cadiz (1978), Exxon Valdiz (1989), to mention only but a few. Operational pollution resulting from daily ship operational routine is the greatest source of oil pollution of the sea. This point is highlighted by a study done by the United States National Academy of Sciences (USNAS), it is estimated that a total of 1.5 million metric tonnes oil enters the sea each year as a result of marine transportation losses - almost two thirds are from vessel operational discharges, while less than one third is due to accidental discharges (Table 1).

Operational pollution can be controlled by providing reception facilities, designating special areas, having discharge criteria and constructing modern vessels. In particlar, tankers should be provided with segregated ballast tanks (SBT), clean ballast tanks (CBT), crude oil washing (COW), oily water separator and oily water discharge monitor amongst others.

Similarly, accidental pollution can be reduced through crew training, cargo handling, navigation, construction and equipment providing segregated ballast tanks and limiting the size of tanks etc..

Table 1

Inputs of Petroleum Hydrocarbon into the Marine Environment

(Million metric tons/annum)

MARINE TRANSPORTATION	1975	1985
Tanker operations	1.08	0.7
Drydocking	0.25	0.03
Marine terminal	0.003	0.02
Bilges and fuel oils	0.5	0.3
Tanker accidents	0.2	0.4
Non-tanker accidents	0.1	0.02
TOTAL	2.133	1.47

SOURCE: United States National Academy of Science.

Prevention of marine pollution is a very wide subject. In this project, the emphasis will be on the " Provision of Adequate Reception Facilities in Ports and Oil

Terminals" in Nigeria as one of the means of reducing marine pollution resulting from routine shipping operations in and around Nigerian waters.

The first attempt to control marine pollution from ships was the International Convention for the Prevention of Pollution of the Sea by Oil in 1954 (OILPOL 54). This Convention was amended in 1962, 1969 and 1971. The Convention contains a requirement for the provision of reception facilities in Article VIII - each Contracting Government shall take all appropriate steps to promote the provision of adequate facilities without causing undue delay to ships using them.

The International Convention for the Prevention of Pollution from ships, 1973 as modified by the Protocol of 1978 relating thereto (MARPOL 73/78) further strengthened the provision of reception facility requirements as contained in OILPOL 54/62/69.

Reception facility provisions in MARPOL 73/78 cover chemicals, sewage and garbage along with oily waste. These are dealt with in the following Regulations of the MARPOL 73/78 Annexes: Regulations 10(7) and 12 of Annex I, for oily waste; Regulation 7 of Annex II for chemical waste; Regulation 10 of Annex IV for sewage waste and Regulation 7 of Annex V for garbage waste.

MARPOL 73/78, which entered into force on 2 October 1983, stipulates that reception facilities for waste shall be made available not later than one year (2 October 1984) from the entry into force of the Convention.

The Government of the Federal Republic of Nigeria is yet to accede to the MARPOL 73/78 Convention as of 1 July 1990 and there is no reception facility in any port, oil terminal or repair port in Nigeria. Hence the urgent need to accede to the most important IMO Instrument on marine pollution - MARPOL 73/78 - and to provide reception facilities.

The Contracting states that ratified OILPOL 54/62/69, did not pursue the building of reception facilities with vigour. The findings of scientists on the increase in pollution of the sea and the awareness of the public and of politicians of the dangers of marine pollution and the need to minimize its effects, led to an intensified effort by IMO to reduce operational pollution which was the main source of marine pollution. The provision of facilities in small, medium and large ports, oil terminals and ship repair yards for the reception of ships waste ashore will drastically reduce operational pollution.

IMO has encouraged the establishment of reception facilities for the receipt of ships waste with vigour. The IMO, through MEPC, has published guidelines to assist governments in the provision of adequate reception facilities in ports for oil, chemical, sewage and garbage wastes.

IMO, in collaboration with other Organizations, has sponsored symposiums, studies, workshops, seminars and projects on the provision of adequate reception facilities.

This project was undertaken as a contribution towards the establishment of reception facilities in Nigeria as a means of reducing operational discharges by ships, especially tankers, in Nigerian waters.

As of 1 July 1990, there was no reception facility in any port or oil terminal in Nigeria. The Government of the Federal Republic of Nigeria has ratified the OILPOL 54/62/69 and only the provisions of OILPOL 54/62 are incorporates into the national law. She is yet to accede to MARPOL 73/78.

The damage done to the Nigerian marine environment is very devastating, especially by the vessels using Nigerian waters. During the operation of these vessels without reception

facilities the wastes generated from cargo tank washing, dirty ballast water, pump and engine room bilges, separator sludge, sewage, garbage etc., find their way into the Nigerian waters, causing consistent pollution of the marine environment.

Pollutants such as oil and garbage are constantly observed in the Nigerian waters, beaches etc.. This is confirmed by A Survey of Marine Pollutants from Industrial Sources in the West and Central African Region, a United Nations Environment Programme (UNEP), Regional Sea Report and Studies No. 2, attributes the sources of oil accumulation on the beaches and oil coating of the sides of boats to petroleum loading terminals, oil exploration activities and oil tankers cleaning bilges near the shores after unloading at oil refineries, tankers transporting petroleum from the Middle East amongst others.

The need for reception facilities becomes more glaring as Nigeria is a producer and exporter of crude oil. The Nigerian oil production quota by the Organization of Petroleum Exporting Countries (OPEC) is 1.6111 million barrels per day for the first half of 1990 (source, West African Magazine No. 3773 of 11-17 December 1989) and about 90% of the production is exported by tankers. The number of crude oil carriers calling at Nigerian oil terminals has being averaging 664 per annum in the ten years of 1979-1988, while the total average figure for vessel visits for the same period is 4,259 per annum (source NPA'S Handbook, published in 1989).

Most of the tankers using Nigeria's oil terminals are old and hardly comply with the provisions of MARPOL 73/78. There is hardly any form of inspection and monitoring of these vessels. The operators of the oil terminals and NPA expect tankers arriving at the terminals to arrive with clean ballast water. However, there is no concerted effort to implement this requirement.

There are visible oil slicks on the surface of the Nigerian waters in ports and oil terminals and yet an

incident of arrest or fine of any vessel for a pollution offence has rarely been recorded. These oil slick are most likely as a result of routine operational discharges from ships.

Also, the Nigerian coast is along the major tanker routes between the Middle East, Europe and the U.S, via the Cape of Good Hope, and thus their operational discharges can contribute to visible oil slicks in Nigerian waters. This was highlighted in Global Oil Pollution, being the result of Marine Pollution Monitoring Programme (MAPMOPP) and the Integrated Global Ocean Station System (IGOSS) Pilot Project on Marine Pollution (Petroleum) Monitoring, published by Intergovernmental Oceanographic Commission (IOC), in 1981.

The discharges of these tankers reach the waters and coast of Nigeria as a result of the prevailing oceanographic and meteorologic circumstances of the region. The spread of the pollution is due to the air-sea dynamics, including the force and direction of the winds and currents, the temperature of the sea and the air.

The provision of reception facilities in Nigeria will greatly reduce pollution in the Nigerian marine environment and the West and Central African region. As of 1 July 1990, there was no recorded reception facility in any of the 18 ccuntries of the West and Central African sub-region. The general trend recorded in most regions of the world regarding reduction of marine pollution by ships is yet to be felt in this sub-region.

Reception facilities will reduce the pressure on vessels to discharge waste overboard while trading in the sub-region. Nigeria is centrally located and most of these vessels always call at Nigerian ports. Nigeria ports and terminals have the busiest and heaviest traffic in the sub-region.

Chapter 1

1. General Information on Nigeria

1.1 Geography-Physical

Nigeria is on the West Coast of Africa, having a total geographical area of 923,768 square kilometers. It is bounded in the south by the Gulf of Guinea, in the west by the Republic of Benin, in the north by the Republic of Niger and in the east by the Republic of Cameroun. Nigeria is located between latitudes 4 - 14 degrees north of the Equator and between longitudes 3 - 15 degrees east of the Meridian. (Map 1).

Nigeria's main river is the River Niger. It enters the country from the north-west and empties into the Gulf of Guinea through the Niger Delta. Its main tributary is River Benue, which joins the River Niger at Lokoja and takes its source in the Republic of Cameroun. The other major rivers in Nigeria are Imo, Ogun, Orashi, Benin, Bonny, Cross River, Escravos, Forcados, Qua-Iboe to mention but a few.

It has a tropical climate: the average highest maximum temperature is 31.4 degrees Centigrade in February/March and the lowest maximum temperature is 23.2 degrees Centigrade in July. The temperature increases from the coast as you move inland. The temperature at the coast rises above 32 degrees Centigrade and humidity can be as high as 95%. The two main seasons are the dry season from November to March

Map 1 – Map of Nigeria

and the rainy season from April to October.

The population is about 100 million and is made up of various ethnic groups. The major tribes are Ibo, Hausa, Fulani, Yoruba, Edo, Urhobo, Efik, Tiv and Kanuri. Nigeria is made up of 21 states and a Federal Capital Territory-Abuja.

1.2 Coastal Region

Nigeria has a coastline of 853 kilometers. The coastal states of Nigeria, from west to east are: Lagos, Ondo, Bendle, Rivers, Akwa Ibom and Cross River states. The Territorial Waters (Amendment) Act 1971 extends the Nigerian territorial waters to 30 nautical miles from the 12 nautical miles contained in the previous Territorial Water Act of 1967.

The Exclusive Economic Zone Act of 1978 extends the Exclusive Economic Zone (EEZ) to 200 nautical miles from the external limit of the territorial waters of Nigeria, covering 315,950 square kilometers.

1.3 Fishery Resources

The Nigeria waters abound with plentiful fisheries. The three main types found are: Pelagic, Dermesal and Crustaceans. The annual fish catch in 1983 was 538,350 metric tons; it declined to 241,635 metric tons in 1985, owing to shortages of trawlers, nets and the cancellation of industrial fishing licenses, but increased in 1987 to 268,500 metric tons.

The improvement of fishing is being intensified as it is the cheapest source of protein for the growing Nigerian population. The fishing fleet is being expanded with the

Table 2
Fishing Statistics 1985-1987

('000 metric tons, live weight)

	1985	1986	1987
INLAND WATER	87.4	107.0	103.2
Tilapias	16.5	17.2	16.5
Upsidedown catfishes	5.4	13.5	5.1
Characins	10.5	14.2	11.0
Naked catfishes	4.4	11.1	16.8
Torpedo-shaped catfishes	19.8	10.1	17.7
Other fresh water fishes (including unspecified)	27.4	40.9	26.6
Nile perch	3.4	n.a	9.4
ATLANTIC OCEAN	154.3	161.5	145.8
West African croakers	29.0	22.2	3.9
Threadfins, etc.	10.0	7.0	13.5
Bonga shad	32.9	21.8	37.4
Sharks,rays,skates,etc.	13.4	9.3	9.2
Other marine fishes (including unspecified)	66.7	93.8	79.9
Crustaceans and molluscs	2.3	7.4	1.8
TOTAL CATCH	241.6	268.5	249.0

Source: FAO, Yearbook of Fishery Statistics.

1.4 Agriculture

Before Nigeria attained independence in 1960, agriculture accounted for more than one-half of the Gross

Domestic Product (GDP) and for more than three-quarters of export earnings. In 1986, agriculture accounted for 41% of GDP and provided less than 3% of total export earnings. Between the 1960's and the mid 1980's, Nigeria moved from the position of a self-sufficiency in basic foodstuffs to one of heavy dependency on imports. This trend was due to under-investment, a steady drift away from the land to urban centers in search of blue and white collar jobs, outdated farming techniques, the effects of drought, a rate of population growth outstripping food production and most importantly, neglect due to new found wealth from oil.

Agriculture is a major employer of labour in Nigeria. Traditional smallholder farmers, using simple techniques of production, account for about two-thirds of Nigeria's total agricultural production. The state farms have not done any better. Grandiose schemes to develop the agricultural sector like "Operation Feed the Nation" (OFN) - (1976- 79) and the "Green Revolution" - (1979- 83), having invested vast amounts of money, failed woefully.

Currently, the states are disinvesting in farms, but are providing various incentives to stimulate agricultural growth. They are encouraging foreign investors and imposing stringent import controls on most agricultural products. They are providing tax relief for agro-allied industries which either diversify into crop farming or utilize local rather than imported produce.

In addition, the States have been engaged in the following task and activities;

changing the controversial "Land Use Decree" in order to facilitate the purchasing of agricultural land for commercial farming;

distributing fertilizer;

assisting in land clearance and providing storage facilities;

encouraging higher produce prices;

relaxing restrictions on imports of agricultural capital equipment;
improving the efficiency of the agricultural credit scheme;
promoting a mass "back to land" campaign;
fertilizer procuring and providing irrigation;
introducing new measures to encourage large scale joint farming ventures.

Traditional small-holder farmers, who produce most of the food/cash crops, will be expected to benefit from easier access to credits. In 1986, commercial banks were directed to increase loans for agriculture from 12% to 15%. (Source: African South of the Sahara 1990).

These incentives are begin aggressively pursued by the present Administration, which has made agricultural development and self-sufficiency in food production a key component of its overall economic recovery plan.

1.5 Vegetation.

The vegetation of the coast is predominately coastal swamps made up of saline and fresh water mangroves. The coastal swamps are used for fishing and fish farming. It is only the fresh water swamps which are used for rice and yam cultivation. Many species of wildlife use the mangrove trees as their habitat. The mangrove trees also serve the inhabitants of the coastal regions, by providing wood for cooking, heating and building purposes. They are also an important factor in the ecosystem of the region.

North of the coastal swamps is the rainforest belt followed by the savanna regions. The extreme northern part of Nigeria belongs to the Sahara region.

1.6 Petroleum

Oil prospecting was begun in Nigeria in 1908 by a German company, the Nigerian Bitumen Corporation, in the Araromi area of the present Ondo states. Their efforts came to an end with the outbreak of the First World War in 1914.

Shell D' Arcy (the forerunner of the present Shell Petroleum Development Company of Nigeria) started prospecting for oil in 1937. Their activities were interrupted by the Second World War, but resumed in 1947.

In 1956, oil was discovered in commercial quantities at Oloibiri in the Niger Delta. Shell started oil production and exportation from its Oloibiri field in 1958. The production rate was 5,100 barrels of crude oil per day. Shell, together with other oil producing companies, reached a peak production figure of 2.4 millon barrels per day in 1979. Nigeria is the sixth largest oil producing country in the world. (Source: Nigeria National Petroleum Corporation-NNPC Information Bulletin 1989).

Nigeria became a member of the Organization of Petroleum Exporting Countries (OPEC) in 1971. Nigerian's OPEC production quota was 1.6111 millon barrels per day for the first half of 1990. (Source: West Africa Magazine, No. 3773 of 11-17 December 1989). Nigeria's proven petroleum reserves are in excess of 16,000 millon barrels of crude oil and over 75 trillion standard cubic feet of gas. The gas reserves are equivalent to three times Nigeria's crude oil reserves. The crude oil reserves are supposed to last between 40 and 45 years at the current rate of extraction. (Source: An NNPC Point of view, West African Magazine No.3759 of 4-10 September 1989, p. 1472). Efforts are currently being intensified to raise recoverable reserves to 20,000 millon barrels from 16,000 millon and to expand production capacity to 2.5 millon barrels per day in the next five years. (Source: An African Economic

Digest-AED, Special Report on Nigeria, August 1989 p. 23). Presently, the country has the ability to produce 1.8 millon barrels per day. The oil and gas industry is the leading sector in the Nigerian economy accounting for over 80% of the nation's total export earnings and about 70% of total Government revenue. (Source: An NNPC Point of view, West Africa Magazine No.3754 p. 1472 of 4-10 September 1989).

The revenue from oil determines the trend of development in the country. Due to the volatile nature of the oil market and prices, the revenue accruing to the nation continues to fluctuates. The revenues are shared in decreasing proportions between the federal, state and local governments, respectively. They are used for financing the nation's imports and for servicing the debt totalling about 30 billion USD (United States Dollars).

In 1971, in response to the need to strengthen and establish government control in the oil industry, the Nigerian National Oil Corporation (NNOC) was established as an integrated oil company.

In 1977, the Ministry of Petroleum Resources, whose functions were mainly regulatory, was merged with NNOC to form the Nigerian National Petroleum Corporation (NNPC), whose functions include exploration, production, transportation, processing of oil, refining and marketing of crude oil and refined oil products-in addition to the regulatory functions in the oil industry.

NNPC operates a Refinery at Warri, a coastal town in Bendle State having a capacity of 125,000 barrels/day. Adjacent to the refinery is a Petrochemical plant producing Carbon Black and Polypropylene. Also NNPC have two Refineries in the coastal town of Port Harcourt in Rivers State having a combined capacity of 220,000 barrels/day. Work has started on a Petrochemical plant in Port Harcourt scheduled to come on stream in 1993. The products of this plant will be Ethylene-

260,000 metric tons per year (mty), Propylene-90,000 mty, Polyethylene-250,000 mty, Butene-1-22,000 mty and Polypropylene-80,000 mty. NNPC have also a Refinery and Petrochemical plant in Kaduna in the north of Nigeria. The capacity of the refinery is 100,000 barrels/day and the Petrochemical plant produces 30,000 mty of Linear Alkyl Benzene (LAB), 15,000 mty of Benzene and 30,000 mty of Kero solvent. (Source: NNPC Point of View, 1989).

A liquified natural gas (LNG) plant at Bonny, an Island near Port Harcourt, is to come on stream in 1995 and will produce approximately 4.5 millon tons of LNG per annum. (Source: LNG for Nigeria the Journey so Far, an NNPC Publication). The LNG plant will reduce the amount of gas flared off due to the under utilization of gas in Nigeria (proven reserves of gas are 75 trillion standard cubic feet). Table 3 - Gas Production and Utilization Statistics 1980-1987.

