THE INTERNATIONAL MARITIME TRANSPORT & LOGISTICS CONFERENCE (MARLOG 6)
GLOBAL INTEGRATION IN PORTS "FUTURE OPPORTUNITIES"
19 - 21 MARCH 2017

STUDY OF PORT RECIPTION FACILITIES INSCZONE PORTS

THURAYA ABO ZIED
Department of Civil engineer, Port said University
Arab street, Cityname, P.O.Box 0000, Countryname,
Thoria_abozied@yahoo.com
Suez Economic Canal Authority
Company address, email

ABSTRACT:
The study concerns in requirements of port reception facility (PRF) according to Imo (international maritime organization) for receiving generated oil and garbage from ship, review the current situation of SCZONE PORTS and the requirement of PRF management, the current and future quantities of oil and garbage to make the perfect design for the future facility and the cost required to complement with the international ports and follow specification of prevention pollution from ships.

Keywords:

IMO International Maritime Organization, MARPOL 73/78, Port reception facility, SGW Ship-generated Waste, PSC Port State Control, oil bilge, sludge and garbage , CR (Cargo Residue).

INTRODUCTION

The overall objective of this study is to provide SCZPORT with a study on the delivery of SGW and CR to PRF in their ports.
The specific objectives are:

- Action requested of Member States, status of Egypt ports according to IMO and specific connection of prevention pollution from ship.
- Prepare waste volume sheets for identified ports based on figures received and design equations.
- Describe the applied waste handling system and managements of all action required between the port and the ship in mentioned port.
- The costs of port reception facilities and Port fees requirements.
- Analyze and design facility of ports (ELADABYA, AIN SOKHNA, and WEST PORTSAID –EAST PORTSAID-ARESH-TUR).

MAIN CONTENTS

The project "Port Reception Facilities for Collecting Ship-Generated garbage, bilge water and oily wastes" is concerned with the identification of required capacities for collection and treatment of relevant types of solid and liquid wastes, taking into consideration the type and capacity of existing installations and specific nature of traffic in each port concerned, as well as specific requirements resulting from such differences.
Annex I of MARPOL 73/78 contains certain regulations and interpretations related to procedures for the retention onboard, treatment, discharge at sea and disposal of oily mixtures generated in the machinery spaces of all ships and the cargo areas of oil tankers. .

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

All the beneficiary port of the project are signatory parties of the International Convention MARPOL 73/78 Annex I and Annex V dealing with the prevention of marine pollution from ship-generated garbage.
The strategic, geographical position of Egypt in the eastern Mediterranean and Red Sea in association with their natural link, the Suez Canal, makes the ports' sector and the maritime industry in general a significant asset for the external trade and economy of the country. the role of ports in Egypt through constant development and modernization to become logistic and distribution centers apart from being important gates for imports and exports, the promotion of the private sector in the ports and maritime related activities, the use of state - of the – art technologies and competent human resources to ensure safety of navigation, protection of the environment, etc.

Wastes types collected from vessels :

- Oil and oil delivered wastes under the scope of MARPOL73/78 Annex-I which arise due to normal activities of vessels;
- Bilge: percolating water and oily waste water formed in machine and auxiliary machine sub tanks of vessels, coffer-dams, warehouses or similar sections of the vessel.
- Sludge: Sludge composed of residue and/or oily sediments formed in engine rooms, fuel tanks of vessels or cargo tanks of oil tankers.
- Slop: Including tank washing water formed due to washing of the cargo tanks of vessels, oily water wastes accumulated in slop tanks.
- Dirty Ballast: Ballast water that cases appearance of oil, oil derived stains or oil stains above water or at the coast line or that creates color changes above or under water or causes accumulation of solid materials/emulsion in suspension when released from the vessel to water.
- Waste oil: Dirty oils that lost its nature after used by main machine and auxiliary machines in the vessel. Solid sludge: Oil sludge solidified at the bottom of oil tank of the vessel.
- Waste water/sewage under the scope of MARPOL73/78 Annex-IV: Sewage: wastes from toilets, urinals and toilet scuppers, liquid wastes from lavabo, scuppers and basins in infirmary, dispensary and hospitals, discharge from areas where there are live animals or other waste waters mixing with these.
- Garbage/trash wastes under the scope of MARPOL 73/78 Annex-V: Trash : municipal and operational solid waste waters formed due to normal operation of the vessel and under the scope of MARPOL 73/78 annex-V.

  -Category-1: plastic.
  -Category-2: floating; piling tools, coating or packaging materials
  -Category-3: grinded; paper products, scraps, glass, metal, bottles
  -Category-4: paper products, scraps, glass, metal, bottles, pottery
  -Category-5: food wastes.
  -Category-6: kiln ashes excluding the ones composed of heavy metal wastes or toxic plastic products.

The study only concerns in bilge, sludge, waste oil and garbage which its regulation MARPOL 73/78 Annex I and Annex V.

Waste Discharge in EGYPT Port Area :

The discharge requirements under MARPOL Annex I and Annex V that are applicable to the Mediterranean Sea are summarized in Table 1 and 2. As the discharge of oil or oily mixture and garbage is subject to control in the Mediterranean Sea,

•ships are requested to retain on board wastes that cannot be discharged into the sea, and

•Ships have to dispose such wastes into adequate reception facilities Made available in ports and terminals.

