

Table 6-1 Environmental Impact Matrix for the Proposed Oil-Berths Project

| Environmental Elements | Environmental Impacts | | | | | | | | | |
|----------------------------|--|-------------------|------------------------------|----------------------------|------------------------------------|------------------------|------------------------|----------------|------------------------------|---|
| | During Construction Works | | | | | After Completion | | | | |
| | Demolition of Existing Structures | Dredge/Excavation | Operation of Heavy Equipment | Construction of Structures | Transportation of Const. Materials | By Existence of Berths | By Operation of Berths | By Oil Tankers | By Tank Yard (For Reference) | |
| Socio-economic Environment | Resettlement/Evacuation of local residents | | | | | | | | | |
| | Employment | | | | | | | | | |
| | Fishery | | | | | | | | | |
| | Traffic and public facilities | | | | | D | | | | D |
| | Community stability | | | | | | | | | |
| | Cultural property | | | | | | | | | |
| | Water rights/Right of common | | | | | | | | | |
| | Public health | | | | | | | | | |
| | Waste | D | | | D | | | | | D |
| | Hazards | | | | | | | | | |
| Natural Environment | Topography and geology | | | | | | | | | |
| | Ground water | | | | | | | | | |
| | Hydrological situation | | | | | | | | | |
| | Coastal zone | | D | | | | | D | | |
| | Flora and fauna | | | | | | | | | |
| Environmental Pollution | Landscaping/Aesthetics | | | | | | | | | |
| | Air pollution | D | | D | | | | | D | D |
| | Sea water pollution | | D | D | | | | | | |
| | Soil contamination | | | | | | | | | |
| | Noise and vibration | D | | D | | | | | | |
| Offensive odor | | | | | | | | | | |

Note : Impact levels
 A : Significant negative impact
 B : Moderately negative impact
 C : not known
 D : Negligible negative impact

Table 6-2 Environmental Impact Elements and Countermeasures (during Construction Works)

| Environmental impact factors | Environmental impact | Forecasted impact level 1) | Countermeasures | Remarks | | | | | | | | | | | |
|--|--|----------------------------|---|---|-----------|-----------------|-------------------|--------------------|--------|-------|------------|--------|-------|------------------|--------|
| 1 Demolition of existing structure | 1.1 Disposal of demolished material | D | Proper selection of dumping site | Demolished materials : concrete, re-bars, steel pipes | | | | | | | | | | | |
| | 1.2 Air pollution | D | | Air pollution by concrete breaker(s) is negligible. | | | | | | | | | | | |
| | 1.3 Noise and vibration | D | | Noise level of concrete breaker(s) at 300m distance (approx. 55 dB) is smaller than that of port operation. | | | | | | | | | | | |
| 2 Dredge/Excavation | 2.1 Turbid water by dumped soil | D | Proper selection of dumping site | The excavated soil with few thousand cu.m. in volume can be dumped without significant effects on the sea water quality. | | | | | | | | | | | |
| | 2.2 Turbid Water by Seabed excavation | D | Selection of dredger type. | Since the port basin was deepened through PAID's maintenance dredging activities, only some marginal portion should be dredged. This works can be done by clam-shell dredging which will cause less turbid water. | | | | | | | | | | | |
| 3 Operation of Heavy equipment | 3.1 Air pollution | D | | Heavy equipment will generate CO ₂ and NO _x . However, generated air pollutants are not expected to influence the ambient air quality. | | | | | | | | | | | |
| | 3.2 Sea water pollution | D | i) Proper supervision and control of waste oil disposal. ii) Selection of equipment iii) Provision of canvas sheet(s) for oil splash prevention | Required heavy equipment: - mobile crane - pile driver (vibratory, diesel) - concrete breaker - floating crane, or crane on barge - back hoe - clamshell - dump trucks - concrete mixer Lime which will be generated by concrete works is anticipated to be negligibly small. | | | | | | | | | | | |
| | 3.3 Noise and vibration | D | | 1) Noise level which will be caused by the heavy equipment is negligible as shown below: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Equipment</th> <th>Source of noise</th> <th>At 300 m distance</th> </tr> </thead> <tbody> <tr> <td>- Concrete breaker</td> <td>113 dB</td> <td>55 dB</td> </tr> <tr> <td>- Back hoe</td> <td>118 dB</td> <td>60 dB</td> </tr> <tr> <td>- Concrete mixer</td> <td>108 dB</td> <td>50 dB</td> </tr> </tbody> </table> Considering the background noise made by port activities, above noise is within tolerable limits. 2) Vibration is negligible. | Equipment | Source of noise | At 300 m distance | - Concrete breaker | 113 dB | 55 dB | - Back hoe | 118 dB | 60 dB | - Concrete mixer | 108 dB |
| Equipment | Source of noise | At 300 m distance | | | | | | | | | | | | | |
| - Concrete breaker | 113 dB | 55 dB | | | | | | | | | | | | | |
| - Back hoe | 118 dB | 60 dB | | | | | | | | | | | | | |
| - Concrete mixer | 108 dB | 50 dB | | | | | | | | | | | | | |
| 4 Construction of structures | 4.1 Disposal of construction materials | D | i) Proper control of dumping materials ii) Proper control of waste/sewage from contractors camp or temporary facilities | Waste of materials: - Surplus soil - Used scaffolding material - Used concrete forms - Waste oil - Aggregate washing water | | | | | | | | | | | |
| 5 Transportation of construction materials | 5.1 Traffic | D | | i) Major imported materials will be directly discharged within the port area and hauled to temporary yard. ii) Major local materials : - Aggregates for concrete - Armour rocks The transportation of those local materials will not affect ordinary traffic activities. | | | | | | | | | | | |
| | 5.2 Air pollution | D | | Air pollution by material transportation is negligible. | | | | | | | | | | | |