Table 3

Gas Production and Utilization Statistics 1980-1987

YEAR	GAS PRODUCTION 10^9 SCF	GAS FLARED 10^9 SCF	% FLARED
1980	867.02	812.56	93.72
1981	608.82	516.24	84.79
1982	719.36	604.16	83.99
1983	619.42	507.39	81.91
1984	653.90	491.64	75.19

1985	655.90	524.42	80.05
1986	661.77	491.81	74.32
1987	606.28	430.91	71.07

10^9 = 1,000,000,000; SCF= standard cubic feet

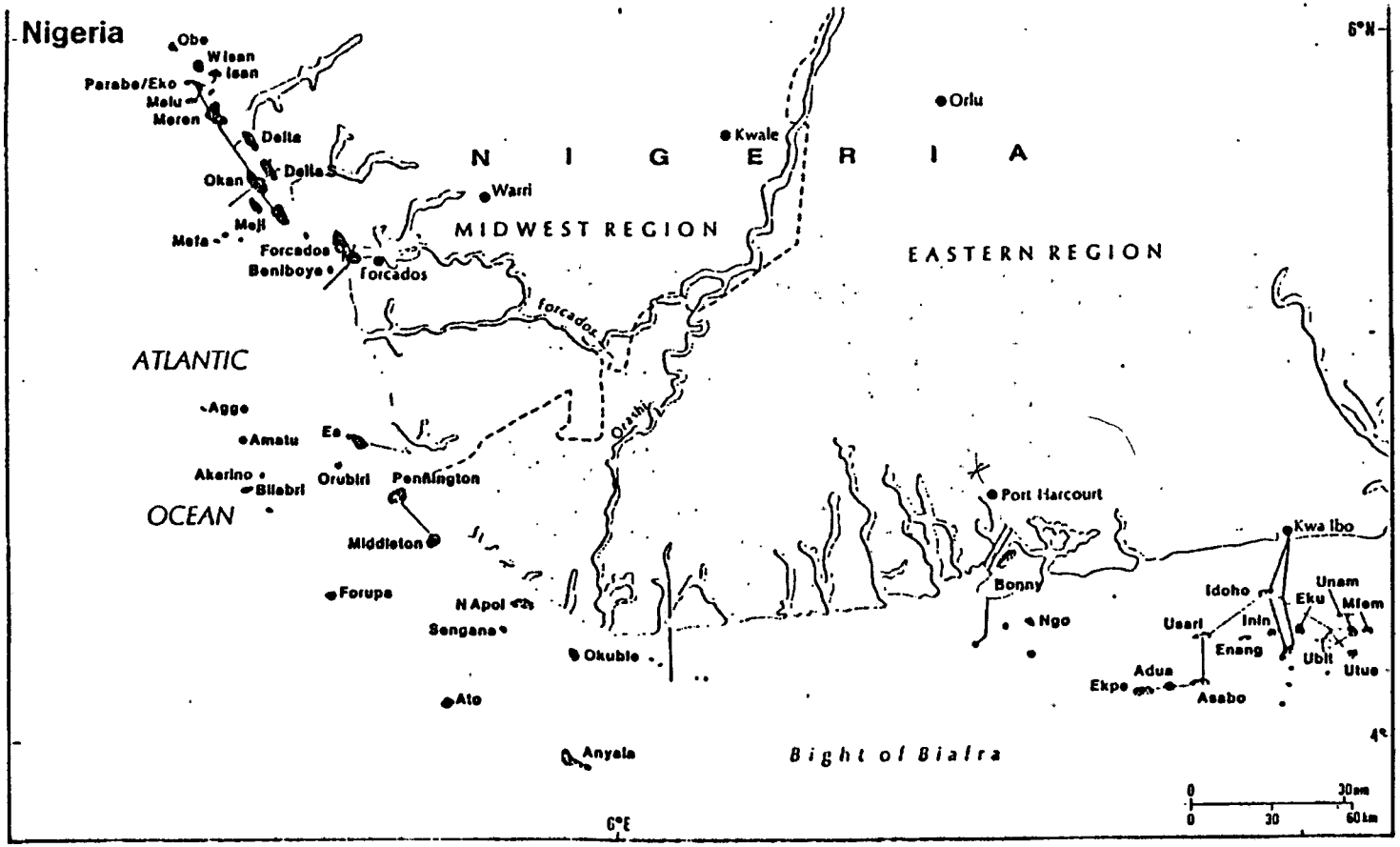
Source: Nigeria Oil Industry Statistical Bulletin 1987.

1.6.1 Petroleum Production

In 1986, a total of 535,929,446 barrels or 76,572,179 metric tons of crude oil and 17,899,708.30 millon standard cubic metres (MSCM) of gas were produced from about 1,257 oil wells. (Source: The 1986 Annual Report of the Petroleum Inspectorate of the NNPC).

The Niger Delta is the main oil producing region in the country. There are many offshore oil fields in Nigeria. (See Map 2: Offshore Oil Activities in Nigeria). The crude produced is mainly sweet crude - Bonny Light, low in sulphur.

A total of 1,688,179,790 metric tons of crude oil and 356,002,208 MSCM of gas were produced in Nigeria between 1958 and 1987. See Table 4: Annual Production Summary, 1958 - 1987.



Map 2 Off-Shore Oil Activities in Nigeria

SOURCE: THE TIMES ATLAS OF THE OCEANS BY A.D COUPER

Table 4

Annual Oil and Gas Production Summary, 1958-1987

YEAR	Oil Production (Metric Ton)	Gas Production (MSCM)
1958	257,591	45,572
1959	562,344	139,871
1960	874,241	144,298
1961	2,306,968	309,915
1962	30080,932	486,522
1963	3,832,633	626,036
1964	6,040,952	1,028,947
1965	13,641,678	2,249,686
1966	20,929,005	2,907,325
1967	16,003,240	2,634,490
1968	7,127,083	1,462,107
1969	27,076,976	4,126,607
1970	54,349,845	8,039,143
1971	76,708,875	12,975,499
1972	95,207,661	17,121,661
1973	102,947,346	21,882,405
1974	117,821,970	27,170,426
1975	94,471,057	18,656,330
1976	108,482,550	21,275,992
1977	109,626,349	21,924,383
1978	99,648,481	21,306,618
1979	120,975,960	27,618,236
1980	108,334,524	24,885,262
1981	71,073,365	17,201,558
1982	67,350,706	14,829,276
1983	64,534,439	15,206,848
1984	72,615,479	16,250,993

1985	79,294,594	18,426,494
1986	76,572,179	17,899,708
1987	66,148,767	17,170,000
Sub-Total	1,688,197,790.00	356,002,208.00
Total	1,688,197,790.00	356,002,208.00

The 1987 oil production figure was converted to metric tons from barrels using the constant of 7.3 barrels = 1 metric ton.

Source: The 1986 Annual Report of The Petroleum Inspectorate of the NNPC.

A greater percentage of the crude oil produced is exported by vessels. The total crude oil exported during the period 1958 -1987 was 1,523,823,300, which included crude oil supplied to off-shore refineries for processing and re-imported into the country for domestic use. This amount is insignificant when compared to the total exports. The total crude oil exported during 1958-1987 represents 90.26% of the total production for the same period. Table 5 shows the Yearly Crude Oil Exports for 1958 - 1986.

Table 5

Yearly Crude Oil Exports 1958-1986

YEAR	QUANTITY (Metric Tons)
1958	248,926
1959	546,456
1960	860,279
1961	2,254,742
1962	3,374,949
1963	3,754,285
1964	5,876,224
1965	13,228,514
1966	19,160,777
1967	14,804,684
1968	7,140,893
1969	26,981,043
1970	52,649,968
1971	73,992,951
1972	87,616,344
1973	99,561,589
1974	109,254,215
1975	86,177,377
1976	101,168,784
1977	97,851,219
1978	92,355,755
1979	110,623,429
1980	90,117,158
1981	64,408,746
1982	54,475,285
1983	53,252,455
1984	61,264,683

1985		66,178,133
1986		64,723,711
1987		59,919,726
Sub Total		1,523,823,300.00
Total		1,523,823,300.00

Note: Total Exports Include Crude Oil Supplied to Off-Shore Refineries.
The 1987 Figure was converted from barrels to metric tons using the constant 7.3 = 1 metric ton.

Source: The 1986 Annual Report of The Petroleum Inspectorate of the NNPC.

In 1987, a total of 875,860 metric tons of petroleum products were transported by sea from Port Harcourt refinery and 680,182 metric tons from Warri refinery. In 1987, a total of 482,886,000 barrels of crude oil were produced and 437,414,000 barrels were exported by ship. (Source: Nigeria and Industry Statistical Bulletin 1987).

According to a report in the West Africa magazine (No. 3802 of 9-15 July 1990, p. 2070) Nigeria's crude oil production including condensates was estimated at 626.45 million barrels, for 1989 an 18.3% increase over 1988. Crude oil exports totalled 525.87 million barrels, an increase of 20.7%. Gas production in 1989 was estimated at 25.25 billion cubic metres, an increase of 23.7%.

Chapter 2

2.1 The Background of IMO

The International Maritime Organization (IMO), formerly called the Inter-Governmental Maritime Consultative Organi until 1982, was established by a convention adopted on 6 March 1948 by the United Nations Maritime Conference in Geneva in February 1948. The convention entered into force on 17 March 1958 and was inaugurated on 6 January 1959 when the Assembly held its first session.

The aims and activities of the organi as contained in Article 1 (a) of the convention are: "to provide machinery for co-operation among Governments in the field of governmental regulation and practices relating to technical matters of all kinds affecting shipping engaged in international trade; to encourage and facilitate the general adoption of the highest practicable standards in matters concerning the maritime safety, efficiency of navigation and prevention and control of marine pollution from ships".

The organi has 134 member states and two Associate members as of 2 February 1990. The structure of the organi consist of an Assembly, a Council and several Main Committees: the Maritime Safety Committee (MSC) having 10 Sub-committees, the Legal Committee, the Marine Environmental Protection Committee (MEPC), the Technical Co-operation Committee and the Facilitation Committee.

Some of IMO's work results in International Treaties commonly referred to as conventions which are developed by representatives of member Governments and adopted by a conference of Governments. A convention when ratified by sufficient number of Governments enters into force and becomes legally binding on the countries that have accepted it. If a "no more favourable treatment clause" is a provision in the convention, it becomes binding on international trading ships of all nations. The number of countries required for a convention to enter in force varies with conventions. In addition other work of IMO may result in Resolutions, Codes, Recommendations and Guidelines which usually are not legally binding on Governments, but are normally used by them in their national legislation. Some of the Recommendation are quasi-mandatory or mandatory depending on the wording of the Recommendation.

2.2 Major International Conventions Dealing With Marine Pollution for Which IMO is the Depository

The prevention of marine pollution from ships has of late grown stronger and stronger as environmental awareness is increasingly becoming important to political leaders all over the world. IMO has responded accordingly and has adopted the following international conventions dealing specifically with pollution of the oceans.

2.2.1 INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION OF THE SEA BY OIL 1954 (OILPOL 54)

This was the first International Convention to control marine pollution from ships. Sponsored by the United Kingdom Government, the International Conference on Pollution of the Sea by Oil was held in London, where it adopted OILPOL 54 on 12 May 1954. It entered into force on 26 July 1958. On the entry into force of the convention establishing IMO in 1958, the depository and secretariat functions relating to the Convention were transferred to the IMCO by the United Kingdom Government.

The convention addressed pollution resulting from routine operational discharges of oil from ships. It was amended by IMO in 1962, 1969 and 1971. The Amendment of 1971 never entered into force. The 1962 Amendment, adopted in April 1962, entered into force in May 1967 and the 1969 Amendment, adopted in October 1969, entered into force on 20 January 1978.

2.2.2 INTERNATIONAL CONVENTION RELATING TO INTERVENTION ON THE HIGH SEAS IN CASES OF OIL POLLUTION CASUALTIES 1969

This Convention was adopted by IMCO on 29 November 1969 after the "Torrey Canyon" disaster in 1967. It entered into force on 6 May 1975. It deals with the right of a coastal state to take action to prevent, mitigate or eliminate danger to its coastline or related interests from pollution by oil, following accidents involving ships outside her territorial waters. A Protocol adopted on 2 November 1973 that entered into force on 3 March 1983, added other hazardous substances, mainly chemicals, to the Convention.

2.2.3 INTERNATIONAL CONVENTION ON CIVIL LIABILITY FOR OIL POLLUTION DAMAGE 1969 (CLC)

This Convention, adopted on 29 November 1969, entered into force on 19 June 1975 and was also due to the "Torrey Canyon" disaster in 1967 off the English coast. The main objective of this Convention is to ensure that adequate compensation is available to persons who suffer from oil pollution by placing the liability for compensation upon the owner of the ship from which the oil escaped or was discharged.

There was a Protocol adopted on 9 November 1976 which included Special Drawing Rights (SDR) as a unit of account for the Convention. It entered into force on 8 April 1981.

Another Protocol substantially increasing compensation was adopted on 25 May 1984.

2.2.4 INTERNATIONAL CONVENTION FOR THE ESTABLISHMENT OF AN INTERNATIONAL FUND FOR COMPENSATION FOR OIL POLLUTION DAMAGE 1971 (FUND)

This Convention was adopted on 18 December 1971 and entered into force on 16 October 1978. The main purpose of this Convention is to provide for further compensation to victims of oil pollution . FUND is made up of contributions by oil importers and enables further compensation to be paid when the limits of compensation payable under the 1969 CLC Convention have been reached. The Civil Liability Convention of 1969 demands that the amount payable be limited. Hence the FUND Convention supplements the CLC Convention.

Since the 1971 Convention, there has been one Protocol adopted on 19 November 1976 and another adopted on 25 May 1984. The latter Protocol raises the compensation available, while the former Protocol of 1976 includes the Special Drawing Rights (SDR) as a unit of account.

2.2.5 CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES AND OTHER MATTER 1972 (LDC)

This Convention was adopted on 13 November 1972 at a Conference that was called by the United Kingdom Government. It entered into force on 30 August 1975; since then IMO has been responsible for the secretariat duties related to it.

The Convention prohibits the deliberate disposal at sea of wastes or other matter from vessels, aircraft, platforms etc., which is a further step towards the international control and prevention of marine pollution.

1978 Amendment (Incineration), adopted on 12 October 1978, entered into force on 11 March 1979; another 1978 Amendment (Disputes) was also adopted on 12 October 1978. The 1980 Amendment (List of Substance) was adopted on 24 September 1980 entered into force on 11 March 1981.

2.2.6 INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS 1973 AS MODIFIED BY ITS PROTOCOL OF 1978 (MARPOL 73/78)

This very important IMO international instrument for the prevention of pollution from ships was adopted on 2 November 1973 and its 1978 Protocol on 17 February 1978. Known both as MARPOL 73/78, they entered into force on 2 October 1983.

The Convention contains five Annexes (Annexes I to V), of which I, II and V have entered into force.

There have been 1984 and 1985 Amendments. The 1984 Amendment, adopted on 7 September 1984, entered into force on 6 January 1986 and the 1985 Amendment, adopted on 5 December 1985, entered into force on 6 April 1987.

MARPOL 73/78 contains measures designed to prevent and reduce accidental and operational pollution.

In addition to the above Conventions, IMO have adopted Codes and Recommendations which complement the requirements of the Convention. The IBC and IGC Codes are presently mandatory and others are as such not binding upon

nations, but states have actively used them in drafting national requirements.

2.3 Provisions for Control of Operational Pollution as Contained in OILPOL 54 and its Subsequent Amendment of 1962, 1969 and 1971

OILPOL 54 came as a result of increased oil pollution of coastlines, especially on oil tanker routes. Prior to OILPOL 54, cargo tanks were washed by water jets and the oily water mixtures of the wash water and ballast water were discharged into the sea without any restrictions.

OILPOL 54 was the first international attempt to reduce marine pollution from ships. The main aim of the Convention was to prohibit the discharge of oil or oily mixtures into the sea having an oil content of more than 100 parts per millon (ppm) within 50 miles from land and in prohibited zones - the Mediterranean sea, the Adriatic sea, the Gulf, the Red sea, the coast of Australia and Madagascar etc.. The limit is more-100 miles from land and it applies to all ships of 500 gross registered tons (grt). These mixtures that are discharged result from routine tanker operations and from engine room bilges.

OILPOL 54 had Amendments in 1962, 1969 and two in 1971. The 1962 and 1969 Amendments entered into force, the two in 1971 did not enter into force but were incorporated into the International Convention for the Prevention of Pollution from Ships 1973.

The 1962 Amendment extended the prohibited zones, by prohibiting the discharge of oily mixtures by new ships of 20,000 grt or more, by lowering the application of the Convention to tankers from 500 to 150 grt and, most

importantly, by contracting parties to undertake to promote the provision of facilities for the reception of oil residues and oily mixtures without causing undue delays to ships (Resolution 4 of the 1962 conference).

The lack of shore reception facilities and the shortcomings of OILPOL 54 led to the Amendment of 1969 which addressed these shortcomings. Some of these shortcomings were: the masters of ships of 20,000 grt or above were allowed to discharge oily mixtures if special circumstances made it neither reasonable nor practicable to retain them on board. The lack of shore reception facilities was assumed by masters as one of such special circumstances; and as such oily mixtures were discharged outside the prohibited zone almost without restriction. Within the prohibited zone discharges from vessels were permitted without regard to quantity provided the discharge did not exceed 100 ppm. Vessels other than tankers, the prohibition zones did not apply, but "as far as practicable from the nearest land" applied. There was no prohibition for ships other than tankers proceeding to ports not provided with reception facilities for residues and oily mixtures from ships. The discharge of oily mixtures containing lubricating oil from machinery bilges was permitted. The 1969 Amendment introduced the Load-on-Top procedure. In this system, dirty ballast and tank washing water is retained on board the ship. This allows for separation of oil and water. The water relatively free from oil is discharged to sea and the oil retained on board. In the loading port, oil cargo is loaded on top of the retained oil. This procedure is normally effected in the slop tank.

The 1969 Amendment limits the amounts of discharges for all ships, through a further limitation on the total quantity of oil which may be discharged from tankers on a ballast voyage and a limit on the rate of discharge.

The discharge criteria for OILPOL 54 as Amended in 1962 and 1969 are as follows:

(a) the discharge from a ship of 500 grt other than a tanker, oil or oily mixture shall be prohibited except when the following conditions are all satisfied

(i) the ship is proceeding en route;

(ii) the instantaneous rate of discharge of oil content does not exceed 60 litres per mile;

(iii) the oil content of the discharge is less than 100 ppm;

(iv) the discharge is made as far as practicable from land.

(b) the discharge from a tanker of 150 grt, oil or oily mixture shall be prohibited except when the following conditions are satisfied:

(i) the tanker is proceeding en route;

(ii) the instantaneous rate of discharge of oil content does not exceed 60 litres per mile;

(iii) the total quantity of oil discharged on a ballast voyage does not exceed 1/15,000 of the total cargo-carried;

(iv) the tanker is more than 50 miles from the nearest land.