Type of solution of waste management :

There are many types of facilities which should be in the port such fixed, floating and mobile which is shown in figure (1,2and 3) but the important step is how the port choose the optimum and suitable facility, An important element in the planning of the port reception facilities, especially in case of stationary reception facilities, is the selection of a suitable location for these facilities. Site selection should be part of a feasibility study in the planning/study phase. Important criteria for site selection are discussed, with respect to the different reception and pre-treatment options.

1. The final treatment and/or disposal facility will be based on-shore,
2. The collection equipment can ei00ther be mobile or shore-based at a central point.

In most cases a choice will have to be made between mobile and fixed reception facilities, although in large ports both can be applied.

A. Mobile reception facilities Selection:

•Advantage:

The investment cost is less (especially in case of trucks), that they can be put in operation very quick, and that they can be operated in a more flexible way.

•Disadvantages

The interference of movements on the quay/in the water with other operations, such as loading/unloading of cargo, and a restricted or prohibited access for mobile facilities on jetties, such as those where oil products, liquefied gases, bulk chemicals or packaged dangerous goods are handled, are possible.

•TYPES:

Floating reception facilities usually barges, either towed or self-propelled.

1. Liquid MARPOL residues by barges.
2. Solid MARPOL residues

B. Vehicles reception facilities selection:

•Advantages:

High flexibility with respect to the place of waste reception can be achieved.

•Disadvantages:

The loading capacity of vehicles is usually much smaller than the capacity of barges; and terrain and road surfacing should be suitable for safe and swift transport.

C. Fixed reception facilities selection

Advantage:

Scope of collected wastes will be wider (as they can be designed and equipped in a way that all MARPOL wastes and residues can be collected), that they have a larger capacity for collection and storage, and that they can combine the collection, storage and treatment of different waste types.

Disadvantage:

•The higher investment cost for these facilities.

•For larger ports a ship has to shift berth, if reception of the waste is located at a fixed place. Shifting berths is a difficult, time-consuming and expensive affair, which might lead to undue delay. If reception facilities are located in the wrong place, delays, congestion and an increased risk of accidents and collisions will result.

The construction of pipelines to each berth might be a feasible option, especially if the reception is combined with a tank cleaning facility, e.g. at an oil terminal.

Integrated fixed plant of oil and garbage components:

Typical layout of a larger port reception and treatment facility for Annex I and II wastes is shown. The plant also has a tank cleaning facility.

The treatment equipment in this facility includes:

.1 a buffering/equalizing tank;

.2 a plate separation;

.3 a flocculation/flotation combination;

.4 a centrifuge; and

.5 a biological treatment.

METHODS

With a view to calculating the quantities of waste generated and expected to be generated in the future by ships visiting SCZ ports, we intended to use available models. An estimate of the garbage volume should be calculated using a range of factors such as persons on board, anticipated length of voyage, the application of minimization technology, type of ship and ship operational considerations. There are different ways and models to estimate garbage. Two models are discussed here:
• the model developed for REMPEC1 in the framework of an Assessment of the existing situation and needs regarding port reception facilities for collecting ship-generated garbage, bilge water and oily wastes.
• the model which FSI3 is currently developing. Both models are micro-models, because they try to calculate the total amount of waste bottom-up, from each individual ship and person on board. This part of paper explain the Analysis of Ship Generated Waste in SCZONE Ports and the followed method Oily bilge water and oil residues.

A. Oily bilge water and oil residues:

$$Q\ t = Q\ si + Q\ m\ (m3/day) \quad (1)$$

Where:

$$Q\ si = N1 * Psi * T/365 \quad (2)$$

And

$$Q\ m=N2*Pm*T/365 \quad (3)$$

in which Qt = Volume of oily wastes from the machinery spaces of ships to be received (m3/day),Qsl = Volume of oil residues (sludge) to be received (m3/day),Qm = Volume of oily bilge water to be received (m3/day),N1 = Number of ships calling at the port annually,N2 = Number of ships without oily bilge water separating and filtering equipment (with only bilge holding tanks) calling at the port on an annual basis,Psl = Oil residues daily production (0.02 x fuel oil daily consumption per day (gr/HP * hr.) of voyage (m3/day),Pm = Oily bilge water production per sailing day from N2 ships calling at the port (m3/day),T = Average duration of voyage before calling at the port and stay at the port area (days),Psi= Oil residues daily production (0.02 x fuel oil daily consumption per day.