1) See notes of Table 6-1

Table 6-3 Environmental Impact Elements and Countermeasures (after Completion)

| Environmental impact factors | Environmental impact | Forecasted impact level ¹⁾ | Countermeasures | Remarks |
|--------------------------------|---|---------------------------------------|---|---|
| 1 By existence of berth | 1.1 Disturbance of port basin by reflected wave (in case vertical wall type is adopted for berth structure) | D | | In case vertical wall type is adopted for the structure of platform and breasting dolphins, the calmness of port basin will be worse due to waves reflected by the vertical wall. The level of disturbance, however, will not affect significantly the environmental level, and port operations condition. |
| 2 By operation of berth | 2.1 Oil pollution of recreation beach at Plage du Heron | | (See countermeasures of 2.2) | <ul style="list-style-type: none"> i) The beach at Plage du Heron which is located east side of Queys No. 14 and utilized for swimming, is contaminated once in a while particularly during the season of "Khamzin". ii) This situation will be improved by the countermeasures as shown in 2.2.s iii) According to the Master Plan prepared by BCEOM this beach area is involved in the future plan of Export Processing Zone. |
| | 2.2 Sea water pollution by spilled oil | | <ul style="list-style-type: none"> i) Enactment of laws and regulations ii) Training of oil-handling workers iii) Establishment of proper oil-handling facilities <ul style="list-style-type: none"> - Oil spill walls on the platform. - Oil sump on the platform. - Derrick(s) or truck crane for handling of oil hoses iv) Provisions of oil handling equipment and materials <ul style="list-style-type: none"> - Oil pans - Oil absorption agent - Oil absorption tape - Oil vacuum pumps v) Promotion of environmental consciousness to all concerned. vi) Proper access way to the working platform, which will allow heavy vehicles to enter the oil handling work area to help workers. | <ul style="list-style-type: none"> i) As described in Section 7.2, Port of Djibouti has oil fence and some other oil pollution control facilities. ii) Captains of oil tanker are obligated to submit "Oil record book, Cargo ballast operation" as stipulated by "Merchant Shipping Protection of Oil Pollution Regulation 1983". iii) Most of oil tankers have segregated ballast tanks which minimize dirty ballast water. iv) While Djibouti is importing port of oil cargoes, the occasion of discharging ballast water is seldom. |
| 3 By oil tankers | 3.1 Waste by oil tankers | D | <ul style="list-style-type: none"> i) Strict deed of garbage collection from ships. ii) Prohibit the sewerage dumping in port area. iii) Promotion of environmental consciousness to oil tankers' personnel. | <ul style="list-style-type: none"> - Most oil tankers have incinerator for garbage. - Most oil tankers have sewerage tanks. |
| | 3.2 Air pollution | D | | <ul style="list-style-type: none"> - Air pollution by oil-tankers <ul style="list-style-type: none"> i) by emission gas of engines ii) by hydro-carbon vaporization particularly from white products such as gasoline. <p>Those gas or vapor, are expected to be dispersed in the air through high funnel or exhaust mast.</p> |
| 4 By tank yard (for reference) | 4.1 Traffic | D | | <ul style="list-style-type: none"> - Existing land transportation will not be affected significantly by increased number of tank trucks. - Increment of rail road traffic volume by tankers of CDE (Ethiopia Djibouti Railway) will be absorbed by existing rolling-stock. |
| | 4.2 Air pollution 4.3 Offensive odor | D | | <ul style="list-style-type: none"> i) Gasoline with high volatility is handled and stored exclusively by Mobile Oil among others. The storage tanks for gasoline owned by Mobile Oil prevent the proliferation of hydrocarbon vapor by covering free oil surface in the storage tanks with floating screen, thus minimizing air pollution. |