(c) the provisions of sub-paragraph (b) of this Article shall not apply to:

(i) the discharge of ballast from a cargo tank which, since the cargo was last carried therein, has been so cleaned that any effluent therefrom, if it were discharged from a stationary tanker into

clean calm water on a clear day, would produce no visible traces of oil on the surface of the water; or

(ii) the discharge of oil or oily mixture from machinery space bilges, which shall be governed by the provisions of sub-paragraph (a) of this Article.

2.3.1 PROVISION OF RECEPTION FACILITIES AS CONTAINED IN OILPOL 54 AND ITS AMENDMENTS OF 1962 AND 1969

(1) The convention contains a requirement for provisions of reception facilities in Article VIII. It states that each contracting government shall take all appropriate steps to promote the provision of facilities as follows:

(a) according to the needs of ships using them, ports shall be provided with facilities adequate for the reception, without causing undue delay to ships, of such residues and oily mixtures as would remain for disposal from ships other than tankers if the bulk of the water had been separated from the mixtures;

(b) oil loading terminals shall be provided with facilities adequate for the reception of such residues and oily mixtures as would similarly remain for disposal by tankers;

(c) ship repair ports shall be provided with facilities adequate for the reception of such residues and oily mixtures as would similarly remain for disposal by all ships entering for repairs.

(2) Each Contracting Government shall determine which are the ports and oil loading terminals in its

territories suitable for the purposes of sub-paragraphs (a), (b) and (c) of paragraph (1) of this Article.

(3) As regards paragraph (1) of this Article, each Contracting Government shall report to the Organi, for transmission to the Contracting Government concerned, all cases where the facilities are alleged to be inadequate.

2.4 Requirements for Control of Operational Pollution as Contained in MARPOL 73

In 1969, it became apparent that OILPOL 54 and its subsequent Amendments were no longer adequate to fight prevention of marine pollution by ships. The growth of size of tankers, the substantial increase of transportation of oil, and chemicals by sea and increasing concern about the environment by all and sundry necessitated the need for a new convention.

The result was the International Convention for the Prevention of Pollution from Ships, 1973. It was adopted on 2 November 1973. The Convention which is the most comprehensive covering maritime pollution deals with all marine pollution except the disposal of land-generated waste into the sea by dumping which is covered by LDC, 1972. The Instrument is made up of Articles and Annexes. The Articles deal mostly with administrative parts of the Convention i.e. application, entry into force, amendments, violation, signature, ratification, acceptance, approval and accession amongst others.

The Annexes contain the technical measures. They are contained in five Annexes which are as follows:

Annex I Oil.

Annex	II	Noxious liquid substances carried in bulk (e.g chemical).
Annex	III	Harmful substances carried in packages (e.g tanks and containers).
Annex IV		Sewage.
Annex V		Garbage.

The summary of the Annexes are as follows:

2.4.1 ANNEX I: PREVENTION OF POLLUTION BY OIL

The oil discharge criteria as contained in 1962 Amendment to the OILPOL 54 were carried forward but the total amount of oil which can be discharged into the sea during a ballast voyage was reduced to 1/30,000 of the amount of cargo carried from 1/15,000 of the capacity, and this applied to persistent black oil and non-persistent white oil. Regarding discharges from machinery spaces of all vessels, the ship must be en route, more than 12 miles from land and the oil content must be less than 100 ppm.

Special areas: The Black sea, Baltic sea, Red sea, Mediterranean sea and Gulf areas were introduce in the 1973 Convention, oil discharges within them being completely prohibited with minor and well-defined exceptions. These special areas are almost surrounded by land and were very vulnerable to pollution by oil.

New oil tankers, having building contracts placed after 31 December 1975 of 70,000 grt and above, must have segregated ballast tanks (SBT) large enough to provide adequate operating draught without recourse to carry ballast water in cargo oil tanks.

Oil tankers must be constructed and equipped in order to operate the Load-on-Top system and to retain oily residues on board for discharge to shore reception facility.

An International Oil Pollution Prevention (IOPP) certificate must be issued to tankers of 150 grt and above, after survey. The duration of the surrey is not to be more than five years.

Machinery space bilges, for all ships of 400 grt and above must be equipped with oily-water separating equipment or a filtering system for discharges of the oily water bilge. A sludge tank must be provided for oily residues from separators and purifiers.

Limitation of size of tanks as contained in the 1971 Amendments of OILPOL 54 was retained, the size of the tank depending on factors like fitting of double bottoms, arrangement of tanks etc.

New sub-division and damage stability requirements ensure that in any loaded condition, the tankers can survive after damage by collision or grounding.

Tankers and other ships must carry and maintain an Oil Record Book for recording all transfers and operations involving oil. The Book is to be signed and retained on board for inspection.

Contracting Parties to the Convention must ensure that adequate reception facilities are provided for oily mixtures and residues at loading terminals, repair ports and ports.

2.4.2 ANNEX II: CONTROL OF POLLUTION BY NOXIOUS LIQUID SUBSTANCES IN BULK

Annex II contains provisions for discharge criteria and measures for the control of pollution by noxious liquid substances carried in bulk.

These substances are divided into four categories A to D, depending on the hazard they pose to marine resources, human health or amenities, Category A being the most hazardous and D being the least.

They are requirements for the discharge of residues only into reception facilities unless certain conditions are met -which varies with the category of the substance. No discharge is allowed 12 miles from the nearest land, in water less than 25 metres in depth, and the discharge must be under the water line. Tougher discharge measures are applied to the Baltic and Black Sea areas.

A Cargo Record Book is required to record all operations involving substances of Annex II and it is open for inspection by the authorities of any Party to the Convention.

2.4.3 ANNEX III: PREVENTION OF POLLUTION BY HARMFUL SUBSTANCES CARRIED IN PACKAGED FORM OR IN FREIGHT CONTAINERS, PORTABLE TANKS OR ROAD AND RAIL WAGONS

Annex III applies to all ships carrying harmful substances in packaged forms or roads and rail tank wagons. There are regulations for packaging, marking and labelling, documentation, stowage, quantity limitations, and exceptions and notification for preventing or minimizing pollution by harmful substances. To help implement these requirements, the International Maritime Dangerous Goods Code (IMDG Code) has been revised to cover pollution aspects.

2.4.4 ANNEX IV: THE PREVENTION OF POLLUTION BY SEWAGE FROM SHIPS

Annex IV contains regulations which do not allow ships to discharge sewage within 4 miles from the nearest land unless they have in operation an approved treatment plant. Sewage must be comminuted and disinfected before discharge between 4 and 12 miles from land.

Annex IV contains regulations for surveys, issue of certificates, discharge of sewage, exception,reception facilities and standard discharge connection amongst others.

2.4.5 ANNEX V: PREVENTION OF POLLUTION BY GARBAGE FROM SHIPS

Annex V contains regulations for disposal of garbage within and outside special area, exceptions and reception facilities amongst others. The Annex prohibits the disposal of plastics anywhere into the sea as plastics are non-degradable.

2.5 The Protocol of 1978

The Protocol of 1978 of the International Convention for the Prevention of Pollution from Ships 1973 was adopted on 17 February 1978 by the International Conference on Tanker Safety and Pollution Prevention. Also adopted at the same conference was the 1978 Protocol of Safety of Life at Sea (SOLAS) 1974. The conference decided that the SOLAS Protocol should be a separate instrument and should enter into force after the entry into force of the parent convention.

Regarding the MARPOL 73 Convention, the conference decided that the Protocol and the parent Convention

should be regarded as a single Instrument and called MARPOL 73/78.

The MARPOL 73 Convention could not enter into force due to technical problems associated with Annex II. The changes by the conference were mainly to Annex I; hence it was decided to adopt the agreed changes and at the same time to allow Contracting States to defer implementation of Annex II for three years after the date of entry into force of the Protocol. MARPOL 73/78 entered into force on 2 October 1983. It was expected that the technical problems of Annex II would be solved by that date (2 October 1986).

The changes strengthened the provisions of Annex I. The requirements intended to further prevent operational discharges by ships and they are as follows:

Segregated ballast tanks (SBT) are required on all new tankers of 20,000 grt and above - before the Protocol SBT were only required on new tankers of 70,000 grt and above. The SBT are to be **Protectively Located** - that is they must be located in such a way that they will help protect the cargo tanks in the event of a collision or grounding.

Crude oil washing (COW) under the Protocol is accepted as an alternative to SBT on existing tankers and it is an additional requirement on new tankers. COW uses oil, the cargo, instead of water for washing the tanks, which is more effective than water. Oily water mixtures generation in the process of using water to wash the tanks is virtually eliminated as a small amount of water is used for the final rinse of the tank.

Drainage and discharge arrangements were amended to improve stripping systems.

As for existing crude oil tankers, they are permitted for a period of between two to four years after the entry into

force of MARPOL 73/78 to use Clean Ballast Tanks (CBT), which is a system whereby certain tanks are dedicated solely to the carriage of ballast water. CBT uses the existing pumping and piping system and hence is cheaper than a full SBT system. The period of grace has since expired as 2 October 1987 was the date on which SBT became mandatory.

2.6 1984 Amendment

MARPOL 73/78 was amended in 1984. The Amendment was adopted on 7 September 1984 and entered into force on 7 January 1986. The Amendment concerns Annex I of the Convention. Designed to make the implementation easier and more effective, the Amendment introduced requirements for special equipment and procedures to prevent oily water being discharged into the sea in special areas. The discharge cannot be effected if the oil content exceeds 15 ppm (Regulation 10).

The carriage of oil in the fore peak tank is banned (Regulation 14).

The discharge of oily wastes from drilling rigs and other platforms is banned when the oil content exceeds 100 ppm (Regulation 21).

2.7 1985 Amendment

On 5 December 1985 the Amendment was adopted and it entered into force on 6 April 1987. The Amendment concerns Annex II. The Annex was updated, taking into account technological developments since when it was adopted in 1973. Also, the Amendment tries to simplify the implementation of the Annex, especially to reduce the need for reception facilities for chemical wastes and to improve cargo tank stripping efficiencies. It contain a number of specific requirements to ensure that both new and existing chemical tankers reduce the

amount of residues to be disposed of. The Amendment also made the Bulk Chemical Code and International Bulk Chemical Code mandatory.

Restrictions on the carriage of category B and C substances have been introduced (Regulation 5A).

A scheme for the mandatory pre-washing of cargo tanks has been introduced (Regulation 8).

A new regulation dealing with oil-like noxious liquid substance has been included (Regulation 14). Also the list of noxious and other substances appended to the Annex and the form of the Cargo Record Book was revised.

The total quantities of B and C substances that can be discharged into the sea were reduced.

The Amendment provided for improved possibilities for executing effective Port State Control (PSC), thus ensuring full compliance with the provisions of the Annex.

2.8 1987 Amendment

The 1987 Amendment adopted in December of 1987 that came into force on 1 April 1989 under "tacit acceptance" makes the Gulf if Aden a special area thus giving it greater protection against discharges of oil.

2.9 Provision of Reception Facilities as Contained in MARPOL' 73/78

MARPOL 73/78 like OILPOL 54/62/69 stipulates that waste should be retained on board for eventual discharge

into shore reception facilities without causing undue delay to vessels using them. In addition, MARPOL 73/78 contains more positive and specific provisions and further strengthens the requirements for the provision of reception facilities as contained in OILPOL 54/62/69.

Reception facilities are dealt with in the following regulations of the Annexes of MARPOL 73/78:

Annex I:	Regulation 10(7) and 12 for oil waste.
Annex II:	Regulation 7 for chemical waste.
Annex IV:	Regulation 10 for sewage waste.
Annex V:	Regulation 7 for garbage waste.

In the provisions it states that reception facilities for waste shall be made available not later than one year (2 October 1984) from the entry into force of the convention - MARPOL 73/78 entered into force on 2 October 1983.

The provision of adequate reception facilities in OILPOL 54/62/69 was not mandatory for ratifying the Convention and as such the building and establishing of reception facilities was not vigorously pursued by Contracting Parties to OILPOL 54/62/69.

MARPOL 73/78 was more specific and required each State to provide adequate reception facilities at ports, repair ports and oil terminals to meet the needs of ships using them. The Convention designated special areas - the Baltic, Mediterranean, Black and Red seas and also the Gulf area and the Gulf of Aden where the discharge of waste is prohibited unless to reception facilities.

Chapter 3

3. The Provision of Adequate Reception Facilities in Ports

3.1 Introduction

The provision of adequate reception facilities has been a major problem for shipping in ports and oil terminals, especially in developing countries. The implementation of MARPOL 73/78 cannot be wholly successful without the provision of adequate reception facilities for ships to discharge oily, chemical,sewage and garbage wastes.

MARPOL 73/78 stipulates that each Contracting State undertakes to ensure the provision of facilities for waste without causing undue delay to ships using them.

The provisions of adequate reception facilities is capital intensive. The technology required to deal with the complexities of "adequate" not "over build" or "inadequate" design and operation of the facilities is lacking as the funds required.

In 1976, the Marine Environment Protection Committee (MEPC) which is one of the main committees of IMO, prepared the Guideline on the Provision of Adequate Reception in Ports- Part I for Oily Wastes. Since then the following Guidelines have been prepared and published:

Part II Residues and Mixtures Containing Noxious Liquid Substances.

Part III Sewage.

Part IV Garbage

These guidelines contain amongst other things estimates of quantities of waste expected to be received, measures for minimizing the need for, and capacity of reception facilities and technologies for the separation process.

The following projects, co-ordinated through MEPC of IMO, on reception facilities were undertaken to assist governments, especially developing countries, to identify the requirements for reception facilities in ports and oil terminals.

PROJECT TITLE	SPONSORED BY	DATES
Symposium on Prevention of Marine Pollution from Ships Section VII - Reception Facilities in Ports.	IMO/Government of Mexico/UNEP.	22-31 March '76.
Feasibility Study on Reception Facility for Selected Ports in a Special Area - Mediterranean.	IMO/UNEP.	1977/78.
Advisory Services concerning the Development of Reception Facilities for Selected Ports in a Special Area - Mediterranean.	IMO/UNDP.	1981-84.

Regional Organization for the Protection of the Marine Environment (ROMPE), Kuwait: Reception Facilities meeting.	ROPME/UNEP.	9-11 October 1982.
Fresh Water Ballast Study.	IMO/Arab Development Institute, Tripoli, Libya.	June-December 1979.
Phase II Study on Fresh Water Tanker Ballast.	IMO/Libyan National Academy for Scientific Research.	1981.
International Seminar on Fresh Water Tanker Ballasting.	Libyan National Academy for Scientific Research.	31 May-1 June 1983.
IMO/UNDP International Seminar on Reception Facilities for Waste.	IMO/UNDP.	30-31 August 1984.
International Symposium on Reception Facilities for Noxious Liquid Substances.	IMO.	13-15 May 1987.
Recycling of Oily Waste in the Marine Industry by K.J.Kenton and Jan Hedberg.	IMO/SIDA Programme for the Protection of the Marine Environment and INTERTANKO.	November 1988.

The above projects not withstanding, the reports emanating from ship owners and operators are that there are acute shortages of reception facilities in most ports, especially medium and small ports throughout the world. (Recycling of Oily Waste in the Marine Industry, Kenton and Hedberg).

There were no reception facilities in any port or oil terminal in Nigeria as of 1 July 1990. The Government of the Federal Republic of Nigeria, although it had ratified OILPOL 54/62/69, was yet to ratify MARPOL 73/78 as at 1 July 1990.

3.2 Summary of the Guidelines on the Provision of Adequate Reception Facilities in Ports (Part 1 Oily Waste)

The summary of the guidelines outlined below is concerned with the Nigerian situation. The oily waste guidelines contain provisions for determining the volumes of oily wastes generated on different types of ships and the capacity of reception facilities required to handle these volumes.

They were developed using Regulations 9,10 and 12 of Annex I of MARPOL. A set of parameters were used to arrive at a system for evaluating the adequacy of reception facilities to meet the needs of ships using them without causing undue delay to them as contained in Annex I.

Quantities of oily wastes are estimated on a per ship basis which would be required to be retained on board and discharged to reception facilities within the constrain's of the following parameters:

(a) origin of oily waste or residue;

(b) ship type and design;

(c) ship operating route; and

(d) the various types of ports and terminals referred to in Regulation 12.

The following types of oily mixtures to be discharged as wastes were considered in the guidelines:

(i) dirty ballast water;

(ii) tank washings;

(iii) oily bilge water; and

(iv) separator sludge and other oily sludge.

These guidelines provide estimates of the average quantities of oily waste generated on board - crude oil tankers, product tankers (black and white), dry cargo ships and combination carries. Accounts have been kept for these vessels operating on long voyages and short voyages (less than 72 hours or 1,200 miles), as well as for ships preparing to enter ship repair yards or special tank cleaning facilities. The total quantity of oily waste supposed to be discharged into the reception facilities of any port can be calculated using the per-ship estimate of oily waste and the traffic density of ship types expected by the port, to arrive at the estimated capacity and adequacy of the reception facilities, not forgetting that each port has its own characteristics. It is also assumed in the calculation that ships requiring the reception facilities are operated in a responsible manner, hence achieving reduction of oily wastes using the various measures contained in Annex I of the Convention.

A definition of the term "adequacy" is also important for the calculation. It can, in general, be defined as follows:

(a) the reception facilities shall have the required capacity of tankage and storage as may be required by ships using them;

(b) the treatment process or technology and the time required to produce a satisfactory effluent or residue for disposal must be reasonable compared to requirements;

(c) a pipeline interface between the ship and the terminal to permit a timely discharge of oily waste to reception facilities or storage tanks should be available;

(d) both the ship's line and the facility pipeline are to be fitted with standard connections specified in Regulation 19 of Annex I of MARPOL. This is to enable pipes for reception facilities to be connected with the ship's discharge pipeline for residues from machinery space bilges.

3.3 Estimates of Quantities of Residues and Oily Mixtures Required to be Received

In estimating the quantities required to be handled by reception facilities, it is assumed that:

(i) The ship should be operated in such a responsible manner that the arrival waste is reduced as far as possible in line with the relevant provisions of the Convention.

(ii) The estimates used are world averages and will vary from port to port.

(iii) Since the publication of the IMO Guidelines in 1976, many tanker ships have been constructed or modified to comply with MARPOL 73/78 that came into force on 2 October 1983. Hence segregated ballast tanks and crude oil washing are widely used, thus reducing further the quantities of dirty ballast water available for discharge to shore based reception facilities.

3.3.1 Crude Oil Loading Terminal Outside a Special Area (Nigeria)

Regarding terminals outside a special area like Nigeria receiving tankers of which some might have completed a ballast voyage of not more than 72 hours or not more than 1,200 nautical miles:

(a) For the tankers that have completed a ballast voyage of not more than 72 hours and not more than 1,200 nautical miles: 30% of vessel dead weight tonnage (dwt) should be dirty ballast.