B. Garbage

The REMPEC model

(The volumes of domestic, maintenance and cargo) Associated waste areCalculated from the following formula:

$$G = GD + GM + GC\ (kg/week) \quad (4)$$

Or

$$G = GD + GM + GC / \rho\ (m3/week) \quad (5)$$

Where:

P	250 kg/ m3 the average density of shipboard garbage
G	the quantity of garbage received in peak seven day period (kg/week)
GD	the quantity of domestic solid waste received in a peak seven day period (kg/week)
GM	the quantity of maintenance solid wastes received in a peak seven day period (kg/week)
GC	the quantity of cargo associated waste received in a peak seven day period 8

- **Quantity of domestic waste**

$$GD = GB + GP + GH \quad (6)$$

Where:

$$GB = NB * TB * QB * PB \quad (7)$$

in which GB = quantity of domestic garbage received in peak seven day period from sea-going cargo ships (kg/week),NB = number of cargo ships calling at the port in the same period,TB = average duration of voyage and stay at the port of sea going cargo ships(days),QB = average daily domestic garbage generation rate on sea-going cargo ships (2.0 kg/person and day),PB = average number of persons onboard a typical sea-going cargo ship (persons/vessel).

$$GP = NP * TP * QP * PP \quad (8)$$

in which NP = number of passenger ships calling at the port in the same period,GP = quantity of domestic garbage received in peak seven day period from passenger ships (kg/week),TP = average duration of voyage and stay at the port this kind of ships (days)
QP = average daily domestic garbage generation rate on passenger ships (3.0 kg / person and day),PP = average number of persons onboard a typical passenger ship(persons/vessel).

GH = NH * TH * QH * PH…… (9)

in which NH = number of harbor craft engaged in the port operation,GH = quantity of domestic garbage received in peak seven day period from harbor craft (kg/week),TH = average duration of voyage and stay at the port of harbor craft (7 days),QH = average,daily domestic garbage generation rate on harbor chart (1.0 kg/person and day) ,PH = average number of persons onboard a typical harbor craft(persons/vessel)

- **Quantity of maintenance waste**

GH = NH * TH * QH * PH…… (10)

in which N = number of vessels in port during a peak seven-day period (vessels/week);
T = average duration of ships' transit and stay at the port area (days);M = average quantity of maintenance solid wastes generated daily from a typical vessel (11 kg/vessel-day).

- **Quantity of cargo – associated waste**

GC = CB + CD + CC…….…… (11)

In which CB = WB * 1/123 = quantity of break bulk cargo solid wastes received in aPeak seven-day period (kg/week);

In which WB = quantity of break bulk cargo received in a peak seven-day period (kg/week); 1 / 123 = break bulk cargo waste generation factor;CD = WD * 1/10,000 = quantity of dry bulk cargo solid wastes received in a peak seven-day period (kg/week);WD = quantity of dry bulk cargo received in a peak seven-day period (kg/week); 1/10,000 = dry bulk cargo waste generation factor's = WC 1/25,000 = quantity of container cargo solid wastes received in a peak seven-day period (kg/week);WC = quantity of container cargo received in a peak seven-day period (kg/week); 1/25,000 = container cargo waste generation factor.

RESULTS

Port Analysis

1-Eladabya port:

The port is Located on the western shore of the Gulf of Suez, and is 17 kilometers from the city of Suez and this port consists of nine berths of length of 1840 meters and a draft between 27-42 feet. 158

kilometers of water area Km square (158,073,000 square meters) (a shared space between the port of Suez - petroleum basin - literary), Land area of 8 square kilometers (854,000 square meters),

The Port Specifications are The maximum design capacity (absorptive) 10.75 million tons per annum statements are as follows: General cargo 3 million tons., Dry Bulk 3 million tons.

Green bulk 3 million tons, Oil 850,000 tons, Hours: 24 hours a day on three shifts, figure (4) shows the master plan of ELADABYA port ,

Table (3,4)shows: oily bilge and sludge and garbage estimated in ELADBIA Port.

2-Elsokhna port:

The port is located on the west coast of the Gulf of Suez on 22.3 square kilometers and at a distance of 43 kilometers from the city of Suez.

It is a port of the century and is one of the latest ports that were created by the system B.O.T and managed logistics centers This system is one of the giant national projects and is the result of planning and implementing a structured very important stage in the development of the Arab Republic of Egypt on the global maritime map. Is the first hub port comprehensive, integrated and multi-purpose. It comes under the name of "third-generation ports" to serve the import and export of general cargo, bulk and container handling and is equipped with the latest modern technology,

The Port Specifications are The total area of 87.8 square kilometers., Water area of 65.5 square kilometers, Floor area of 22.3 square kilometers and Larger view of the harbor 5.5 square kilometers (5.5 million) m2, , figure (5) shows the master plan of AIN-SOKHNA port , Table (5,6)shows: oily bilge and sludge and garbage estimated in AIN-SOKHNA Port.

3-WEST PORT-SAID port:

Port Said port is situated on the Northern entrance of the Gulf of Suez. It is considered one of the main Egyptian ports due to its distinguished location at the crossroad of the most important world sea trade route between the East and Europe via Suez Canal, and the most extensive transshipment port in the world.

The port is bordered, seaward, by an imaginary line extending 0.5 N.M. from the western breakwater boundary till the eastern breakwater end. And from the Suez Canal area, it is bordered by an imaginary line extending transversely from the southern bank of the Canal connected to Manzala Lake, and the railways arcade livestock,

Port Specifications are Total Area is3 km2 (3000895 m2),Water Area is 1.7 km2 (1733800 m2),Land Area is1.3 km2 (1267095 m2,Total Warehouse Area is90000 m2,Container Yard Area is435000 m2.,Total Customs Zone isport boundaries

Cisterns Area is 109473, 4 m2and Total Area of General Cargo Storage Warehouses is0.05 km2.

figure (6) shows the master plan of WEST PORT-SAID port , Table (7,8)shows: oily bilge and sludge and garbage estimated in WEST PORT-SAID Port.