1) See notes of Table 6-1

Chapter 7 Organization and Management

CHAPTER 7 ORGANIZATION AND MANAGEMENT

7.1 Organization and Management

7.1.1 Outline of Port Autonome International de Djibouti

The Republic of Djibouti has three ports; Djibouti, Tadjoura and Obock. Port of Djibouti is managed by the Port Autonome International de Djibouti (PAID), the self-supporting public corporation under the strong control of the President and the Minister of Port and Maritime Affairs, while the ports of Tadjoura and Obock are administrated and managed by the District.

The basic concept about a port management of Djibouti, resembling those of France and Japan, is highly appreciated for the port function contributing to regional development and national interest.

That is, the port is considered not only as a transport industry but also as business and as being planned and managed linking the socio-economic policy of the country.

The progress of Port of Djibouti directly means that of the Republic of Djibouti, since such matters as port services, trans-shipments via Port of Djibouti, incomes from the transportation to Ethiopia, etc. have strong influence on the national finance.

The Djibouti Port has been operated on a 24-hour and 365-days working basis, enabling ships for 24-hour loading and unloading works. Although all the ships are required for pilotage, the pilots are empowered to decide whether or not tugboats are to be used. The pilots embark in the ships at about 1 mile offshore. The assignment of vessels is made on the general use principle and prioritized distribution system is introduced.

The cargo services for the container terminals and oil berths are managed by PAID's staff. Such works for oil loading and unloading, entry and departure, berthing tugboats and tugging works are under the control of the Harbour Master Office.

For the oil loading and unloading, each oil company assigns 5 and 3 personnel each to the oil berth and oil base for connecting and disconnecting tanker's pipes to the land side pipes.

At the container terminals two 35-ton PACECO container cranes are equipped, and four 40-ton forklift trucks, two 12-ton forklift trucks, 8 tractors, and 12 trailers are placed in operation.

The cargo works have been undertaken by 3 teams working in two shifts, the daytime shift being from 8:00 to 18:00 hours, and the nighttime shift is from 18:00 to 8:00.

7.1.2 Organization of PAID

The highest decision making authority of PAID is the Board of Council, but the development plans of the Port of Djibouti and other related matters are determined by the Cabinet Conferences and Presidential Decrees. The Ministries making Cabinet's decisions are as follows:

- 1) Prime Minister
- 2) Minister of Foreign Affairs
- 3) Minister of Agriculture and Rural Development
- 4) Minister of Commerce and Economy
- 5) Minister of Transport, Telecommunication, Post and Tourism
- 6) Minister of National Defense
- 7) Minister of National Education
- 8) Minister of Finance
- 9) Minister of Public Function and Administrative Reforms
- 10) Minister of Industry, Energy and Mine
- 11) Minister of Interior and Decentralization
- 12) Minister of Youth, Sport and Cultural Affairs
- 13) Minister of Justice
- 14) Minister of Port and Maritime Affairs
- 15) Minister of Public Sanitation and Social Affairs
- 16) Minister of Labor and Social Welfare
- 17) Minister of Public Works, Urban Development and Housing
- 18) Minister of Planning, Arrangement of Territory, Environment and Cooperation