(b) For tankers completing a ballast voyage of more than 72 hours or 1,200 nautical miles: no facilities for cargo residues or oily mixtures are required (if the weather conditions can prevent the effective separation of the oily water during the ballast voyage, allowance has to be made for reception facilities of substantial quantities of dirty ballast water).

3.3.1.1 GENERAL OBSERVATIONS

(i) Terminals receiving a mix of the above tanker categories have to consider the likely mix of categories in the assessment of the size and design of the facilities.

(ii) The amount of dirty ballast aboard a tanker on arrival in the appropriate categories will vary from ship to ship and also according to weather conditions. In general, the total ballast weight on average will be greater than 30% of dwt. However, in recommending a basic figure of 30% of dwt for the average quantity required to be discharged, allowance has been made for the large number of crude oil carriers which are presently provided with permanent segregated ballast tankage ranging from 10% to 18% of dwt. The amount of dirty ballast expected will be greatly reduced in the future as many tankers use SBT, LOT,COW etc.

(iii) Some tankers arriving with dirty ballast may also occasionally have oily wash water from tank cleaning carried out en route. This wash water is small when compared with the quantity of dirty ballast, it will probably be less than 5%. The 30% of dwt for the average quantities to be received may be considered as an adequate overall recommendation.

(iv) Reception facilities at crude oil loading terminals need not accept oil residues due to tank cleaning operations as the Load on Top system will take care of the residue. Hence only the receipt of dirty ballast and wash water need to be considered. The bulk of the dirty ballast and wash water, if any, will have an oil content which can be as low as 50 ppm. Floating on the dirty ballast in the ship will be a layer of cargo residue and this will be entrained with the ballast towards the end of the discharge from each ballast tank. The amount of oil so entrained may be between 0,4% and 1% of the volume of the dirty ballast on any tank.

3.3.2 Product Tanker Terminals Loading an Average Quantity of More than 1,000 Metric Tons Per Day

3.3.2.1 PRODUCT TANKERS (BLACK AND WHITE)

(a) Due to the nature of the product tanker trade, it is not generally possible to load a cargo of products on top of residues from the previous cargo or wash water and all product loading terminals will need a degree of ballast and residue shore reception.

(b) In most cases, a product tanker will arrive on a ballast voyage in one or two conditions. It may not have carried out tank cleaning and thus the average arrival dirty ballast will be 30% of dwt. On the other hand, if the product tanker has had sufficient time to carry out tank washing, she may arrive with clean ballast which need not be discharged to shore facilities. But she will have a slop tank containing some water. The majority of the wash water may have been decanted with a mixture of the previous cargo products floating on top. The amount of cargo residues so floating in the slop tank may be in the order of 0.2% of the total cargo capacity of the ship.

(c) All dirty ballast water, wash water and cargo residues will be required to be discharged to the reception facilities if no other means are provided for disposal or treatment.

(d) A product tanker may discharge a cargo at a terminal and be required to load a cargo of different product parcels at the same terminal. In these circumstances, it may be necessary to clean some or all of the cargo

tanks either alongside or outside the terminal area before loading the new cargo. Reception facilities will thus be required to accept the tank washings pumped directly from the tanker as it cleans.

3.3.2.2 GENERAL OBSERVATION

The recommended basic figure of 30% of dwt as the amount of dirty ballast from product tankers to be discharged ashore is an average figure. The quantity of ballast during a ballast voyage will be dependent upon the length of the voyage and geographic and climatic considerations and varies from ship to ship. As such, for a ship that had time and good weather conditions, the arrival ballast to be discharged ashore will be less than 30% of dwt. In a longer and more exposed voyage where more ballast is required that can be cleaned during the voyage the arrival dirty ballast is also pegged at 30% dwt.

3.3.3 All Ports Having Ship Repair Yards or Tank Cleaning Facilities

The following are estimated quantities of oily mixtures and residues which such ports may be required to handle.

3.3.3.1 CRUDE OIL TANKERS

(i) Up to 30% dwt as dirty ballast.

(ii) A variable amount of wash water from tank washing. This is estimated at 4-8% of dwt.

(iii) About 1% of dwt as oily residue separated from ballast water during the voyage.

(iv) Oily solids accumulated in cargo tanks vary considerably and are estimated at 0.01% to 0.1% of dwt per voyage.

(v) A tanker having its cargo tank cleaned during the voyage will accumulate oily residues in the slop tanks and clean ballast water. The contents of the slop tank to be discharged to the shore facility, may likely be waxy, viscous and emulsified in nature. The slop tank would have to be cleaned and the washings passed to the reception facilities.

3.3.3.2 BLACK PRODUCT TANKERS

Same as for crude oil carriers except that the oily sludge is estimated to be 0.5% of dwt.

3.3.3.3 WHITE PRODUCT TANKERS

(i) Same as for crude oil tanker except that the white product residue may not exceed 0.2% of dwt and that there will usually be substantively smaller quantities of wash water.

(ii) Whereas crude oil and black product liquid residues, once de-watered, may be disposed of as fuel or re-refining as may be found locally appropriate, disposal avenues for white oil residues may be more restricted because of their widely varying components and volatility.

3.3.3.4 ALL OTHER SHIPS

Means should be provided for the acceptance of oily ballast water, wash water and residues which result from the cleaning of bunker tanks and sludge tanks. Quantities involved are dependent on a number of factors and can only be assessed locally.

3.3.4 All Ports and Terminals which Handle Ships with Tanks for Sludge, the On-board Processing of Fuel and Lubricating Oil etc

(i) A diesel propelled ship using residual fuel oil generally accumulates a sludge from the fuel oil separators. The quantity of this separated sludge is estimated at 1% of fuel oil consumed. In broad terms, a 10,000 SHP ship at sea under power may accumulate such sludge at the rate of about 0.25 metric tons/day. The accumulation rate would be roughly *pro rata* to the ship's horsepower.

(ii) Ships are required to be provided with sludge holding tanks of sufficient capacity in conformance with Regulation 17 of Annex I. Normally, ocean going diesel propelled ships with sludge holding tanks of between 5 and 10 metric tons should provide for 15 to 25 days of steaming without having to empty the sludge tanks. All ports and terminals receiving these ships should provide means of relieving any such ships promptly up to at least 10 metric tons of such sludge.

(iii) Ports and terminals should estimate the proportion of ships arriving with diesel propulsion using residual fuel, these ships on a world wide basis, represent a very high proportion of total ocean-going shipping.

3.3.5 All Ports in Respect of Oily Bilge and other Residues

(a) Bilge water accumulation at sea varies widely and depends upon the type of machinery, age of ship and standard of housekeeping aboard. Figures ranging from 1 to 15 metric tons/day for ocean tonnage and from 0.1 to 3.0 metric tons/day for coastal tonnage have been quoted as typical for well-run vessels. The rate of bilge water accumulation in port is likely to be substantially less than when the machinery is under power at sea.

(b) All ports will need some facilities for the discharge of oily bilge water. Ports handling ocean tonnage should be able to accept up to 100 metric tons of bilge water at any one time. Proportionately smaller facilities will be needed at ports serving coastal vessels.

(c) Subject to the provisions of Regulation 9(4) of Annex I, ships equipped with oily-water separating equipment in accordance with Regulation 16(7) of Annex I will have a reduced quantity of effluent to be discharged ashore.

(d) There is also a need for facilities - to receive dirty ballast water from bunker fuel tanks. Although the Convention prohibits "new" ships over 4,000 grt other

Chapter 4

The Nigerian Ports, Terminals, Repair Yards and Maritime Traffic

4.1 The Growth of the Port Industry in Nigeria

The history of port development dates back to the middle of the 19th century, when attempts were made to open up the entrance to the Lagos lagoon to ocean going vessels. There was considerable littoral drift along this coast, and the constantly shifting channels in the bar at the entrance made entry very difficult.

In 1906, dredgers started work at the bar and the construction of the first length of the East Mole began.

In February 1, 1914 the first mail-steamer s/s Akoko entered Lagos Harbour. Two months later a regular service began to operate, the vessels berthing at the customs Wharf on Lagos Island.

In 1913, a decision was taken to develop Apapa Port, Lagos and in 1921 construction began for the first four deep-water berths of 548.64 metres. In 1948, an additional 762 metres was constructed.

Also in 1913, Port Harcourt Port was opened to shipping. In 1927, the Port had four berths of 585.22 metres.

In 1954, the Ports Act was promulgated and on April 1, 1955 Nigerian Ports Authority (NPA) commenced full operations and taking responsibilities in all matters relating to port development,providing facilities for cargo handling, and maintaining safe approaches to ports by providing dredging, pilotage, lighthouses, buoys and other navigational aids in all Nigerian ports. Before 1955 eight Government agencies were responsible, e.g the handling of cargo at the Lagos and Port Harcourt quays was the responsibility of the Nigerian Railway Department, the Marine Department was responsible for the maintenance of the harbour channel and the berthing of vessels, while a Port Engineer in the Public Works Department was in charge of the maintenance of the quays etc.

Between 1955-1966, six berths of 943 metres were added to Lagos Port, while Port Harcourt had an addition of four berths of 506 metres.

The Nigerian Civil War of 1967-1970 resulted in the closure of Port Harcourt to foreign traffic. Lagos was the only port in operation, hence necessitating the Federal Government of Nigeria to acquire through the NPA the ports of Warri, Burutu and Calabar previously operated and owned by private entrepreneurs.

The Nigerian Civil War came to an end in 1970. Massive imports for reconstruction, rehabilitation of the war-torn economy and the new found wealth in oil - (the oil boom days) resulted in port congestion between 1970 and 1975. The congestion was of two dimensions: cargo congestion and ship congestion. Inadequate facilities and bureaucracy in customs procedures were the main reasons for the cargo congestion. The ship congestion was mainly due to an increase in Government revenue from oil, the price of oil having risen astronomically thus increasing the purchasing power of all and sundry. The demand for foreign goods went up and there was an over-importation of cement - 20 million tonnes to be delivered within a period of twelve months. In the middle of 1975, 455 ships

were awaiting berthing places; 300 of them were carrying bags of cement.

The port congestion became a turning point in the development of the ports. A lot of money was allocated to the development of ports. In 1977, Tin Can Island Port in Lagos was commissioned. Two years later, the new Warri and new Calabar Ports were completed.

In 1982 the new Sapele Port was completed. It is presently used by the Nigerian Navy. The five ports controlled by the NPA have the capacity to handle over 25 million tonnes of cargo annually.

As the ports were completed, the price of oil collapsed and the economy nose-dived. It has yet to recover, thus resulting in under-utilization of the port facilities.

4.2 Ports and Oil Terminals

There are five ports under the control of the Nigeria Port Authority and they are as follows:

Apapa Port Complex;

Tin Can Island Port;

Delta Port Complex;

Rivers Port Complex;

Calabar Port Complex.

4.3 Apapa Port Complex

The Apapa Port Complex used to be called the Lagos Port Complex until the Tin Can Island Port in Lagos was built. The Apapa Port Complex is the largest and main port of Nigeria. It is made up of Apapa Quays, Third Apapa Wharf Extension, Fish Wharf, Apapa Dockyard, Apapa Petroleum Wharf, Bulk Vegetable Oil Wharf, Ijora Wharf, Lily Pond Inland Container Depot at Ijora and Atlas Cove Tanker Jetty.

4.3.1 Apapa Quays

The Apapa Quays, excluding the Third Apapa Wharf Extension, have a total quay length of 2,459 metres and are capable of handling up to twenty loading and discharging vessels at a time. The depth of water at the main berths ranges from 8.23 to 9.50 metres.

4.3.2 Third Apapa Wharf Extension

The Third Apapa Wharf Extension has a total quay length of 1,600 metres with a maximum draught of 10.5 metres. It is capable of accommodating four to six container ships and three conventional cargo or Ro-Ro vessels. It has four finger jetties for service crafts and tugs at the same time.

4.3.3 Ship Repair

The NPA has a dockyard primarily built for the maintenance of the Authority's own fleet, but also provides slipway facilities to commercial interests for small crafts.

4.3.4 Bulk Vegetable Oil Wharf

The wharf is a 50-metre T-shaped jetty carried by two dolphins which can be used by vessels of up to 152 metres in length and 7.92 metres in draught. Also, the jetty could be used to discharge petroleum products. There are also two privately owned tank farms for storage of bulk vegetable oil. The tanks are connected by a pipeline to the quays for direct loading of vessels.

4.3.5 Apapa Petroleum Wharves

There are terminals for ocean going oil tankers discharging and loading refined petroleum products that are also used by coastal oil tankers engaged in the distribution of these products. The wharves have direct pipelines connecting the tank installations of various oil companies to the jetty to facilitate handling of the products.

4.3.6 Atlas Cove Oil Terminal

The Atlas Cove Tanker Jetty commissioned for operations in 1981 was jointly financed by the NPA and NNPC.

Berth 1 is 70 metres long and 12 metres wide capable of berthing a 35,000 dwt ocean going vessel. Berth 2 is 35 metres long and 14 metres wide, capable of berthing a 5,000 dwt coastal vessel.

The depot has eleven storage tanks that can hold up to 0.1 million tonnes of products at a time and is expected to handle a total of 1.1 million tonnes of products annually.

The depot is a link to the oil pipeline network criss-crossing the whole nation. Products can be received or loaded from the jetty.

4.4 Tin Can Island Port

The Tin Can Island Port was commissioned on 14 October 1977 to supplement Apapa Port, which was facing a tremendous influx of Lagos bound cargo.

The port has a quay length 2,500 metres which consists of seven break-bulk general cargo berths, two Ro-Ro berths and one berth for bulk cargo together with other ancillary facilities. It is capable of accommodating up to sixteen vessels at a time having a draught of 9.50 metres. It is designed to handle three million tonnes of cargo per annum.

4.5 DELTA PORT COMPLEX

The Delta Port Complex is made up of Warri, Koko, Sapele, Aladja Steel Jetty, Warri Refinery Jetty and the crude oil terminals of Escravos, Forcados and Pennington.

The ports of Warri, Koko and the old port of Sapele are operated by the NPA while the Aladja Steel Jetty is owned by the Delta Steel Company and the Warri Refinery Jetty by the NNPC. The NPA keeps surveillance of the private jetties in the Delta area.

The Warri Port is about 109 kilometers from Escravos Bar which is the main gateway to all Delta Ports.

4.5.1 Warri Port

The old port of Warri has a total quay length of 876 metres having eight berths made up of four main berths, three canal berths and one customs Jetty. Associated with this port is the Ogunnu Wharf.

4.5.1.1 The New Port of Warri

The new port built adjacent to the existing facilities was commissioned for operation in 1979. It has six main berths including one Ro-Ro berth. The total quay length of 1,600 metres can accommodate up nine cargo vessels and other services crafts.

Anchorage facilities are available at Benner and Dodo Islands in addition to six mooring berths.

4.5.1.2 Ship Repairs and Bulk Oil Installation

There is a slipway capable of taking vessels of up to 37 metres in length and 102 dwt. It is primarily used for the maintenance and repair of barges and other similar river craft.

There is a Tank Farm at Warri Port for the storage of vegetable oil earmarked for export.

4.5.2 Wharf for the Warri Refinery

The Wharf can take a vessel of 15,000 dwt. Loading and discharging of refined products and discharge of dry cargo can be effected from the berth. There is a Petrochemical Plant at the Warri refinery, which can also use the Wharf.

4.5.3 Escravos Oil Terminal

The Terminal is located at the mouth of Escravos River. It has two single point mooring buoys whose minimum water depths are 32 and 21.95 metres. There is no length restriction, but only one vessel can load at a time. The storage capacity of the terminal is 2,800,000 barrels. The present

loading rate is 25,000 barrels per hour and the average turn-around time per vessel is about 36 hours.

4.5.4 Forcados Oil Terminal

The Terminal has two single mooring buoys of a permissible maximum loading draught of 19.81 metres. There is no length restriction to the only vessel that can load at a time. There is a storage capacity of 7,300,000 barrels. The present maximum loading rate is 86,250 barrels per hour and average ship turn-around time is about 40 hours.

4.5.5 Pennington Oil Terminal

Pennington Oil Terminal has one off-shore tanker loading berth. The maximum permissible loading draught is 13.72 metres and the length restriction of the only one vessel that can load at a time is 224 metres. The storage capacity at the terminal is 337,000 barrels and the present maximum loading rate is 18,000 barrels per hour. Average ship turn-around time is about 42 hours.

4.5.6 Old Sapele Port

There are mooring buoys for logging purposes where loading and unloading of cargo overside is effected.

The new Sapele Port, having six fully equipped berths - five general cargo and one Ro-Ro - and a total quay length of 1,150 metres at a dredged depth of 10 metres, is

presently used by the Nigerian Navy.

4.5.7 Koko Port

Koko Port is a natural port having 137 metres quay length with 7.32 metres draught alongside. The NPA operates the wharf for the handling of general cargo vessels.

There is an Oil Jetty operated by Total (Nigeria) Limited for the handling of refined petroleum products, bitumen etc..

4.6 RIVERS PORTS COMPLEX

The Rivers Ports Complex comprises the Ports of Port Harcourt, Degema, Abonnema and the Crude Petroleum Oil Terminals of Bonny (On/Off - Shore) and Brass off-shore, the Okrika Refined Petroleum Oil Jetty and the Federal Lighter Terminal.

4.6.1 Port Harcourt Port

The Port Harcourt Port is the third largest in Nigeria after the Apapa and Tin Can Island Ports. The main quay is 1,390 metres long capable of berthing eight main line vessels. The maximum draught for vessels is 7.62 metres.

4.6.1.1 Bulk Oil Installation

There is a Bulk vegetable oil installation situated at the northern end of the main quay, having 16 storage tanks capable of holding 37,000 tonnes at a time. Pipes are connected to the Bulk Oil Plant berth just outside the quay area having a number of take off points along the main quay.

At Abonnema, there are five tanks, each capable of holding 3,048 tonnes of vegetable oil. Three other tanks, each capable of holding 1,016 tonnes, are also installed approximately 1,609 metres away from the main quay. At the moment these tanks are used for palm oil.

4.6.1.2 Ship Repair and Maintenance

The NPA operates and maintains a shipyard for light craft with a maximum capacity of 81 tonnes.

4.6.2 Bonny On-Shore Terminal

The Terminal is made up of three main berths viz: A, C, D and a standby berth B.