4-EAST PORT-SAID port:

East Port Said Port has a distinguished location east of the Northern entrance of the Suez Canal, at the confluence of three continents, and at the crossroad of the most important world sea trade route between the East and the west.

The port is bordered from the North by the Mediterranean Sea, from South by the industrial zone, from East by El-Malaha Lake, and from the Western verge of Suez Canal inside the frontiers of Port Said Province,

The Port Specifications are total Area is72.10 sq. km (72.100.000 m2),Water Area is1.5 sq. km (1.500.000 m2),Land Area is70.6 sq. km (70.600.000 m2),Total Customs Zone is 33.5 sq. km (33.500.000 m2),Total Yards Area is 0.6 sq. km (600.000 m2),Maximum Port Length is 10 km (western port boundary) and Maximum Port Width is 8 km (southern boundary).

figure (7) shows the master plan of EAST PORT-SAID port , Table (9,10)shows: oily bilge and sludge and garbage estimated in EAST PORT-SAID Port.

4-ARESH port and AL-TOR port:

Those ports are small so the construction of port reception facilities will be required when the development will start.

Figure 8 shows the summary of annual oil- garbage volume of every ports.

Tables

Table (1): Simplified overview of the discharge provisions regarding cargo residues of the revised MARPOL Anne

Marpol Relevant Annexes	Type of waste	ship type and size	Discharge criteria	general requirement
annex I	oil from machinery spaces	Oil tanker of all sizes and other ships ≥400 grt	1- the ship is proceeding en route; 2- the oily mixture is processed through an oil filtering equipment meeting the requirements of regulation 14.7 of this Annex; 3- the oil content of the effluent without dilution does not exceed 15 parts per million; 4- the oil content of the effluent without dilution does not exceed 15 parts per million; 5- the oily mixture, in case of oil tankers, is not mixed with oil cargo residues.	1- Whenever visible traces of oil are observed on or below the surface of the water in the immediate vicinity of a ship or its wake, Governments of Parties to the present Convention should, to the extent they are reasonably able to do so, promptly investigate the facts bearing on the issue of whether there has been a violation of the provisions of this regulation. The investigation should include, in particular, the wind and sea conditions, the track and speed of the ship, other possible sources of the visible traces in the vicinity, and any relevant oil discharge records.2- No discharge into the sea shall contain chemicals or other substances in quantities or concentrations which are hazardous to the marine environment or chemicals or other substances introduced for the purpose of circumventing the conditions of discharge specified in this regulation. 3- The oil residues which cannot be discharged into the sea in compliance with this regulation shall be retained on board for subsequent discharge to reception facilities.
		Ships <400 grt	1- the ship is proceeding en route; 2- the ship has in operation equipment of a design approved by the Administration that ensures that the oil content of the effluent without dilution does not exceed 15 parts per million; 3- the oily mixture does not originate from cargo pump-room bilges on oil tankers; and 4- the oily mixture, in case of oil tankers, is not mixed with oil cargo residues	
	cargo tank area	oil tankers	no discharge except clean or segregated ballast	

Table 2 :Simplified overview of the discharge provisions regarding cargo residues of the revised MARPOL Annex

Type of garbage	Ships outside special areas	Ships within special areas	Offshore platforms and all ships within 500 m of such platforms
Food waste comminuted or ground	Discharge permitted ≥3 nm from the nearest land and *en route*	Discharge permitted ≥12 nm from the nearest land and *en route*	Discharge permitted ≥12 nm from the nearest land
Food waste not comminuted or ground	Discharge permitted ≥12 nm from the nearest land and *en route*	Discharge prohibited	Discharge prohibited
Cargo residues[1] not contained in wash water	Discharge permitted ≥12 nm from the nearest land and *en route*	Discharge prohibited	Discharge prohibited
Cargo residues[1] contained in wash water		Discharge only permitted in specific circumstances[2] and ≥12 nm from the nearest land and *en route*	Discharge prohibited
Cleaning agents and additives[1] contained in cargo hold wash water	Discharge permitted	Discharge only permitted in specific circumstances[2] and ≥12 nm from the nearest land and *en route*	Discharge prohibited
Cleaning agents and additives[1] contained in deck and external surfaces wash water		Discharge permitted	Discharge prohibited
Carcasses of animals carried on board as cargo and which died during the voyage	Discharge permitted as far from the nearest land as possible and *en route*	Discharge prohibited	Discharge prohibited
All other garbage including plastics, domestic wastes, cooking oil, incinerator ashes, operational wastes and fishing gear	Discharge prohibited	Discharge prohibited	Discharge prohibited

Table 3 :oily bilge and sludge estimated in ELADBIA Port.