The Port is managed by the Port Director under the jurisdiction of the Board. The Board consists of the Minister of Port and Maritime Affairs as chairman, and representatives of National Assembly, related public institutional organizations, private sectors, PAID personnel and port laborers. The Board consists of the following members:

Table 7-1 Members of Board of Council

| Organizations | Board Members |
|--|---------------|
| 1. Chairman of Board (Minister of Port and Maritime Affairs) | 1 |
| 2. Representative of National Assembly | 2 |
| 3. Government | |
| 1) Ministry of Port and Maritime Affairs | 1 |
| 2) Ministry of National Defense | 1 |
| 3) Ministry of Finance (Dir. of Customs) | 1 |
| 4) Ministry of Trade & Transport & Tourism | 1 |
| 5) Ministry of Industry & Mine | 1 |
| 6) Director of National Economic Planning | 1 |
| 7) District of Djibouti | 1 |
| 8) Director of Djibouti Airport | 1 |
| 4. Private Sectors | |
| 1) Chamber of Commerce | 2 |
| 2) Ship Owners | 1 |
| 3) Stevedore Company | 1 |
| 4) Freight Forwarder | 1 |
| 5) Trading Company | 1 |
| 6) Oil Company | 1 |
| 7) Bank | 1 |
| 5. PAID Personnel (Union) | 1 |
| 6. Dock Labor Union | 1 |

The Board makes the final decisions on all matters concerning port management, facilities and operation, except for the work and facility plans which entail significant modification or change to the port structures or their accesses, or those persons who execute public aid by the government. Major job authorities of the Board are to:

1. Decide scope of works to be executed within the proposed plan.
2. Decide the maximum charge and the using conditions of facilities which are managed by the Board.
3. Permit on the lease contract of the port premises for the period from 1 year to 30 years.
4. Establish companies or organizations performing the activities relative to the port and maritime affairs.

The Board is required to draw up every year, before December 1st, a prospective report on the current year based on the expected expenditures and revenues from the Port and the their assets management, to obtain the approval by the authorities concerned. The account and financial management of PAID shall be audited by the public auditor appointed by the government ordinance. The organization charts of the Ministry of Port and Maritime Affairs, and PAID are shown in Figs. 7-1 and 7-2.

PAID is the organization executing the decisions made by the Board. The Port Director is appointed by government ordinance and executes all matters relating to the Board authorities.

The Port Director appoints the Managers for the major Divisions of the PAID with the approval of the Chairman of the Board, whereas the Port Director appoints all personnel of the Port, and manages all public services relating to the port management. Besides this, he represents the Port on judicial and civil affairs.

In addition, he decides the amounts of the surplus of necessary funds and reserve funds, and also executes personnel affairs based on labor agreements, procurement contracts and other pre-determined matters.

As shown in the Organization Chart, under the Port Director are the eight Divisions, including; Accounting, Administration and Finance, Operation, Investigations and Statistics, Commercial, Facility, Utilities, Harbor Master Office, and Container Terminal.

The principal jobs of each Division are as follows:

1. Finance and Accountancy

Accounting, receipts and disbursement.

2. Division of Administration and Finance

General affairs including the judicial affairs, preparation of salaries, personnel management, secretariat of the Board, etc.

3. Division of Operation

Supervision of affairs of each port (except for the water supply), supervision of stevedores, management of warehouse on jetty, cleaning of port facilities, lighting and collection of charges.