Berths A and D can accommodate vessels up to 78,236 dwt, 198-310 metres long and 15 metres draught, while berth C can take ships of up to 53,851 dwt, 198-292 metres in length and 15 metres draught at flood ways.

Loading on these berths is by means of 812.8 millimetre flexible hoses with an average rate of between 3048-

4064 tonnes per hour.

Berth B can accommodate vessels of up to 47,754 dwt at ebb ways, 220-335 metres in length and 15 metres draught. Loading, at an average rate of 1,219 tonnes per hour, is by means of a 304.8 millimetre submarine line terminating in two 203.7 millimetre flexible rubber hoses.

Four mooring buoys berths for cargo vessels using Mediterranean moor are also available. Vessel with a maximum length of 244 metres and draught of 11.9 metres can be moored to these buoys.

4.6.2.1 Bonny Off-Shore Terminal

The Terminal has two single mooring bucys, having no length restriction on the loading vessels. The Terminal uses the storage facilities at Bonny Shore Terminal.

The permissible maximum loading draught is 22.86 metres, whilst the maximum loading rate for light crude is 61,712 barrels per hour and for medium crude 58,400 barrels per hour. Only one vessel can load at a time. Shell (Nigeria) Limited and ELF (Nigeria) Limited are operating both at the Bonny On/Off-Shore Terminals.

4.6.3 Brass Off-Shore Terminal

The Terminal is a single mooring terminal with a storage capacity of 1,878,000 barrels and is being operated by Nigeria Agip Oil Company Limited.

The permissible maximum loading draught is 30.48 metres and the pumping rate is 9,500 barrels per hour.

4.6.4 Federal Lighter and Ocean Terminal

The Lighter Terminal can handle main line vessels. It started operation in 1981 and has 16 berths.

The NPA is currently making efforts to complete the Federal Ocean Terminal at Onne. The Terminal when completed will be the deepest sea port in Nigeria, able to handle modern container and bulk vessels.

4.6.5 Okrika Jetty

This Refined Petroleum Oil Terminal comprises an outer Jetty capable of berthing ocean going vessels of up to 35,350 dwt, 193 metres in length and 9.7 metres draught. The inside Jetty can handle coastal tankers of up 91 metres long and 5.0 metres draught.

The Jetty mainly serves the two refineries at Port Harcourt (Alesa-Eleme), and hopefully will also serve the Petrochemical Plant scheduled to come on stream in 1992.

4.6 Calabar Port Complex

The Calabar Port Complex comprises the old Calabar Port and the new port commissioned for operations in 1979. The maximum recommended draught for vessels using the main line port is 7 metres chart datum and the channel is 150 metres wide.

4.6.1 Qua-Iboe Oil Terminal

The Terminal is owned and operated by Mobil Oil Producing (Nigeria) Limited. The tanker loading facilities consist of two berths. One is a Seven Point Spread Mooring located approximately 19 kilometers South of the terminal tank farm, having a depth of water at the manifold of 20.31 metres. The other is a Single Point Mooring located approximately 31 kilometers South East of the terminal tank farm with a depth of water at the manifold of 26.56 metres.

The crude oil storage facilities consist of seven tanks each of 500,000 barrels capacity. Loading rates vary from 30,000 barrels per hour at the Spread Mooring to 65,000 barrels per hour at the Single Point Mooring.

4.7 Nigerdock Nigeria Ltd

The Nigerdock Nigeria Limited, at Snake Island near Tin Can Island Port in Lagos, is the only drydock in Nigeria capable of drydocking ocean going vessels of up to 25,000 dwt.

The drydock has a length of 200 metres, width of 34 metres and a depth of 9 metres. They undertake the repair

of hulls and engines.

4.8 Maritime Traffic

The Maritime Traffic in Nigeria is the biggest and the heaviest in the West and Central African sub-region of Africa.

Nigeria has the largest population in the sub-region and the biggest market (Tables 6 and 7); she produces and exports the largest quantity of crude oil (Maps 3 and 4), when compared with the 18 countries that make up the West and Central African sub-region.

The reduction in oil earnings by Nigeria has reduced the once thriving import business. The Nigerian traffic, which traditionally accounted for 70-80% of the southbound traffic of the United Kingdom - West African Line (UKWAL) - the Conference Line serving West Africa which has now dropped to below 60% (AED of 24 July 1989 pp 23).

The total number of ships and their Net Registered Tons (NRT) that entered Nigeria ports and oil terminals from 1979/80 to 1988 is given in Table 8.

Table 6

Seaborne Shipping ('000 of tonnes)

		1976	1984	1986
Nigeria	(a)	101,220	69,000	73,100
	(b)	5,000	14,990	15,832
Cote d'Ivoire	(a)	na	4,590	4,610
	(b)	na	4,685	4,810
Ghana	(a)	2,280	1,377	1,432
	(b)	3,100	3,341	3,422
Cameroon	(a)	838	7,687	9,432
	(b)	1,360	3,000	3,192
Senegal	(a)	2,580	2,348	2,399
	(b)	1,636	2,300	2,491
Sierra Leone	(a)	100	55	64
	(b)	341	441	475

Source:ECA

(a) - Loaded; (b) - Unloaded; na - not available.

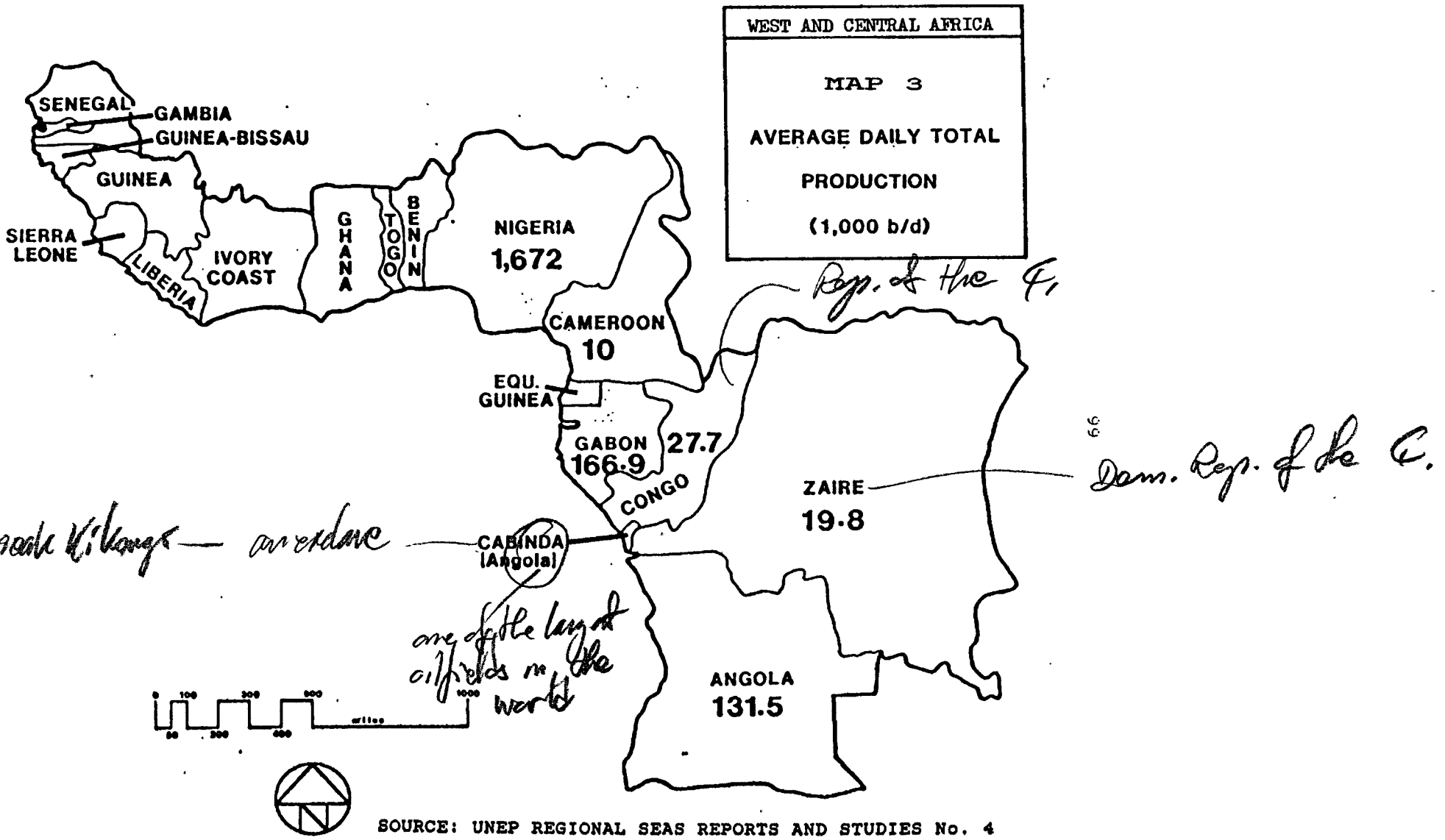
Table 7

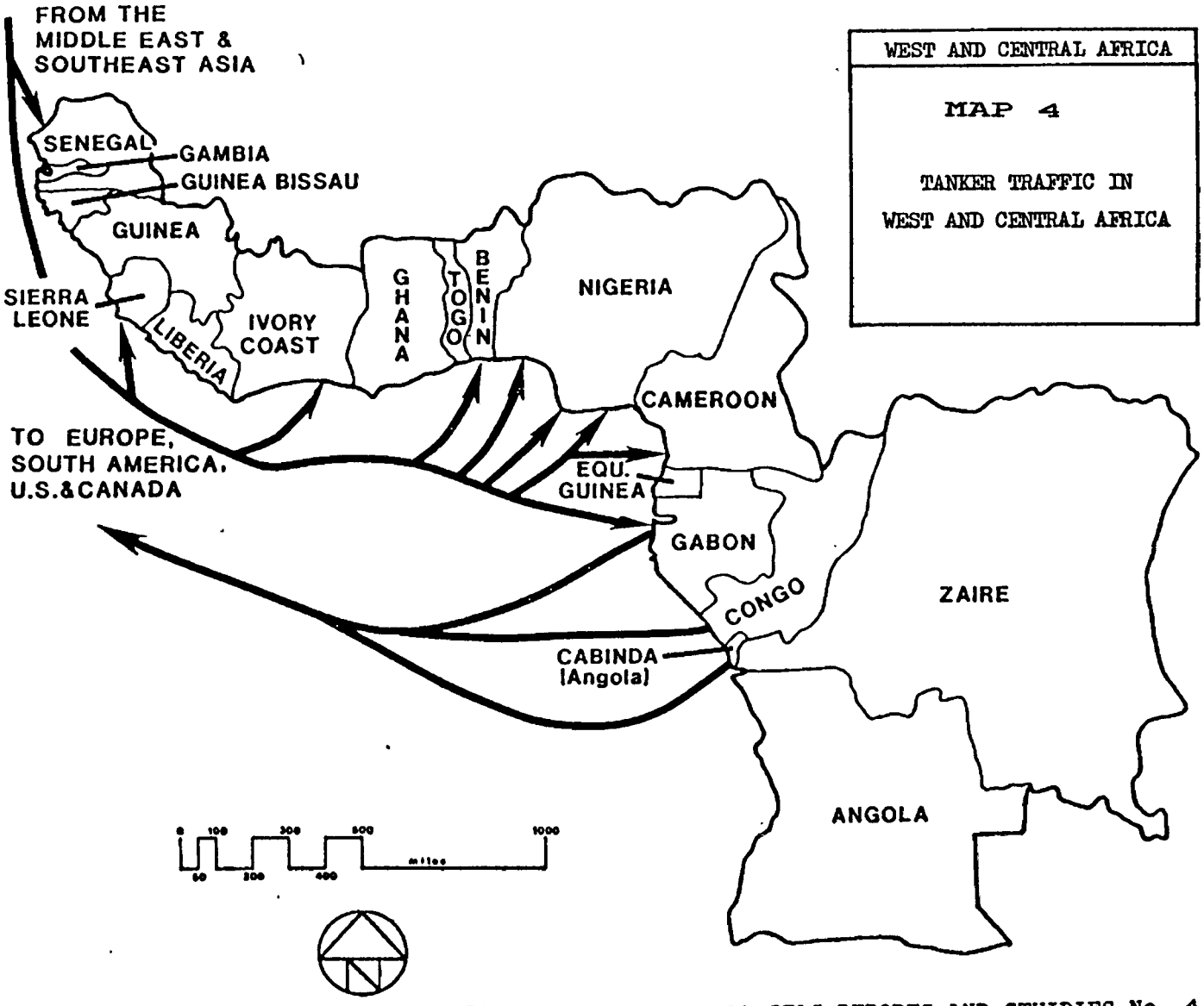
Cargo Throughput Handled at Nigerian Ports (Exclusive of Crude Oil Terminals): 1979/80 – 1988

YEAR	TOTAL CARGO		TOTAL CARGO
	INWARD	OUTWARD	THROUGHPUT
1979-80	15,584,787	2,354,415	17,939,202
April Dec. '80	14,401,270	2,085,415	16,486,685
1981	20,728,974	2,913,742	23,642,716
1982	20,073,797	2,537,432	22,611,229
1983	16,394,509	2,346,700	18,741,209
1984	12,372,417	2,278,685	14,651,102
1985	13,453,939	2,947,740	16,401,679
1986	9,851,059	2,423,520	12,274,579
1987	9,288,006	2,249,584	11,537,590
1988*	7,773,258	3,510,432	11,283,690

* Provisional Figure

Source: NPA Handbook Published in 1989


WEST AND CENTRAL AFRICA
MAP 3
AVERAGE DAILY TOTAL PRODUCTION
(1,000 b/d)
SENEGAL
GAMBIA
GUINEA-BISSAU
GUINEA
SIERRA LEONE
LIBERIA
IVORY COAST
GHANA
TOGO
BENIN
NIGERIA
1,672
CAMEROON
10
EQU. GUINEA
GABON
166.9
27.7
CONGO
ZAIRE
19.8
CABINDA (Angola)
ANGOLA
131.5
Rep. of the C.
Dem. Rep. of the C.
grade Kikongo — an ordure
one of the largest oilfields in the world
SOURCE: UNEP REGIONAL SEAS REPORTS AND STUDIES No. 4



SOURCE: UNPE REGIONAL SEAS REPORTS AND STUIDIES No. 4

Table 8

Vessels and their Net Registered Tonnage (NRT) that Entered Ports, Jetties and Crude Oil Terminals

YEAR	NUMBER OF VESSELS	NRT
1979/80	5,622	86,645,608
April-Dec. '80	6,409	58,020,545
1981	6,569	59,474,754
1982	5,639	52,918,744
1983	4,449	49,933,108
1984	3,263	48,299,435
1985	3,493	50,462,293
1986	3,003	47,037,527
1987	2,824	42,852,343
1988	3,009	42,217,649

Source: NPA Handbook Published in 1989.

Note: The source of information for Chapter 4 is mostly from the NPA Handbook Published in 1989.

Chapter 5

5. Reception Facilities Required in Nigerian Ports and Oil Terminals

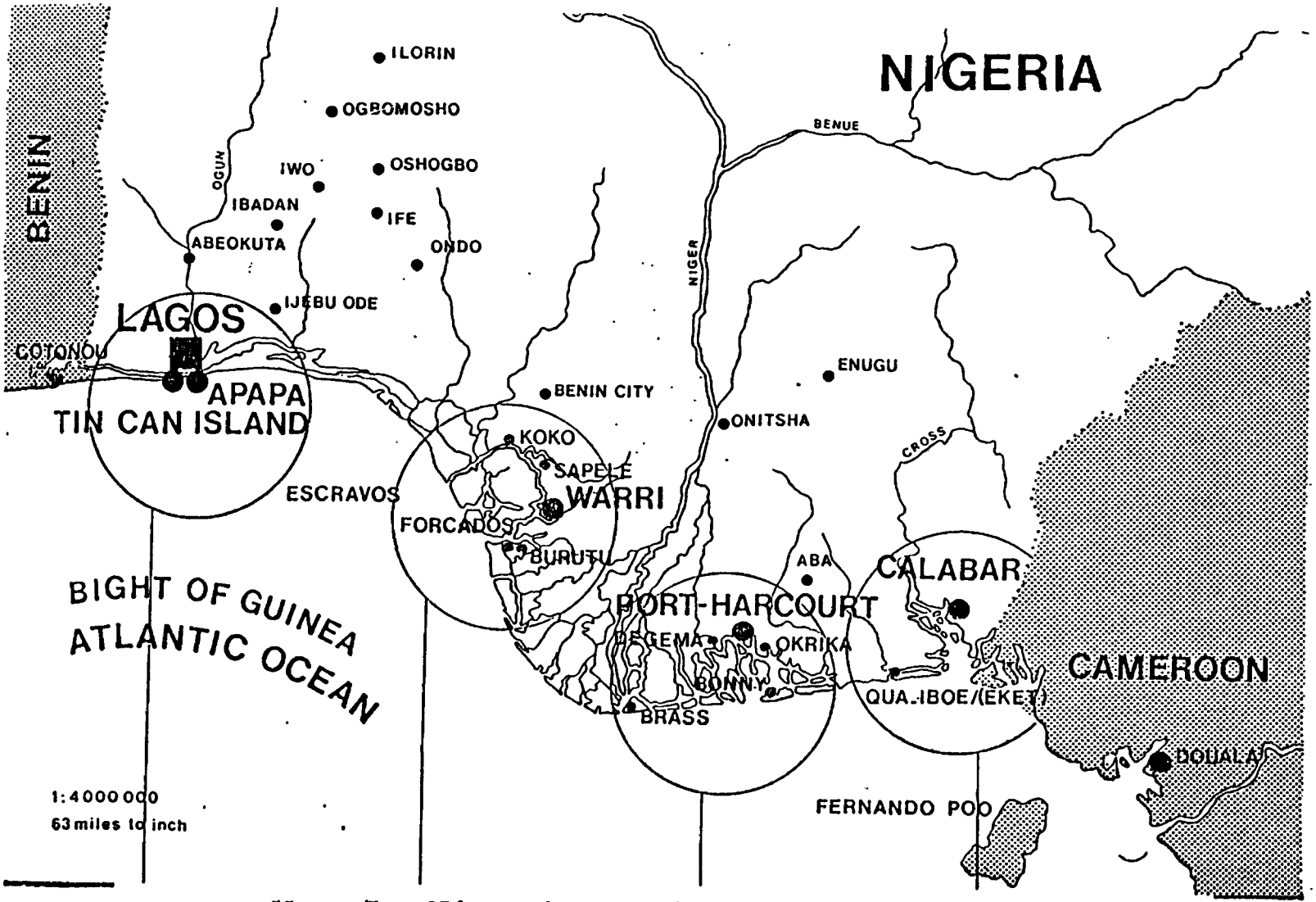
5.1 Introduction

The Ports and Oil Terminals in Nigeria are divided into four distinctive regions. They are Lagos Ports -West, Delta Ports - Mid West, Rivers Ports - East, and Calabar Ports - South East (Map 5).