SHIP TYPE	Fuel Consumption (M3/DAY)	Psi (M3/DAY)	Pmi (M3/DAY)	Qm =N2*Pm *T/365	Qsi =N1 * Psi*T/365	Qt(m3/day)	Qt(m3/year)
CONTAINER	90.00	1.80	0.90	1.11	4.44	5.55	4,613
bulk carrier ship	16.67	0.33	0.17	0.13	0.54	0.67	
tanker ship	27.78	0.56	0.28	-	-	-	
CARGO SHIP	16.67	0.33	0.17	1.28	5.13	6.42	
LNG	66.67	1.33	0.67	-	-	-	
Σ	217.78	4.36	2.18	2.53	10.11	12.64	

Table 4 :Garbage estimated in ELADBIA Port.

	GD = GB + GP + GH(Quantity of domestic waste)	GM (Quantity of maintance waste)	GC = CB + CD + CC(Quantity of cargo waste)			TOTAL Garbage WEIGHT(Ton/year)	TOTAL Garbage volume(m3/year)
	GB = NB * TB * QB * PB (cargo ship)	GM = N * T * M	CB= WB * 1/123 break bulk	CD = WD * 1/10,000 Dry bulk	CC = WC 1/25,000 CONTAINER		
N (SHIP/WEEK)	13.64	13.64	6,788.62	565.20	0.92	600.33	2,401.31
T	10	10					
Q kg/person / day	2	11					
P person	36.2	0					
G kg/week	9872.2	1499.9	130.19	10.84	0.02		

Table 5 :oily bilge and sludge estimated in AIN-SOKHNA Port.

SHIP TYPE	Fuel Consumption(M3/DAY)	Psi(M3/ DAY)	Pmi(M3/DAY)	Qm=N2*Pm*T/365	Qsi=N1 * Psi*T/365	Qt(m3/ day)	Qt(m3/year)
CONTAINER	90.00	1.80	0.90	9.78	39.11	48.88	43,174
bulk carrier ship	16.67	0.33	0.17	1.81	7.24	9.05	
tanker ship	27.78	0.56	0.28	3.02	12.07	15.09	
CARGO SHIP	16.67	0.33	0.17	1.81	7.24	9.05	
LNG	66.67	1.33	0.67	7.24	28.97	36.21	
Σ	217.78	4.36	2.18	23.66	94.63	118.29	

Table 6 :Garbage estimated in ELADBIA Port.

	GD = GB + GP + GH(Quantity of domestic waste)	GM (Quantity of maintance waste)	GC = CB + CD + CC(Quantity of cargo waste)			TOTAL Garbage WEIGHT(Ton/year)	TOTAL Garbage volume(m3/year)
	GB = NB * TB * QB * PB] **(cargo ship)**	GM = N * T * M	CB= WB * 1/123 break bulk	CD = WD * 1/10,000 Dry bulk	CC = WC 1/25,000 CONTAINER		
N (SHIP/WEEK)	21.02	21.02	1,357.72	41.80	101.04	915.56	3,662.26
T Average duration of voyage	10	10					
Q kg/person / day	2	11					
P person	36.2	0					
G kg/week	15217.9	2312.1	26.04	0.80	1.94		

Table 7 :oily bilge and sludge estimated in WEST Port-SAID PORT

SHIP TYPE	Fuel Consumption(M3/DAY)	Psi(M3/ DAY)	Pmi(M3/DAY)	Qm=N2*Pm*T/365	Qsi= N1 * Psi*T/365	Qt(m3/ day)	Qt(m3/year)
CONTAINER	90.00	1.80	0.90	9.78	39.11	48.88	43,174
bulk carrier ship	16.67	0.33	0.17	1.81	7.24	9.05	
tanker ship	27.78	0.56	0.28	3.02	12.07	15.09	
CARGO SHIP	16.67	0.33	0.17	1.81	7.24	9.05	
LNG	66.67	1.33	0.67	7.24	28.97	36.21	
Σ	217.78	4.36	2.18	23.66	94.63	118.29	

Table 8 :Garbage estimated in WEST Port-SAID PORT

	GD = GB + GP + GH(Quantity of domestic waste)	GM (Quantity of maintance waste)	GC = CB + CD + CC(Quantity of cargo waste)			TOTAL Garbage WEIGHT (Ton/year)	TOTAL Garbage volume (m3/year)
	GB = NB * TB * QB * PB **(cargo ship)**	GM = N * T * M	CB= WB * 1/123 break bulk	CD = WD * 1/10,000 Dry bulk	CC = WC 1/25,000 CONTAINER		
N (SHIP/WEEK)	11.70	11.70	41,073.17	656.10	19.64	550.49	2,201.96
T	10	10					
Q kg/person / day	2	11					
P person	36.2	0					
G kg/week	8469.8	1286.8	787.70	12.58	0.38		

Table 9 :oily bilge and sludge estimated in EAST Port SAID PORT

SHIP TYPE	Fuel Consumption(M3/DAY)	Psi(M3/DAY)	Pmi(M3/DAY)	Qm=N2*Pm*T/365	Qsi= N1 * Psi*T/365	Qt(m3/day)	Qt(m3/year)
CONTAINER	90.00	1.80	0.90	25.63	102.53	128.16	46,778
bulk carrier ship	16.67	0.33	0.17	-	-	-	
tanker ship	27.78	0.56	0.28	-	-	-	
CARGO SHIP	16.67	0.33	0.17	-	-	-	
LNG	66.67	1.33	0.67	-	-	-	
Σ	217.78	4.36	2.18	25.63	102.53	128.16	