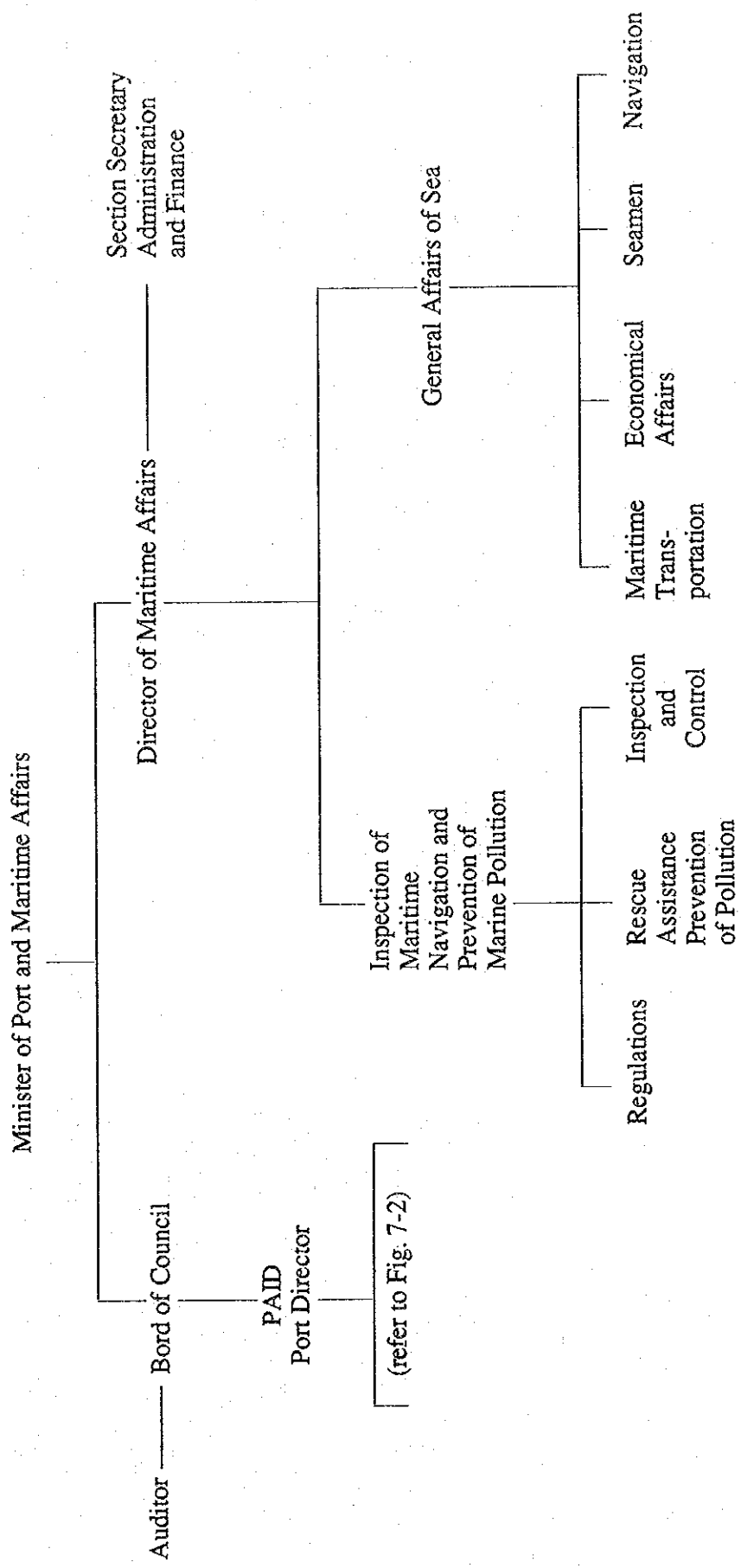


Figure 7-1 Organization Chart of Ministry of Port and Maritime Affairs

Port Director

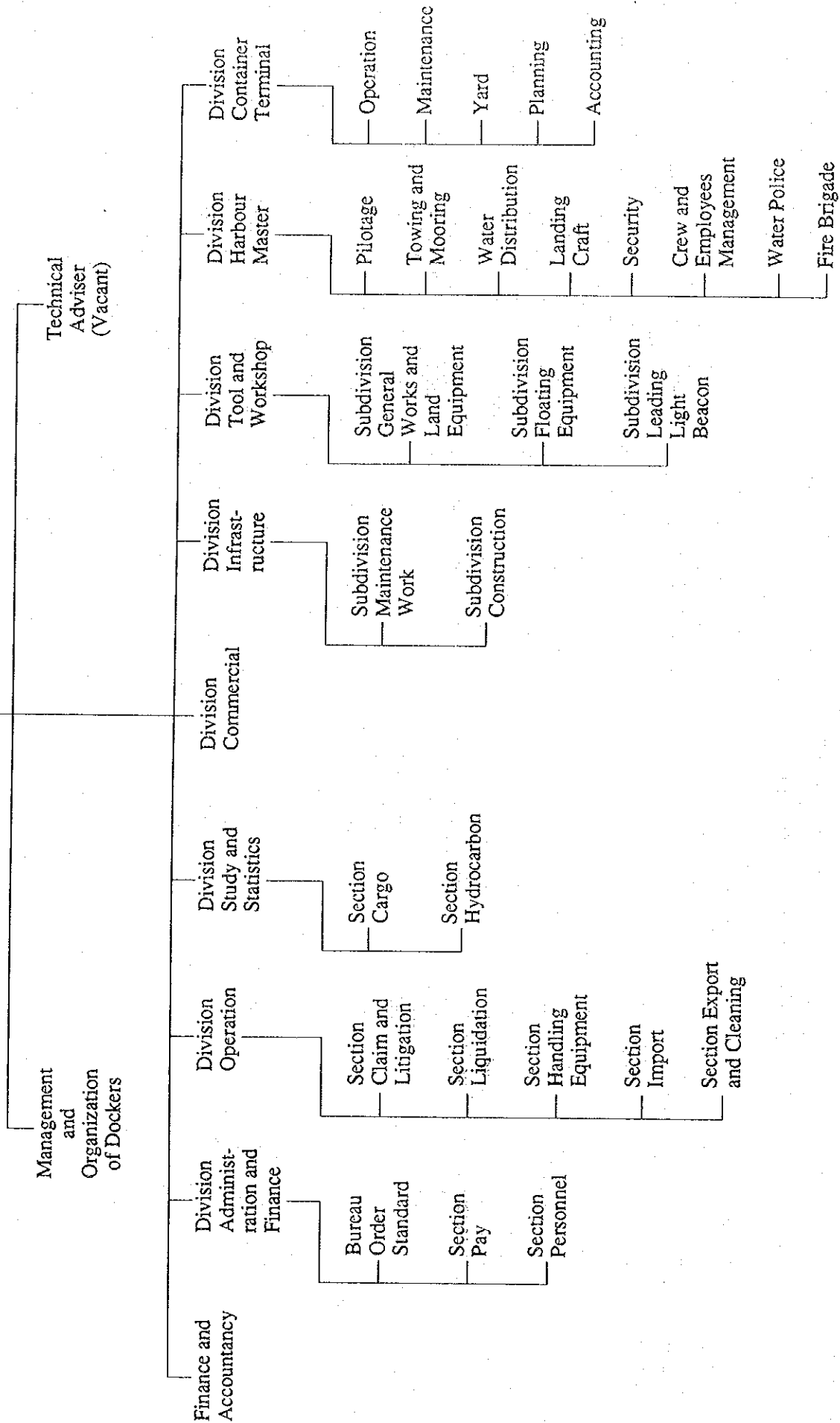


Figure 7-2 Organization Chart of Port Autonome International de Djibouti (PAID)

4. Division of Study and Statistics
Statistics of the port, research and study.
5. Division of Commercial
Public information, port sales.
6. Division of Tool and Workshop
Construction, maintenance and management of port facilities.
7. Division Infrastructures
Maintenance of cargo handling equipment, working crafts and navigation aids.
8. Division of Harbor Master Office
Pilotage, tugboat assistance, mooring, berth assignment, water supply, ferry, police and fire fighting service, oil cargo handling supervision at oil berths.
9. Division of Container Terminal
All affairs at the container terminal.

The personnel assignment to each Division is shown in Table 7-2. A total of 672 persons are engaged in the port management, 44 persons as the PAID staff and 628 persons as employees. Judging from the present conditions or the scale of the Port of Djibouti, the present number of personnel appears to be more than necessary.