The Ports and Oil Terminals within a region are at close proximity to one another. As such, a centrally located reception facility within a region will conveniently and economically serve all ports and oil terminals within that region. The waste can be transported by road tankers or by barges to the reception facility for treatment and final disposal.

5.2 Lagos Ports and Nigerdock Drydock (Western Region)

Lagos Ports are comprised of Apapa Port Complex and Tin Can Island Port (TCIP). A total of 18,436 vessels having a total NRT of 87,428,825 entered these two ports during the period 1979/80-1988. Apapa Port had a total of 13,212 vessels having 62,389,649 NRT, while TCIP had 5,224 vessels having a NRT of 25,039,176. (Table 9).



Map 5 Nigeria Ports and Oil Terminals

SOURCE: NPA BI-LINGUAL MAGAZINE SECOND EDITION

5.2.1 Oily Waste

A reception facility for oily waste established in Apapa Port will take care of all the oily waste from ships using the Apapa Port Complex which includes the Apapa quay, Third Apapa Wharf Extension, Petroleum Wharf Apapa, Atlas Cove Jetty and Bulk Oil (BOP) - Lever Brothers Wharf.

The vessels using the Apapa quay and Third Apapa Wharf Extension are mainly dry cargo vessels. They will need a reception facility for their engine room bilges, separator sludge and dirty ballast water from fuel oil bunker tanks.

The vessels loading or discharging bulk vegetable oil in Lagos are mostly dry cargo vessels. The wash water of their tanks will also be received by the reception facility, together with engine room bilges, separator sludge and, if any, dirty ballast water from the fuel oil bunker tanks. It is important to point out that since 1984, according to NPA figures on bulk vegetable oil handled in ports (NPA Handbook, 1989), vegetable oil has only been discharged rather than loaded at the port.

At the Atlas Cove Jetty and Petroleum Wharf Apapa, the vessels are mostly tankers loading and/or unloading petroleum products. The vessels using the wharf and jetty will need a reception facility for engine room bilges and separator sludge.

Also at the Atlas Cove Jetty and Petroleum Wharf, the vessels scheduled to load, if arriving with dirty ballast water, will need a reception facility for their ballast. Table 10 shows the loading of bulk refined petroleum products during 1979-1988. A total of 478,052 tonnes of products was loaded from Apapa port during the period in review.

In some instances, a vessel arrives, unloads and loads during the same visit. In such cases, tank washing water

will be received at the reception facility.

The oily waste received from the Apapa quay, Third Apapa Wharf Extension and Petroleum Wharf can be transported to the reception facility by either road tankers or barges. For Atlas Cove, barges are the only possible means of transportation as of the present.

Table 9

Total NUMBER OF VESSELS AND THEIR NRT THAT ENTERED ENUMERATED NIGERIAN PORTS, JETTIES AND CRUDE OIL TERMINALS BETWEEN 1979/80-1988

LOCATION	TOTAL NUMBER OF VESSELS	TOTAL NRT
Apapa Port	13,212	62,389,649
Tin Can Island Port	5,224	25,039,176
Sub-Total	18,436	87,428,825
Port Harcourt	4,538	16,144,918
Federal Lighter		
Terminal	498	2,032,730
Bonny	2,528	129,179,385
Brass	727	50,289,500
Okrika	2,063	8,821,115

Merryland (Bonny)*	318	1,224,662
Sub-Total	**10,672**	**207,692,310**
Warri	7,086	17,871,758
Sapele	1,471	1,968,710
Koko	359	484,941
Escravos	778	44,036,773
Forcados	1,806	118,512,500
Pennington	266	15,045,729
Sub-Total	**11,766**	**197,920,411**
Calabar	1,180	3,068,66
Qua-Iboe	503	40,029,123
Anthan+	36	2,722,331
Sub-Total	**1,719**	**45,820,120**

* M.V Merryland was a storage tanker, stationed at Bonny River,presently M.V Tuma is in place.

\+ Anthan became operational in 1986.

Source: NPA Handbook, 1989.

The loading and unloading of refined petroleum product at these ports may be drastically reduced if the government links up all its four refineries by pipeline as indicated by the Minister of Petroleum. (Source: Volume 11 No. 25, pp 19 of 25 June - 1 July 1990 issue of AED).

Most of the refined petroleum products discharged in these ports by ocean going vessels were as a result of offshore refining arrangements due to insufficient refining capacity in the country. Crude oil was exported and refined outside the country and then imported as refined petroleum product. At present this arrangement only takes place if there is a major breakdown of any of the country's refineries. As a result of the completion and coming on stream of the fourth refinery, the nation has surplus refining capacity and will be exporting the surplus from Warri and Port Harcourt refineries to the neighbouring states in the West and Central African region.

The vessels using the Tin Can Island Port (TCIP) are mostly dry cargo vessels. Their engine room bilges, separator sludge and, if any, ballast from fuel oil tanks will be transported by either road tankers or barges to the proposed reception facility at Apapa.

The Nigerdock drydock at Snake Island will also transport the oily waste resulting from ships using their facilities by barges to the reception facility at Apapa.

The TCIP, Nigerdock and Atlas Cove are within a five kilometer radius of Apapa Port. As such a reception facility at Apapa, having the largest number of ships visits per year, will surely serve the other ports economically and conveniently.

It is also important to point out that the proposed reception facility at Apapa Port will serve all the dry cargo vessels trading in the West and Central African sub-region. The is no "adequate" reception facility at present available in

any of the 18 countries in the region. The Port is about mid-way between the extreme West African state of Mauritania and the extreme Central African state of Angola. Most of the vessels trading in the sub-region always call at Lagos as it is the biggest and busiest port in the sub-region. Also, Lagos is a bunker port, so vessels needing only bunkers can have their oily waste relieved of them at the same time.

Table 10

Loaded Tonnes at Main Bulk Refined Petroleum Product Ports 1979-1988

Year	APAPA	OKRIKA JETTY	WARRI	MERRYLAND+
1979/80 April-Dec	68,093	715,756	828,342	-
1980	50,567	579,718	733,860	-
1981	68,180	749,953	1,228,933	-
1982	72,166	690,799	1,157,093	-
1983	-	816,691	1,036,842	-
1984	36,833	732,625	1,003,538	386,239
1985	33,613	939,716	1,074,150	608,316
1986	7,621	971,737	828,810	196,634
1987	77,804	963,992	518,711	7,299
1988*	63,175	935,569	1,320,552	45,779
TOTAL	478,052	8,096,556	9,730,831	1,244,267

* Provisional Figure.

+ Merryland is a storage tanker, the unloading figures was used as costal tanker, arrive with dirty ballast.

Source: NPA Handbook, 1989.

5.2.2 Chemical Waste

Most of the chemicals arriving at Lagos Ports are received in packaged form or container tanks. Chemical tankers hardly call at the ports. Lagos state and its environs are the most heavily industrialized in Nigeria and in the sub-region.

Hence, for the time being and immediate future, a reception facility for chemical waste from ships is not an urgent necessity.

5.2.3. Sewage Waste

Lagos Ports have to ensure that vessels using their facilities do not discharge sewage, not treated by an approved sewage treatment plant within the port area. Vessels without an approved sewage treatment plant but having their sewage comminuted and disinfected with approved equipment should be encouraged to discharge their sewage 4 nautical miles away from the nearest land (and for sewage held in holding tanks 12 nautical miles from the nearest land) at a moderate rate, ship en route at not less than 4 knots.

The possibility of building a reception facility for Lagos Ports or other ports in Nigeria in the very near future is very remote. This is because further away from the Apapa Port area towards the city at Iddo, raw sewage is being discharged into the Lagos lagoon, with the knowledge of the Local Government Authority and the Lagos State government.

5.2.4 Garbage

All berths within the Lagos port region should have facilities for collection of ship generated garbage. This garbage should be transported and disposed off, like all garbage generated within the Lagos municipality.

5.3 Delta Ports (Mid-Western Region)

Under the Delta Ports, there are the ports of Warri, Old Sapele and Koko; the oil terminals of Escravos, Forcados, Pennington; and the wharf of the Warri refinery.

From table 9, Warri Port has the highest number of visits by vessels - 7,086, having a total of 17,871,758 NRT during 1979/80-1988. Forcados oil terminal has the highest total NRT for the same period - 118,512,500 from a total of 1,806 vessel visits. Table 9 shows the figures for the other ports and oil terminals.

5.3.1 Oily Waste

A reception facility at Forcados will be ideal to receive oily waste from vessels visiting the Delta Ports region. Being busier oil terminal between Escravos and Pennnington, Forcados will conveniently handle the majority of the oily waste.

Most of the time, tankers loading at the Delta oil terminals load Escravos light at Escravos, Forcados blend at Forcados and Pennington light at Pennington during the same voyage. Thus, with draught limitations permitting, the loading scheduling will be such that the tanker loads first at Forcados

in order to discharge its ballast at the reception facility and then tops up at the other oil terminals in the Delta region.

If loading at Forcados first is not possible, oily waste can be transported by barges or coastal tankers or retained on board to be discharged before loading at Forcados.

The oily waste discharges by ships at the oil terminals of Delta Ports region will be mostly dirty ballast, tank washings, engine room and pump room bilges, sludge from cargo slop tanks and separator sludge amongst others.

The oily waste discharged at Koko, Old Sapele Warri Ports and Warri refinery Wharf can also be transported to Forcados by coastal tankers or barges.

Alternatively, the oily waste from these ports can be treated at the Warri refinery oil treatment plant. On the assumption that Warri refinery will receive and treat the oily waste from Koko, Old Sapele and Warri ports, transportation of the waste can be done by road tankers or barges, whichever is economical.

The oily waste emanating from Koko, Old Sapele and Warri ports will be mostly engine room bilge, separator sludge, if any, and dirty ballast from fuel oil bunker tanks, whereas the oily waste coming from Warri refinery will include in addition dirty ballast from cargo tanks and tank washing etc..

There was no vegetable oil handled at the Delta Ports in 1987 and 1988, as contained in the figures published by NPA in their Handbook of 1989. As such, very little waste oil will result from the bulk vegetable oil trade presently and in the near future. If any, the oily waste will be disposed like other oily waste from ships in the Delta Ports.

5.3.2 Chemical Waste

As in Lagos Ports, most of the chemicals arriving at Koko, Old Sapele, Warri ports etc. are mostly of package types and in container tanks.

Unlike Lagos Ports, there is a Petrochemical Plant adjacent to Warri Refinery. The Plant produces 18,000 metric tons/year (mty) of Carbon Black and 13,000 mty of Polypropylene. Carbon Black is transported in package form. Polypropylene can be transported in bulk, but it is classified by IMO as a non-polluting substance to the marine environment, under Annex II of the Convention.

Thus, a chemical waste reception facility in the Delta Ports region is not an urgent necessity now or in the nearest future.

5.3.3 Sewage Waste

The same proposal and discharge criteria highlighted under Lagos Ports regarding sewage waste should be adopted for the Delta Ports.

5.3.4 Garbage Waste

Warri, Koko and Old Sapele ports and Warri refinery Wharf should all have provisions for ships to deposit their garbage waste for collection and disposal like the municipal generated garbage waste of the respective area.

The oil terminals of Escravos, Forcados and Pennington should deliver their garbage waste to supply vessels,

tugs, or barges for onward transportation to the nearest port for final disposal along with municipal waste.

Alternatively, the garbage waste can be incinerated at the Forcados or Escravos tank farm settlement.

5.4 Rivers Ports (Eastern Region)

In the Rivers Ports, Port Harcourt Port has the highest vessel arrival figure in the last ten years (1979/80-1988). The vessels that arrived were 4,538 having a total NRT of 16,144,918 for the period. The highest total of NRT arrivals for the same period was for the Bonny on/offshore oil terminal, having 129,179,385 for 2,528 vessels (Table 9).

5.4.1 Oily Waste

A reception facility established at Bonny Island will take care of all the oily waste generated on board vessels using the Rivers Ports.

All ships going to Port Harcourt Port, Okrika Jetty and Federal Lighter Terminal have to pass through Bonny on their way to these ports. M.V Merryland, a storage tanker for petroleum products, was stationed on the Bonny River. She has been replaced by M.V Tuma. Bonny is about 80 nautical miles from Brass Oil Terminal. Thus, Bonny is central for the establishment of a reception facility for use by all ships using the River Ports. Hence, it will be economical.

The dry cargo vessels using the Port Harcourt port and federal lighter terminal will have engine room bilges, separator sludge and on rare occasion dirty ballast from fuel oil

bunker tanks when used. These oily wastes can be collected and transported to the proposed reception facility at Bonny Island by barges for treatment and final disposal.

The majority of oil waste will be coming from the oil terminals, Bonny on/offshore, being the busiest, will have the oily waste from the vessels pumped directly to the reception facility proposed at Bonny. The majority of the oily waste will include dirty ballast from cargo tanks, engine room and pump room bilges, separator and slope tank sludge etc.

Similarly, oily waste will come from the Brass oil terminal. The oily waste will be transported by coastal tankers or barges to the reception facility at Bonny for treatment and disposal.

The Okrika jetty serves the two oil refineries at Alesa Eleme near Port Harcourt. At this jetty, vessels loaded a total of 8,096,556 tonnes of refined petroleum products during 1979-1988 (Table 10). This figure will greatly increase with the commissioning of the second Port Harcourt refinery and the fourth in the country. The oily waste - dirty ballast, tank washings, engine room and pump room bilges and sludge - can be treated at the refinery's oily waste treatment plant. Alternatively, it can be transported to the proposed reception facility at Bonny for treatment.

On commissioning the second refinery at Alesa Eleme and the fourth in the country in March 1989 the total refining capacity of the nation was brought to 445,000 barrels per day (bpd) of crude oil - thus giving the country an estimated surplus of 100,000 bpd. The surplus is earmarked for export to the West and Central African states. According to Lloyd's List International No. 54,153 of 23 March 1989 p. 2, a new terminal at Bonny with 350,000 tonnes of storage linked by 34 miles of pipeline to the refinery was planned for completion by the end of 1990.

If the building of pipeline and storage tanks materializes, most of the loading activities at the Okrika jetty will shift to the new Bonny terminal and all oily waste will be easily and cheaply treated at the proposed reception facility at Bonny.

Also, on completion of the 4.5 million tonne per annum capacity Liquefied Natural Gas Plant at Bonny in 1995, all oily waste from vessels loading at the plant's terminal will be transported and treated at the proposed reception facility in Bonny.

If oily waste results from the bulk vegetable oil trade, it will be taken to the reception facility for treatment. The trade has slowed down as of late and local production is supplemented by imports.

The oily waste from the storage tanker M.V Tuma stationed at Bonny River should be moved by barges to the proposed reception facility in Bonny. The use of a storage tanker at Bonny River may not be required in the future when the proposed storage facility for refined petroleum products at Bonny is completed at the end of 1990.

5.4.2 Chemical Waste

The majority of chemicals arriving at Rivers Ports are in package form and container tanks. They are transported to the industries in this form. After use, the waste is disposed as land based chemical waste.

A Petrochemical Plant at Eleme near Port Harcourt is scheduled to come on stream in 1993. The products of the plant will be 260,000 metric tonnes per year (mty) of Ethylene; 90,000 mty of Propylene; 250,000 mty of Polyethylene; 22,000 mty of Butene-1 and 80,000 mty of Polypropylene.

Ethylene, Propylene and Polypropylene are classed by IMO as non-polluting substances carried in bulk for the purpose of Annex II of MARPOL 73/78. Polyethylene, which is a form of plastic carried in bulk, should also be a non-polluting substance carried in bulk re: Annex II. The other product of the plant -Butene-1 is a Liquified Petroleum Gas.

Hence, like Lagos and Delta Ports, Rivers Ports will not have an urgent need for a reception facility presently or in the near future for chemical waste.

5.4.3 Sewage Waste

The arrangement spelt out for Lagos and Delta Ports should be extended to Rivers Ports as regards sewage waste from ships using the Rivers Ports.

5.4.4 Garbage Waste

Port Harcourt and Federal Lighter Terminal should have provisions for the collection of garbage waste from ships. The waste should be disposed along with the municipality garbage waste of Port Harcourt and Onne.

The garbage waste from ships using Okrika jetty should be transported to the Port Harcourt refinery for disposal or to Okrika or Eleme town for disposal, in accordance with these areas waste disposal arrangements.

The waste collected from vessels using the Bonny on/offshore terminals, the new proposed terminal at Bonny for evacuation of petroleum product, the LNG terminal and the storage tanker M.V Tuma should be collected by barges for final disposal

at Bonny Island, in-line with the disposal system in use in the Island.

5.5 Calabar Ports (South Eastern Region)

Calabar Port had 1,180 ships visit having 3,068,666 total NRT while Qua-Iboe Oil Terminal had 503 ships call having 40,029,123 NRT (Table 9).

5.5.1 Oily Waste

Most of the vessels that call at Calabar Port might have visited either Lagos, Rivers or Delta Ports before arriving. As such, dry cargo vessels should have emptied their bilge holding tanks, separator sludge tanks etc., but there may be vessels having oily waste for disposal to the reception facility.

Qua-Iboe Oil Terminal is a busy terminal, where there will always be oily waste from routine tanker operations. Also, Qua-Iboe Oil Terminal is about is about 50 nautical miles from Bonny.

Anthan Oil Terminal is very close to Qua-Iboe terminal and it started operations in 1986. There will be oily waste resulting from routine tanker operations at the terminal.

In order to minimize the amount of the oily waste expected, all crude oil tankers using the Anthan and Qua-Iboe terminals should comply with the SBT Regulations of MARPOL 73/78.

The oily waste from Calabar, Qua-Iboe and Anthan should be transported by barges or coastal tankers to the proposed reception facility at Bonny. This solution will be most

ideal and economical at the present. In the near future, a reception facility can be planned and built for the South Eastern Region when the traffic increases and it becomes uneconomical to transport oily waste to Bonny for processing.