Table 10 :Garbage estimated in EAST Port-SAID PORT

	GD = GB + GP + GH(Quantity of domestic waste)	GM (Quantity of maintance waste)	GC = CB + CD + CC(Quantity of cargo waste)			TOTAL Garbage WEIGHT(Ton/year)	TOTAL Garbage volume(m3/year)
	GB = NB * TB * QB * PB **(cargo ship)**	GM = N * T * M	CB= WB * 1/123 break bulk	CD = WD * 1/10,000 Dry bulk	CC = WC 1/25,000 CONTAINER		
N (SHIP/WEEK)	39.87	39.87	-	-	640.00	1,734.53	6,938.10
T	10	10					
Q kg/person / day	2	11					
P person	36.2	0					
G kg/week	28866.8	4385.8	-	-	12.27		

NO.	Action	Yes /No
1	Notification by master of the ship or his agent in the port at least 24 hours prior to arrival	yes
2	Format based on Annex PRF Directive and IMO Circ. developed and used by ports	no
3	EDIFACT-message directly into port information system(WASDIS) Processed by Harbor Master's office	no
4	Enforcement: Port State Control and Environmental Administration	no
4	link with fee system (WASCOL)	no

Figures

Figure (1): Mobile reception facility

Figure (2): vehicles reception facility

Figure 3: fixed reception facility

Figure 4: master plan of EL-ADABIYA port

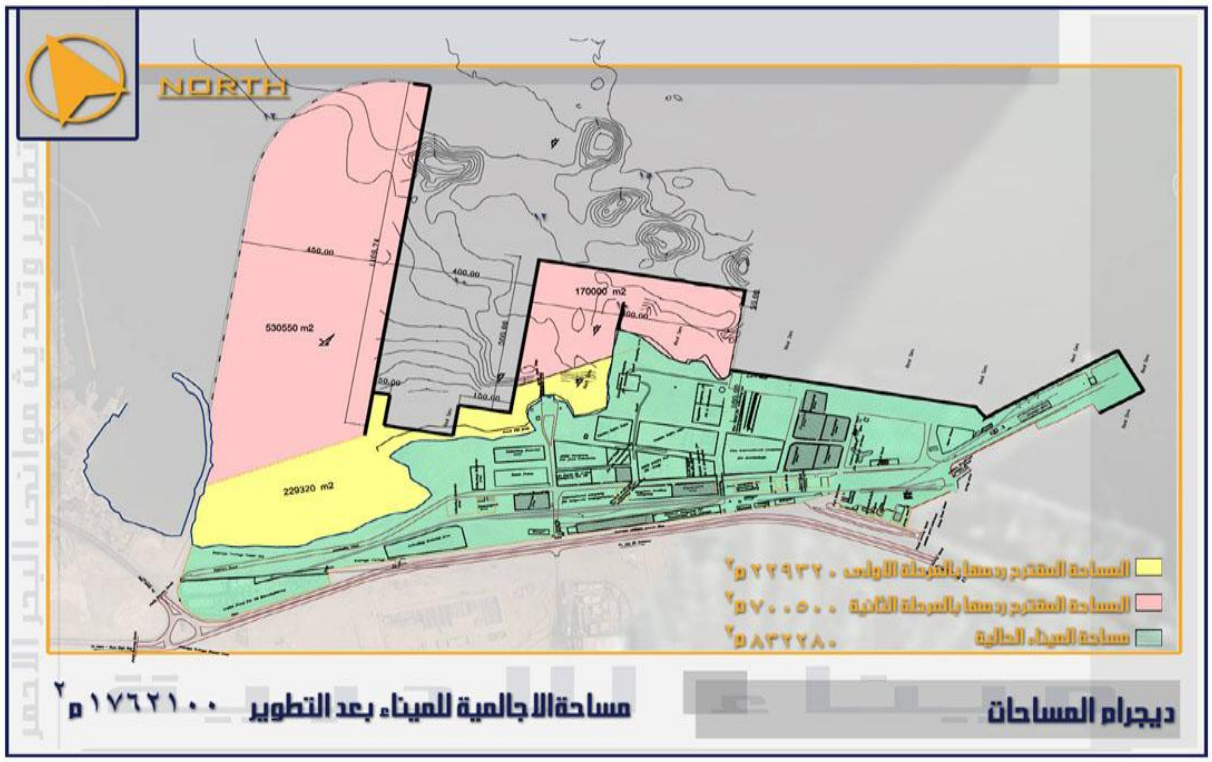


Figure 5: master plan of AIN-SOKHNA port