5.5.2 Chemical Waste

The chemicals arriving at Calabar Port are mostly in package form and container tanks. In general, there are very few or no chemical tankers using the Calabar Ports (South Eastern Region). There is no urgent need at present to establish a reception facility for chemical waste.

5.5.3 Sewage Waste

The arrangement for Lagos, Delta and Rivers Ports should be extended to the ports in this region. Thus, no urgent need for a reception facility for sewage waste in the present or in the immediate future.

5.5.4 Garbage Waste

The garbage waste from ships using the Calabar Port should be collected and disposed like the garbage waste of the municipality of Calabar.

The garbage waste from ships using Qua-Iboe and Anthan oil terminals should be collected by barges, supply boats etc. for disposal at Eket, Calabar or Bonny.

Chapter 6

6.0 Establishment of Reception Facility in Apapa, Forcados, Bonny and Recommendations

6.1 Introduction

In chapter 5, reception facilities were proposed to be established at Apapa Port to serve the Lagos Ports (Western) region, at Forcados to serve the Delta Ports (Mid Western) region, and at Bonny to serve the Rivers Ports (Eastern) region and the Calabar Ports (South Eastern) region.

In this chapter, legislation, technology of the separation process, the modalities for operation, and recommendations amongst others will be examined and highlighted.

6.2 Legislation

Decree No. 58 of 1988 establishing the Federal Environmental Protection Agency (FEPA) was signed into law on December 30, 1988. The decree contains provisions for national

environment standards on water quality, effluent limitations, discharge of hazardous substances, co-operation with Ministry of Petroleum Resources (Resources Department), and oil related discharges into the Nigerian environment.

Also, Decree No. 42 on Harmful Waste of 1988 was signed into law on 25 November 1988. It concerns preventing dumping of Toxic Waste within the Nigerian environment.

The provisions contained in the FEPA decree No. 58 and Harmful Waste decree No. 42 are very inadequate to meet and check the pollution of the Nigerian marine environment by ships.

The Petroleum Resources Department of the Ministry of Petroleum Resources has prepared National Environment Guidelines and is waiting for the Guidelines to be signed into law as of 1 January 1990.

The Guidelines are very silent on the reception of waste from ships and the provision of reception facilities for vessels using the oil terminals. The Guidelines in general are very inadequate to prevent or minimize the pollution of the marine environment by ships.

The only law regulating pollution by ships at sea in Nigeria is the OIL in Navigable Waters Act 1968 which is based on the 1954 Convention for the Prevention of Pollution of the Sea by Oil as amended in 1962. The 1969 Amendment was ratified but is yet to be incorporated into the national law.

In "a Legislative Framework for the Control of Marine Pollution in Nigeria" by L. N Mbanefo, a paper presented at the Nigerian Branch of the Institute of Marine Engineers, the author states that during the reviewing and updating of the 1962 Merchant shipping Act of Nigeria, comprehensive drafts of new legislation incorporating the OILPOL and MARPOL Conventions amongst other were prepared and submitted to the government of

Nigeria.

According to a 1989 IMO publication entitled Technical Co-operation Within a Family of Nations, the final Draft of the Merchant Shipping Decree with its 53 Annexes of draft legislation was submitted to IMO in July 1988, and in October 1988 the draft legislation was officially handed over to the Ministry of Transport.

Hopefully, the government will accede to the MARPOL 73/78 Convention and its subsequent Amendments. The revised Merchant Shipping Act hopefully will soon become law and will contain provisions for adequate reception facilities in ports and oil terminals and encompass other provisions of MARPOL 73/78 - Annexes I - V.

In general, the national legislation for reception facilities should be in-line with the provisions of Regulations 10 (7) and 12 of Annex I and Regulation 7 of Annex V for use at the present. Regulations 7 of Annex II and 10 of Annex IV should be reserved for use in the future.

The contents of the national legislation for reception facilities should include amongst others the following: Purpose; Definition and Acronyms; Delegation; Operations; Penalties for Violation; Responsibility; Payment; Requirements as regards Notification of and Information on Waste; Re-transportation of Waste and Final Disposal; Reporting Inadequate Reception Facilities; Standard Discharge Connection and Effluent Discharge Standards.

6.3 Measures for Minimizing the Need for and Capacity of Reception Facilities

The measures for minimizing the need for and capacity of reception facilities are highlighted in IMO Guidelines on Provision of Adequate Reception Facilities in Ports; Part I - Oily Waste; Part III - Sewage and Part IV - Garbage.

The measures summarized below are for oily and garbage waste only.

In as much as the Convention states that the Contracting Government should ensure that "adequate" reception facilities be provided to meet the need of ships using them without causing undue delay, it's absolutely important that the facility is not "over-built". Estimates should be based on reasonable and balanced requirements to avoid incurring excessive initial capital costs.

Various measures are currently available or will become available in the majority of vessels in the nearest future which will most likely reduce the need for and hence the capacity requirements of reception facilities. Some of them are as follows.

6.3.1 For Oily Waste

(i) SEGREGATED BALLAST TANK

The introduction of segregation ballast tanks on tankers as contained in the Convention has progressively reduced the quantities of oily ballast resulting from the mixture of sea water and oily residue after cargo discharge.

(ii) RETENTION-ON-BOARD (LOAD-ON-TOP)

Where tankers can effectively employ retention-on-board procedures for handling the dirty ballast water, there will be no significant amount of dirty ballast water accumulated on board which will be discharged to a reception facility. Refinements in the retention-on-board procedures through improved slop tank design, the cascade system and chemicals to accelerate oily water separation can possibly reduce the minimum time required to operate retention-on-board effectively. This will make it universally applicable to tanker operations. The need for reception facilities could be minimized as the use of retention-on-board procedures and their design features are incorporated on an increasing number of operating tankers.

(iii) CARGO TANK CLEANING

Crude oil washing under controlled conditions, such as an inert gas system, can effectively reduce the oil residues in cargo tanks, thereby reducing the throughput waste load in repair ports and in reception facilities. It is estimated that crude oil washing can reduce the oily residues from 1% to 0.1%. Improved cargo tank stripping systems such as location of limber holes and tank suction can also effectively reduce oil residues in cargo tanks.

(iv) OILY-WATER SEPARATING AND OIL FILTERING EQUIPMENT

Effective oily-water separating and oil filtering equipment used in conjunction with the effluent discharge from the slop tanks and bilges can provide means for reducing the oily waste loads to reception facilities.

(v) INCINERATION OF OILY WASTES

Vessel operators might consider the installation of packaged incinerator plants on board, to burn oily wastes, residues, as well as solid wastes, such as garbage, dunnage etc..

(vi) OPERATING ALTERNATIVES

Other operating alternatives may be used in order to reduce quantities of oily waste generated on board ships, thus resulting in the reduction of the capacity of reception facilities. In each case, the economic viability of the operating alternative should be studied to determine its cost against that of providing reception facilities.

The following practical alternatives may be considered:

(a) Increasing the segregated ballast capacity of existing tankers;

(b) reducing speed or lengthening steaming time to complete retention-on-board;

(c) transferring ballast at cargo transhipment terminals to other tanks, if this does not compromise the pollution avoidance procedure or cargo quality status of these vessels;

(d) washing tanks at discharge terminals, if tank cleaning and discharge of tank washing are possible at those terminals, and

(e) avoiding as far as practicable the use of bunker tanks for the carriage of ballast water.

6.3.2 For Garbage Waste

Although Regulation 3 of Annex V of MARPOL 1973 permits the discharge of non-plastic garbage into the open ocean, the measure described below will minimize the need for and capacity of reception facilities.

6.3.2.1 Compaction and Baling

DISPOSAL AT SHORE

The compaction and baling of garbage waste for disposal ashore will reduce the need for and capacity for reception facilities due to the reduction in total volume of the waste and efficient handling.

6.3.2.2 Incineration and Residue Disposal

Incineration reduces the total waste volume and converts organic, bio-degradable solid wastes to relatively inert ash. This method normally results in some air pollution.

The hazardous nature of emissions and ash resulting from the incineration of garbage waste and other residues on ships was highlighted by the Government of the Netherlands (MEPC 29/21/4). The meeting agreed that more specific and detailed standards for incinerators were necessary and that the Maritime Safety Committee should be requested to examine the matter.

The ash residue resulting from incineration can be water quenched and disposed of by some other means or in port.

6.3.2.3 Grinding or Comminution

The provision of Regulation 3(1),(c), of Annex V of the 1973 Convention permits the discharge of comminuted food wastes and all other garbage including papers, rags, glass, metals, bottles, crockery and similar refuse beyond 3 nautical miles from the nearest land. If the comminuted solid waste is purely organic in nature, it could also be passed through the vessels sewage treatment system for treatment. Such comminuted or ground garbage must be capable of passing through a screen with openings no greater than 25 millimetres.

6.4 Establishing and Capacity Requirements for Lagos, Forcados, and Bonny-Proposed Reception Facilities

The establishment of reception facilities for oil at Lagos, Forcados and Bonny will reduce greatly the oil currently discharged into the waters of the West and Central African sub-region.

The type and exact capacity will require an in-depth study to determine the most economical, efficient and adequate capacity for ships using them without causing undue delay. The advocated in-depth study will not be part of this project; rather the essential parameters and inputs towards the establishment of the reception facilities will be examined here.

The types of reception facilities will be examined under "Technology of the Separation Process" but capacity requirements are as follows:

In Chapter 3 of this project, the Guidelines on the Provision of Adequate Reception Facilities in Ports for Oily Wastes, published by IMO in 1976, were examined. The method for estimating quantities of residues and oily mixtures expected to be discharged in oil terminals, ports and repair yards by different types of ships was discussed. The summary is shown in Table 11.

6.4.1 Reception Facility for Ballast Water

Table 11

PROPORTION TO DWT:

	Ballast	Wash Water	Liquid Oil Residue	Oily Solids
Crude Oil Tanker	30%	4-8%	Up to 1%	0.1%
Black Product Tanker	30%	4-8%	Up to 0.5%	0.1%
White Product Tanker	30%	4-8%	Up to 0.2%	0.1%

From Table 11, the capacity for the reception facility for ballast water for Lagos, Forcados and Bonny can be easily estimated or calculated. Table 9 indicates the number of vessels and their net registered tonnage that entered enumerated Nigerian ports, jetties and crude oil terminals during the period 1979/80-1988. Unfortunately, the table did not indicate dead weight tons (dwt) as in Table 11. The dwt of these vessels can be collected from the NPA Statistical Division for a more accurate computation of the reception facility capacity requirements for ballast water.

The ballast water and wash water for Lagos reception facility will be from tankers using Atlas Cove, Bulk Vegetable Oil Plant Wharf (Lever Brothers Wharf) and Petroleum Wharf Apapa. For Forcados, it will be from the crude oil terminals of Escravos, Pennington, Forcados and Warri Refinery Wharf and small quantities from the Vegetable Oil berths in the Delta Ports. For the Bonny reception facility, it will include waste from the crude oil terminals of Brass, Bonny on/offshore, Qua-Iboe and Anthan and Okrika jetty and Vegetable Oil berths.

6.4.2 Reception Facility for Separator Sludge and Oily Bilge Water

The Guideline on the Provision of Adequate Reception Facilities in Ports - Oily Waste recommends that ports and terminals receiving ocean going diesel propelled vessels with sludge holding tanks should be able to provide a reception facility for at least 10 metric tons.

Regarding oily bilge water, the recommendation is that the port or terminal should be able to accept up to 100 metric tons of bilge at any one time. For existing ships allowed to ballast fuel oil bunker tanks, a minimum of 500

metric tons of dirty ballast water can be expected.

The estimation of minimum reception capacity for bilge and separator sludge as laid down by the United States Department of Transport and the Coast Guard as contained in paragraphs - 158.210, 158.220 and 158.230 of Title 33 Code of United States Federal Regulations 1989, can be adopted for use in Nigeria as an alternative for computation. It is as follows:

> For each day a port or terminal is under operation, a reception facility shall be capable of receiving -
>
> (a) sludge from on-board fuel and Lubricating oil processing in the amount of 10 metric tons or 1 metric ton multiplied by the daily vessel average, whichever quantity is greater and
>
> (b) oil bilge water in the amount of 10 metric tons or 2 metric tons multiplied by the daily vessel average, whichever quantity is greater.

The above methods for estimating separator sludge and bilge water can be used to arrive at the capacity for these wastes for the Lagos, Forcados and Bonny reception facilities.

The alternative below can also be considered. Table 12, gives port entries and total oily waste (exclusive of ballast water) and approximate quantity of separated waste etc..

Table 12

	Port Entries	Total Oily Waste (Exclusive of Ballast Water	Approximate Quantity of Separated Waste Oil per Year
Rotterdam	45,000	300,000	60,000
Hamburg	14,000	80,000	16,000
Antwerp	10,000	40,000	8,000
Gothenberg	5,000	22,000	4,500
Tokyo	4,500	35,000	7,000

Source: Recycling of Oily Waste in the Marine Industry, by K.J Kenton and Jan Hedberg.

By comparing the port entries and the total oily waste in Table 12, an approximate estimate can be made of the quantity of waste expected or available for discharge per ship visit. Although this will vary from port to port, it can be used as a guideline for estimating the minimum requirements when establishing the proposed reception facilities in Nigeria.

The building and commissioning of the proposed three reception facilities will take some time to materialize. During the building phase, the following suggestions are recommended to minimize operational discharges from ships:

All crude oil and black product tankers calling at Nigerian ports and oil terminals should be equipped with SBT, as stipulated by the MARPOL Convention. Samples of the surfaces of the SBT should be taken at random for analysis before they are discharged overboard.

A Clause in the Charter Party of tankers trading in Nigeria waters should make it possible for the ships to carry the

dirty ballast until opportunity becomes available to them to deballast to a reception facility. The cost arising thereof is to be shared by the shipowner and the charterer.

If the proposed product storage tank farms at Bonny, and their pipelines materialize as planned at the end of December 1990, the NNPC'S tanker M.V Tuma, presently used as a product storage tanker at Bonny River, will be free and she can be converted for use as a floating reception facility, until the fixed reception facilities are completed.

The possibility of using the existing submarine pipelines at the crude oil terminals to load crude oil and discharge ballast water to some crude oil storage tanks in the tank farms of the oil terminals should be examined.

This will act, maybe as a temporary measure, to receive oily waste and ballast water from ships which will be treated and disposed.

The advantages and disadvantages of using the existing submarine pipeline and the cost etc. of installing a new line should be looked into.

The economic advantages should not be the only factor for consideration. The simplicity of the system and the provisions in the MARPOL Convention that state that ships using reception facilities should not be unduly delayed amongst others should also be examined.

The use of existing facilities and infrastructures will reduce, immediately, a considerable amount of the oily wastes currently discharged into the Nigerian waters, especially during the design and construction stages of the proposed reception facilities at Bonny and Forcados. This could also be extended to Qua Iboe oil terminal.

F. Magi and A. d'Addio in their paper "Consideration of the Dimensions of Ballast Water Reception and Treatment Plant", at the Symposium on Prevention of Marine Pollution from Ships - Acapulco Mexico, 1976, examined three alternative system, for unloading ballast to onshore facilities. These are as follows:

(a) the possibility of ballast water discharge by means of an installation completely separated from that used for crude handling;

(b) partial use of existing installations for the handling of crude - for moorings equipped with two lines, one of the two may be alternatively used for the discharge of ballast water, the latter being displaced into the on-shore tanks by means of the crude at the end of the discharge operation;

(c) full use of the existing installations for the handling of crude; this applies only to moorings connected to the shore by a single line.

6.5 Technology of the Separation Process

According to the Guideline for the Provision of Reception Facilities in Ports - Oily Wastes, the technology of the treatment and separation process is a significant factor in determining the adequacy of a reception facility. It provides a measure of the time required to complete the process cycle and it is the primary means of producing an effluent of required purity.

These processes should include separation, treatment, and the ultimate disposal of the residue and effluent from the reception facility. The effluent discharge criteria should be defined in the national law. The maximum oil content of the effluent from the reception facility to be discharged to the sea should be less than 10 ppm and devoid of any harmful substances. Also the national regulation should spell out the criteria of the final disposal of the residue.

There is a lot of technology available presently for separation of oily waste. In broad terms it can be divided into two categories:

SEPARATING WATER FROM OIL;

SEPARATING OIL FROM WATER.

The details of the different separating techniques for oily waste will not be examined, but the most commonly used ones will be mentioned. Kenton and Hedberg in their report "Recycling of Oily Waste in the Marine Industry" gave details of separating techniques for oily waste.

6.5.1 Separating Oil from Water

In the marine industry, generally oil has to be separated from water - dirty ballast water, oily bilge etc..

Separation by gravity: this requires storage tanks and valves to run off the effluent and residues; sometimes heating and long waiting times are required for separation to take place.

There are different types of oil-water separators - API and Parallel Plate separators to mention but a few. They use baffles or parallel plates to aid separation. Oil rises to the top, where it is collected.

Filtration can also remove oil from water. Materials used are quartz sands, coke, crushed lime stone and activated carbon filters.

In hydrocyclones, the oily mixture enters tangentially a cylindrical tube which creates a swirling flow having a gravity force of about 1000g. The oil rises to the top of the central core where it is collected.

Centrifuge separation can be use to separate oil from water. The centrifugal force throws the water to the outside and the oil to the core of the centrifuges.

In flotation tanks, air or gas bubbles are introduced. They become attached to the oil droplets in the oily mixture, which then rise to the top where they can be skimmed off.

Biological treatment and bacterial growth is a system where bacteria are introduced and they biologically separate the oil droplets from the water.

6.5.2 Separating Water from Oil

In this type of separation, the larger percent of the mixture is oil, and the water is removed from it. The separating process can be by the use of settling tanks, where due to the force of gravity the water settles below the oil and is drained off. The settling can be accelerated by heating or and by the addition of demulsification chemicals.

Distillation/evaporation is another method whereby water is removed from oil. The mixture is heated above 100 degree Centigrade, and the water and other solvents evaporate. The boil off should be condensed and the water removed from the other mixtures to minimize air pollution.

6.6 Capital Cost and Financing of the Proposed Reception Facilities

The capital cost of building a fixed installation for Lagos, Forcados and Bonny will run into several millions of U.S dollars. Establishing a reception facility is a capital intensive project. The money needed for construction will be mostly in hard currency.

According to Kenton and Hedberg, the cost of building a reception facility for receiving contaminated ballast water before 1986, for a crude oil and product oil tanker loading port having large tank farms, was 3 million U.S dollars or more. After 4 years, in 1990, with inflation over the years, the capital cost will be very much in excess of 3 million U.S dollars.

The capital cost of the ballast treatment plant operated by Boru Hatlari Ile Petrol Tasisma A.S. (BOTAS), at Ceyhan, southern Turkey was approximately 5 million U.S dollars (MEPC XI/16/1) as of 2 May 1979.

Kenton and Hedberg estimate that the cost of installing a small reception facility will be 50,000 U.S dollars - having a capacity of receiving up to 10,000 tonnes of oily waste per year. This small reception is mounted on a 10 by 10 metre concrete slab and surrounded by a bundwall. Four mobile tanks with a capacity of 25 tonnes each are connected to an oil-water separator and a sand filter. Pumps, pipework and connections are also provided.

In John Oestergaard's report prepared for the World Bank and IMO on "A Preliminary Survey of Waste Disposal in West and Central African Ports", Table 13 shows the estimated cost for a treatment facility for oily waste water.

The finance for constructing the three reception facilities will not come easily.

The financing of the reception facility in Forcados and Bonny can be through Clean Nigeria Associates (CNA) or a similar Organization formed by the Oil Producing Companies operating in Nigeria.

CNA was founded in 1981 by eleven oil producing companies co-operating to enhance oil containment and clean up capabilities in Nigeria in the event of an oil spill. The function of CNA can be enlarged to include building and operating reception facilities in Bonny and Forcados. These arrangement can be co-ordinated through NNPC and the Ministry of Petroleum Resources. These oil companies have the resources and the finance; they also produce the oil which the tankers transport from Nigeria and operate the oil terminals. These tankers that carry the crude oil, contribute immensely to the pollution of the Nigerian waters through routine tanker

operation discharges.

The NNPC and Petroleum Inspectorate of the Ministry of Petroleum Resources on coming up with a Guideline which will be legislated into law, the oil companies will have no alternative than to oblige and finance the building of reception facilities in the oil terminals, most especially at Bonny and Forcados. This proposed Act will go a long way towards reducing the pollution from ship in Nigeria waters.

The finance for the Lagos reception facility will be a lot more difficult to secure. The NPA the operators of the port, is supposed to finance its construction. The NPA can solicit the financing from banks or international organizations. Organizations like World Bank, UNDP, IMO, SIDA, UNEP and other Governmental Agencies can be approached to fund this noble concept of reducing operational discharges by ships in the West and Central African region.

NIL

Table 13

Cost Estimate for Port Reception and Treatment Facility for Oily Waste Water

PRICES IN USD ,000

SIZE OF HOLDING/ SEPARATION TANKS	2*150 M^3	2*250 M^3	2*400 M^3	1,000 M^3
Tanks	61	88	119	107
Foundations	18	22	27	24
Ground and sewage Work, Incl. oil separator, oil storage tanks, and pump station	53	61	68	76
Pipe Work, Incl pumps and valves	53	56	58	61
Electricity Work	24	25	26	27
Projecting	30	30	30	30
Total	239	282	328	325

SOURCE: Annex A, of A Preliminary Survey of Waste Management and Waste Disposal in West and Central African Ports by J. Oestergaard.

If finance cannot not be secured for Lagos Ports, only storage tanks can be built in the port to receive the waste. This waste can be transported to Bonny or Forcados reception facilities for treatment and final disposal. Coastal tankers bringing oil to Lagos from Port Harcourt or Warri refineries can use this waste as their return ballast back to these refineries where they will be discharged and treated.

The Government of Nigeria will need help to finance the Lagos reception facility, the reason being that the country is overburdened with an external debt of 34,089 million U.S dollars (Source: IMF/World Bank as was reported in AED, Volume 11 No. 23 pp 14 of 11-17 June 1990). The building of the reception facility will not be a priority of the government, thus help should be sought from elsewhere.

The Report by the IMO/INTERTANKO/ICS/CEC study on financial mechanisms for the funding of reception facilities (MEPC 29/WP.13/Add.1) is eagerly awaited. The work was finished in March 1990. This Report may offer a solution for the funding of the proposed three reception facilities, especially Lagos.

Note

6.7 Operation

The operational modalities should be spelt out in the national regulations. It should be such that the reception facilities will be self-financing.

Kenton and Hedberg reckon that 20% of waste oil can be recoverable from the total bilge water and separator sludge discharges and that approximately one tonne of waste oil is received for each seagoing ship entry to port.

The budget illustration for operating a small reception facility by Kenton and Hedberg (Table 13), shows that for a capital cost of 50,000 USD, the plant can pay for itself in under 3 years with no charge to ships for reception of the oily waste and the recovered oil sold at current market price.

Similarly, according to the information provided by the Turkish Authorities on the reception and treatment plant at BOTAS (Ceyhan) terminal for a plant costing 5 million USD, the sale of crude oil recovered was able to pay for the capital cost of the plant in under 2 years (Table 14).

Table 14

Cost of the Plant:	Approx. 5 million USD
Crude oil loaded from May 1977 to February 1979: (the terminal had operated with 30% capacity up to 1 January 1979)	169,002,993 barrels
Crude oil recovered:	218,312 barrels
Income from the crude oil recovered:	Approx. 2.5 USD
Approx. price per barrel recovered:	11.45 USD
Approx. period over which revenues from recovered oil equal initial capital outlay:	2 years.

Source: MEPC XI/16/1 (ANNEX I).

NO!?! should not be!

From the above evidence, it is possible to make a profit from the sale of recoverable waste oil from ship oily waste treated at reception facilities. Hence the three proposed reception facilities will be a viable investment.

The national law should demand that waste be segregated at source - separator sludge should not be mixed with bilge water. To augment the supply for oily waste from ships, oily waste from ashore - garages, industries etc. - should also be collected and treated in the reception facilities. This will take care of the present situation whereby most of these oily wastes are emptied into the drainage system and eventually find their way to the sea.

6.7.1 Fees

The reasoning that "no fee for discharging of waste in ports" will encourage masters to discharge their waste to reception facilities is absolutely correct. But for the three proposed reception facilities for Nigeria, a nominal fee covering the cost of transportation and treatment of the waste should be charged to shipowners which will be included in the overall port dues. This is the practice in most countries. In Gothenberg-Sweden and Copenhagen-Denmark the cost of discharge of waste is included in the overall port charges - thus, no special charge. In the United Kingdom, Poland, Finland and Norway charges can be made by port operators, while in Singapore and the former German Democratic Republic no charge applies for only dirty ballast. The USA, USSR and Federal Republic of German have some kind of fee which varies from port to port.

fee should

no! - separate post. and not higher than to cover actual costs.

6.7.2 Advance Notice Requirement

At least 24 hours advance notice should be given to the port by the Agent of the vessel, giving the quantity, the content of the waste and the estimated time of the arrive of vessel in compliance with other measures contained in the MEPC Circular on "Guidance for the Development of Uniform information on the Availability and use of Waste Reception Facilities in Ports", Annex 9 of MEPC 23/22. The provisions of this circular can be incorporated into the national regulations.

6.8 Inspection and Monitoring

Operators of ports, especially of reception facilities, should conduct inspections or surveys under Port State Control (PSC) using the Paris Memorandum of Understanding and the Guidelines for Surveys under Annex I of MARPOL 73/78 [Resolution MEPC. 11(18)]. A checklist can be developed for easy reference by surveyors for PSC. The Oil Record Book is to be inspected to ascertain that the vessel has been discharging ~~her~~ its oily waste to shore reception facilities. This inspection is be to carried out on all ships that have no discharge or very little discharge to deliver to the reception facilities.

The enforcement of discharge criteria contained in MARPOL 73/78 should be pursued religiously for most vessel in Nigeria waters, especially the ones in port.

On board inspection of ships using Nigerian ports should check that the discharge and pollution prevention equipments recommended by MARPOL 73/78 are installed and in good working condition. Tankers using Nigerian waters should, in addition, have an International Oil Pollution Prevention Certificate (IOPP) and operate segregated ballast tanks as stipulated by the Convention.

Naval ships, helicopters and light aircraft should be employed for effective monitoring of the Nigerian waters.

Regarding monitoring, a paper by R. Grant on "Tanker De-Ballasting Operation at Sullom Voe Oil Terminal" during the IMO/UNDP International Seminar on Reception Facilities for Waste on 30-31 August 1984, states that the - condition has been imposed by the authority whereby all tankers are obliged to berth with at least 35% of their carrying capacity as ballast, an incentive to discourage the discharge of contaminated ballast at sea; failure to comply with the ruling will result in the terminal refusing to load the offending ship. The oil terminals should adopt this procedure as a cheap and effective way of monitoring pollution by tankers using the Nigerian waters.

not anyone CBT, all SBT.

6.9 Disposal of Waste

As stated previously, garbage waste will be disposed of by the municipal garbage disposal system in operation in the area where the port is situated.

After treatment of the oily waste, the effluent (water) will be discharged back to the sea. The discharge will be constantly monitored and should be in-line with the acceptable standards stipulated in the national regulations (less than 10 ppm is recommended).

The recovered waste oil from the oily waste can be sold as waste oil or improved upon by regeneration (re-refining), reclamation or recycling. The details of these processes will not be examined in this project.

The waste disposal strategy should include amongst others:-

- segregation of waste at source;
- recycling and treatment of the waste to reduce its effect to environment;
- continuity of the reception facility's plants;
- disposal of effluent and residue should be in line with the provisions contained in the law;
- final disposal of residue to be monitored on a continuous basis;
- an independent body to monitor the disposal arrangements of the reception facilities.

Disposal of the residue can be in the form of sludge farming, landfilling or incineration. If the disposal of the residue is not effected properly, it could devastate the environment in the future and also contaminate the ground water. The disposal of waste in an environment conscious nation is attracting much attention, facing stiff opposition and closely watched and monitored. Hence the most common disposal methods - landfill, sludge farming and incineration will be examined.

6.9.1 Landfill

According to The Oil Companies European Organization for Environmental and Health (CONCAWE) Report No. 3/80 on Sludge Farming, - landfilling is the most common traditional means of solid waste disposal. Its shortcomings are widely recognized and the method is subject to increasing restrictions and criticism on environmental grounds.

Kenton and Hedberg reckon that an uncontrolled cocktail of wastes is deposited onto a landfill site, which creates mixtures of hazardous products in future, with the likelihood of leaking and reaching underground aquifers or water

sources. Hence this option is under severe scrutiny.

If this method will be used to dispose of the waste from the reception facilities, a careful scientific study has to be carried out before a site is chosen. The site will have the remotest possibility of contaminating the ground water and monitoring of the site will be on a continuous basis. Only a fixed quantity of oil can be spread over an area of landfill and the oil has to be stabilized to minimize its mobility, as recommended by Kenton and Hedberg.

From the above, other possibilities of waste disposal will have to be pursued by the operators of the reception facilities. The local Authority/Ministry of Environment should issue Guidelines on methods of disposal of waste which will include landfill.

6.9.2 Sludge Farming

Sludge Farming is defined in CONCAWE Report No. 3/80 as one of the destructive techniques of waste disposal. It is based on the biological oxidation of hydrocarbons by the natural soil microflora.

The report recommends a selection of a piece of land with suitable drainage, prepared as for agricultural purposes including the addition of fertilizer as necessary. The waste oil is spread on its surface at an appropriate concentration. The oily waste is mixed with the top-soil using normal agricultural machinery and the mixing is repeated at intervals. The microbial population present in the top-soil grows on the oxidation. The final product of the process appears to be microbial biomass - contributing to the soil humus content, carbon dioxide and water.

The plot of land will be continuously monitored. The application may be repeated at suitable intervals after soil analysis has been carried out.

The CONCAWE Report concludes that provided some simple safeguards are observed, sludge farming is ecologically the most suitable and cost effective method of oily waste disposal.

Kenton and Hedberg recorded the following drawbacks of sludge farming:-

(a) large areas of land may be required for the spreading of large quantities of oily waste;

(b) the oily waste must be closely monitored for contaminants and other hazardous chemicals in the oil;

(c) oily waste containing heavy metals such as lead or cadmium, alkalines, soluble toxic substances and other persistants is less suitable for sludge farming.

The reception facilities should seriously consider sludge farming as a method of disposing of their waste as it is cost effective and ecologically most suitable.

6.9.3 Incineration

With the restrictions on landfilling and the absence of large piece of land for sludge farming, then incineration can be considered. Incinerators operate at 800-1000 Degrees Centigrade, but high temperature ones operate at 1,200 Degrees Centigrade while cement kiln types operate at about 1,800 Degrees Centigrade.

The main types of incinerators available are:-

Box Furnace;
Vortex Combustion;
Fluidizer Bed Furnace;
Cement Kilns and Rotary Kiln .

CONCAWE Report No. 3/80 highlights the following advantages and disadvantages for incineration of oily waste.

ADVANTAGES:

- Reduction of the volume of waste - the residue is only 5-10% of the original sludge volume;

- the end product is sterile ash which neither ferments nor emits odours;

- incineration allows heat recovery under certain conditions.

DISADVANTAGES:

- Requirement for full-time operator;

- production of pollutant gases, soot and solid particulates, requiring cooling, water spraying or other special treatment before release to the atmosphere, in order to satisfy air pollution regulations,

- incineration is a destructive process with high energy consumption (unless heat recovery can be employed to minimize the energy penalty);

- the final ash, albeit of low volume, requires disposal.

Kenton and Hedberg reckon that the cost of having waste incinerated is high; hence less expensive acceptable alternatives are preferred.

Incineration is another alternative that can be considered as a means of waste disposal by the operators of the proposed reception facilities.

Chapter 7

Conclusion

In the previous Chapters, the need for reception facilities has been highlighted as a means of reducing operational discharges from ships that are polluting and destroying the Nigerian marine environment.

A total of 1,655,542,959 metric tonnes of crude oil was exported from Nigeria between 1958 and 1989. According to UNEP Regional Seas Reports and Studies No. 4, between 0.35% and 0.5% of a tanker's cargo results in tanker's operational discharges, without the use of Load-on-Top (LOT), Crude Oil Washing (COW) and Segregated Ballast Tanks (SBT) in tankers.

LOT, COW and SBT have been practiced on tankers at different times in the last 20 of the 31 years under consideration. Thus, a conservative operational discharge figure of 0.43% of the tanker cargo will be used to calculate the approximate tonnes of oil discharged into the Nigerian marine environment due to operational discharges by tankers loading crude oil in the oil terminals.

Also, it is assumed that the cargo carrying capacity of the tankers that carried the crude oil is equal to the total amount of oil lifted.

As such, 1,655,542,959 metric tonnes of cargo were carried from Nigeria during that period. 0.43% of the total exports is 7,118,834, which is approximately equal to the operational discharges resulting from the dirty ballast, wash

water etc. discharged into the Nigerian marine environment by tankers during the period 1958-1989.

Kenton and Hedberg reckon that the equivalent of 1 tonne of waste is received for each seagoing ship entry to port - from the discharge of bilge water and separator sludge.

From 1958 to June 1989, a total of 132,744 vessels entered Nigerian ports and oil terminals, hence resulting in 132,744 tonnes of waste oil which most likely was discharged into Nigerian waters.

A yearly average of 229,629 metric tonnes due to operational tanker discharges and 4,352 metric tonnes per year due to bilge and separator sludge discharges find their way into the Nigerian waters annually.

The absence of reception facilities in Nigerian ports and oil terminals is making it impossible to reduce significantly the above operational discharges into the Nigerian marine environment by ships.

Three reception facilities have being recommended to be sited at Lagos, Forcados and Bonny. The need to accede to MARPOL 73/78 and subsequent Amendments and the incorporation of the necessary provisions into the Nigerian national law cannot be over emphasized. This move will be the starting point of the long fight towards reducing the pollution of the Nigerian marine environment by routine operational discharges from ships.

The legislation should delegate power of enforcement, inspection, monitoring and responsibility for controlling marine pollution to the NPA and the Marine Inspectorate Division of the Ministry of Transport. The Navy and Marine Police should aid the NPA and Marine Inspectorate Division in the surveillance of the Nigerian waters. The penalties for violation of the regulations should be spelt out in the legislation.

The three proposed reception facilities should be adequate for all the oily waste expected from ships using Nigerian ports and oil terminals. The non-recommendation of reception facilities in all ports, especially small and medium ports in Nigeria, should not be construed as inadequacy, as flexible plans should be incorporated and available to relieve all vessels of their waste without causing them undue delay. The lack of funds to build more reception facilities necessitates this approach.

The reception facilities should be open to all vessels. This is because the proposed reception facilities are envisaged to service the West and Central sub-region. The reception facilities should be self-financing and tax relief should be given to their operators and on recovered waste oil.

The United States system of issuing a Certificate of Adequacy to a port or terminal receiving oceangoing tankers, or any other oceangoing ship of 400 gross tons or more, should not be applied. The centrally located reception facilities should cater for all small and medium ports within their regions.

The oily waste from the smaller and medium ports should be transported to the reception facilities. The operators of the reception facilities and transporters of the waste should be licenced, as is the case in The Netherlands. The licenced authorized transporter and collector of the waste (garbage and oil), will have authorization for collection and retransportation and delivery of the waste to the reception facilities and designated locations. This will safeguard against the indiscriminate dumping of these waste.

Bureaucracy is to be reduced to the barest minimum for ships using the facilities. In order to act as a deterrent and discourage carelessness by ship personnel, it is important to warn ships that delays may be encountered if a ship spills oil.

Vessels should be ready to discharge oily waste at any time to reception facilities. For a ship discharging SBT directly overboard, booms should be provided to surround the vessel. This will contain any accidental discharge of oily water mixture overboard.

The overboard discharge valves of bilge pumps, oily water separators are to be shut and sealed when the vessel is in port. Unless the vessel has operational equipment that can guarantee 15 ppm and automatic stopping device which will close the overboard discharge valve if 15 ppm is exceeded.

The three reception facilities should work in co-operation, especially during downtime/breakdown of any one of the facilities. The reception facilities should always be upgraded. Planned maintenance and condition monitoring of the plants should be practiced to minimize downtime and undue delay to the vessels using the facilities.

For the future, the trade pattern of vessels, the traffic density and pattern, changes in technology and methods of ship operations which will affect the quality and quantity of waste should be continuously investigated, assessed and evaluated. The results obtained are to be used in upgrading the reception facilities in terms of capacity, treatment, standards amongst others. The address to report inadequacy should be readily available to ship masters and ship agents.

Monitoring, surveillance and assessment of the Nigerian waters with regards to pollution will be continuous and will provide the necessary feedback to plan for the future trends and developments in the fight against marine pollution resulting from ship operational discharges.

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