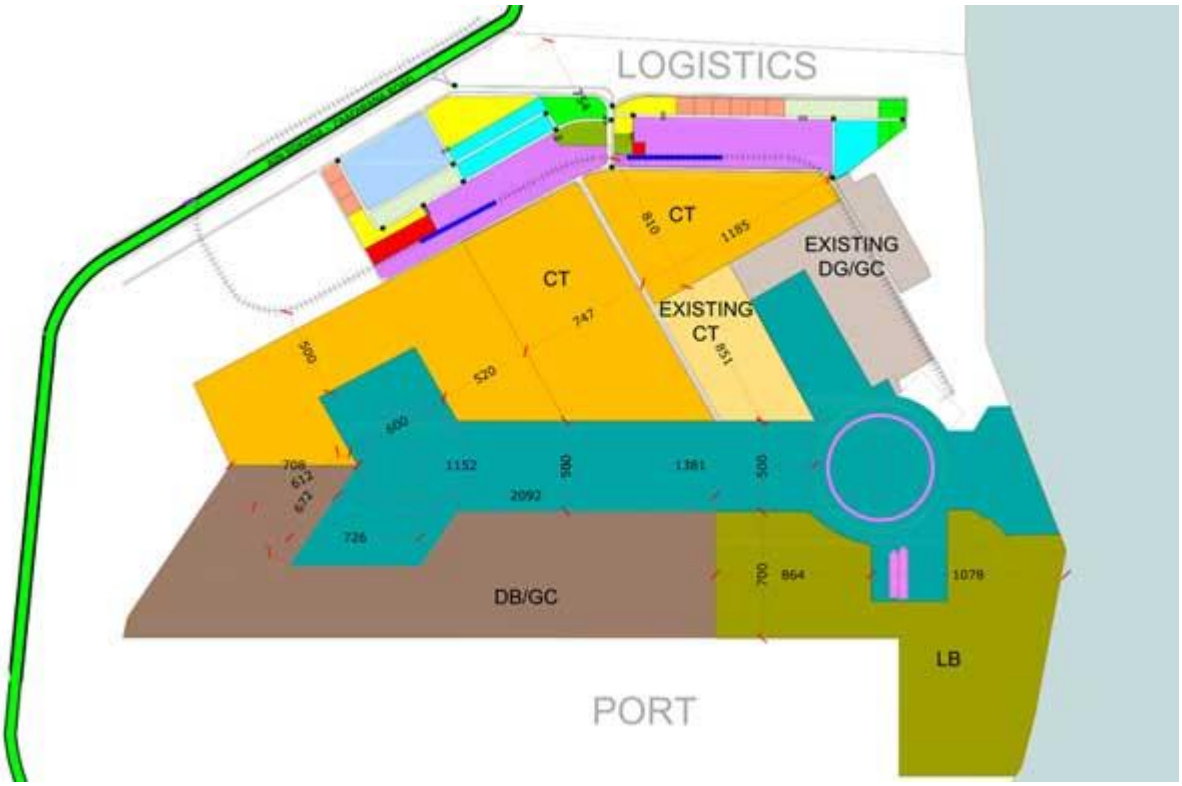


Figure 6: master plan of WEST port-SAID PORT

Figure7: master plan of EAST-PORTSAID port

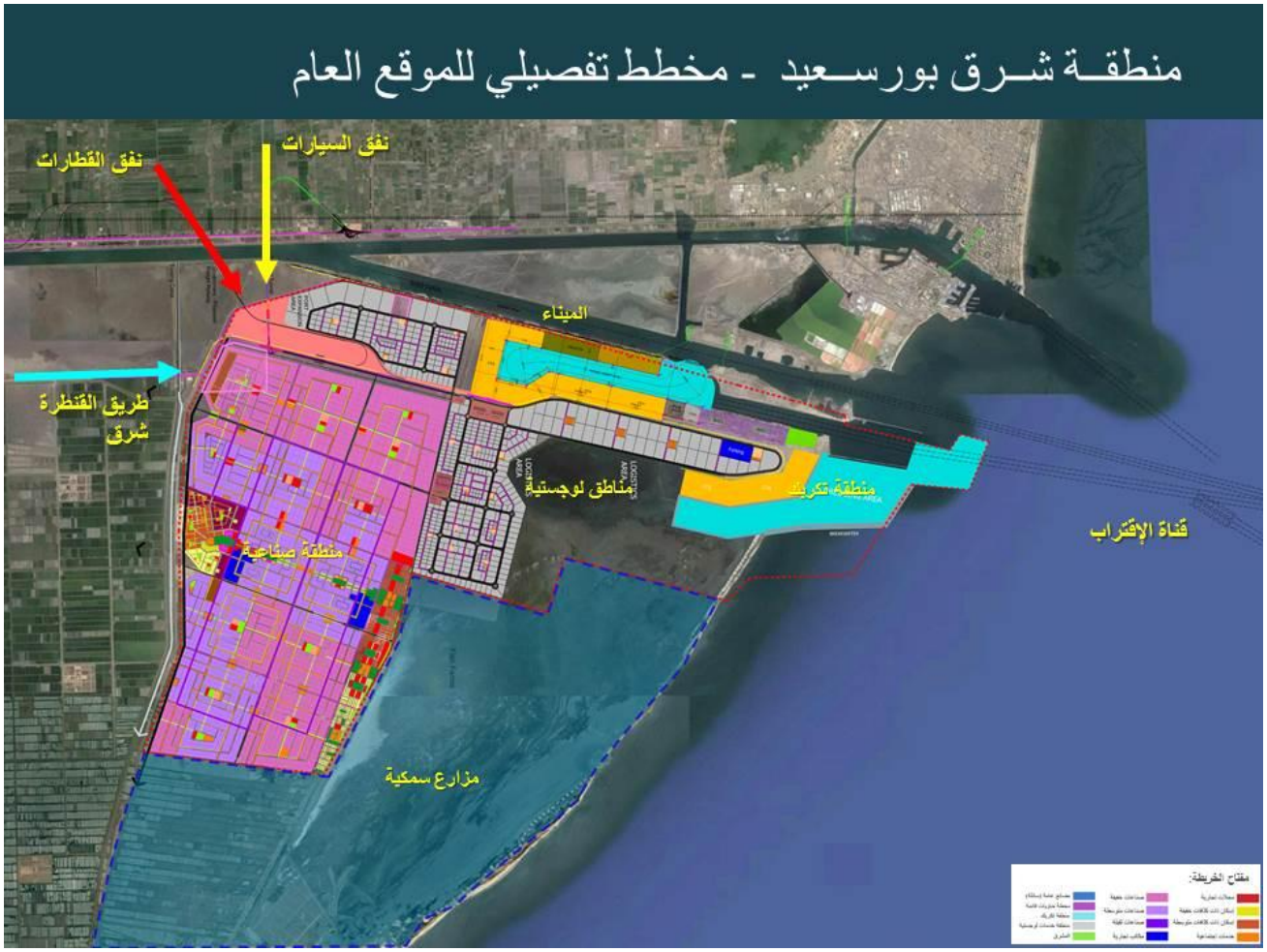
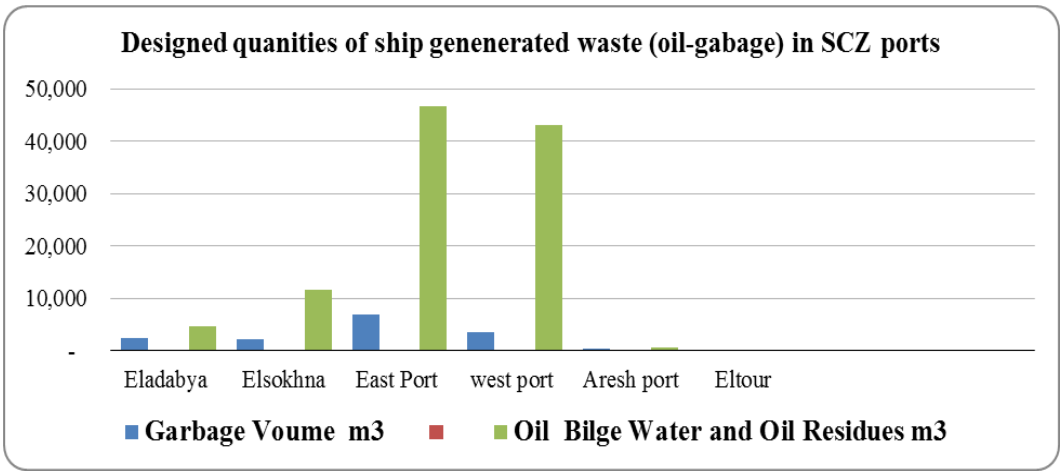


Figure 8:annual oil- garbage volume of every ports



CONCLUSIONS

(1) Apply the implementation of IMO Marpol annex I,V in Egypt ports as soon as possible because the last inspection of IMO committee in NOV.2016 gave scope to EGYPT port to implement the facilities and the committee comments in Egypt ports .

(2) According to analysis of ship waste in SCZ ports and the current stage of every port , SCZ authority should construct the PRF required to make a profit from these facilities and implement IMO requirements.

(3) WEST port said and EAST port said will be the first stage of the facility construction according to its demand volume.

(4) The facility types should be carefully chosen as the previous analysis it can be used the mobile facility in AIN-SOKHNA port and ADABYA port but in EAST and WEST port-said port its preferable to construct fixed facility according to the waste volume and port properties.

(5) Port fees of theses service should cover the construction of facility and the choice of every facility .

(6) Recycling of garbage and oil is high priority , However some reception facilities may not have access to recycling systems due to remoteness or other local reasons but if the facility will recycle the waste it will increase the valuable of fess which lead to increase the income .

REFERENCES

1. Jens Peter Ohlenschlager and Giovanni Gordiani. (Editors), "EMSA STUDY ON THE DELIVERY OF SHIP-GENERATEDWASTE AND CARGO RESIDUES TO PORT RECEPTIONFACILITIES IN EU PORTS, European Maritime Safety Agency (EMSA), 2012.
2. Peter van dens dries. "Management of ships' waste of the Antwerp port, Antwerp Port Authority, April, 2013.
3. The Littoral States of Indonesia, Malaysia and Singapore with the cooperation of BIMCO and INTERTANKO, "Port Reception Facilities Booklet Straits of Malacca and Singapore ," September, 2013 4. Nawy, E. G., *Prestressed Concrete: A fundamental Approach*, 3rd ed., Prentice Hall, NJ, 2000.
4. MARINE ENVIRONMENT PROTECTION COMMITTEE, "INADEQUACY OF RECEPTION FACILITIES "Revision of the IMO Comprehensive Manual on Port Reception Facilities, European Maritime Safety Agency (EMSA), 2012.