Table 7-2 Personnel Numbers by Divisions of PAID

| Name of Division | PAID Staff | Employee | Trainee | Total |
|----------------------------------|-------------------|----------|------------------|-------|
| Office of Port Director | 2 | 3 | - | 5 |
| Division of Commercial | 2 | 1 | - | 3 |
| Division of Study and Statistics | 1 | 10 | - | 11 |
| Finance and Accountancy | 3 | 24 | - | 27 |
| Div. of Admin. and Finance | 5 | 34 | - | 39 |
| Div. of Infrastructure | 6 | 42 | 2 | 48 |
| Div. of Operation | 4 | 77 | - | 81 |
| Div. of Tool/Workshop | ⁽¹⁾ 13 | 129 | 3 | 142 |
| Div. of Harbor Master Office | 5 | 150 | - | 155 |
| Div. of Container Terminal | 3 | 158 | 1 | 161 |
| Total | 44 | 628 | ⁽²⁾ 6 | 672 |

(1993)

Note: (1) Including 2 cooperating persons

(2) Trainees are not included as personnel of PAID

7.1.3 Present Situation of Management and Operation

(1) Control of Vessels Entry and Departure

The Harbour Master Office of PAID controls all the navigations of vessels in the Port and near shore. One 2,200 Hp tugboat and two other tugboats with maximum power of 1,800 Hp are in operation. The tugboat with 2,200 Hp is equipped with fire fighting devices.

Compulsory pilotage are required for all ships in the Port, except for small ones. Ships longer than 170 m are required to use two tugboats and 3 personnel for the tugboat operation.

The assignment of ships are adjusted and controlled by the Harbour Master Office. The pilot station communicates with ships by means of the port VHF system. However, as the existing radar system has been out of use, the arrangement of entry of ships is occasionally delayed. The pilots have been educated and trained in France and have satisfactory working ability of international level.

(2) Mooring Facilities

1) Cargo Handling Works at Oil Berths

The oil unloaded at Berth Nos. 11 and 12 is transferred to the oil storage tanks of 200,000 m³ capacity owned by three oil companies namely, Total, Mobil and Shell. The pipelines laid ashore consist of common pipeline group shared by the three oil companies and the others branch pipelines connected to individual oil tank yards owned by each oil company. The common pipelines are comparatively new, and the maintenance costs are equally shared between the three oil companies.

Port entry and departure, as well as berthing and unberthing of oil tankers, are directed by the pilots, tugboats, line boats, and line men of the Harbor Master's Office. Tugboats, line boats and line men are arranged by three teams on a two work shift basis, the daytime shift being from 8 a.m. to 6 p.m. and the night time shift from 6 p.m. to 8 a.m. Two tugboats with three line men are used for the tankers of 170 m or longer. The port entry and departure can be arranged at any time of the day.

For unloading of oil, each oil company assigns five men to the oil-berth and three men to the onshore oil base for connection and disconnection of tanker pipelines and onshore system by rubber pipings. Walkie-talkies are used for communications between the oil-berth and the onshore oil base. The flow of the work is as shown in Fig. 7-3.

At the Port of Djibouti there are six maritime agencies such as Societe Maritime L. Savon et Ries, Comad, J.J. Kothari & Co, Ltd., Maritime & Transit Services (MTS), Compagnie Generale Maritime (CGM) and Inchcape Shipping Services. All the companies, except Kothari, are actively working as maritime agencies in coordination with the three oil companies.

2) Cargo Handling at Container Terminal

Since 1985, the South Wharf which comprises Berth Nos. 1 and 2, has been functioning as the container terminal. All the containers brought into the Port are stocked once in the container yards and transferred to cargo owners, and then loaded to ships. There are no cargoes directly transferred to the owners at the quay. The work of cargo transfer is in general performed from 8:00 to 18:00 throughout the week except on Friday. However, overtime cargo transfer services are also available in the nighttime except on Friday and daytime on Sundays and holidays. Acceptance of the export cargoes is closed 24 hours before the arrival of cargo ships.

Stocking plans for exporting cargoes are made by PAID one day before the receipt of containers, based on the booking lists submitted to PAID by the maritime agencies. For the transfer of import cargoes, PAID makes plans one day before the transfer of cargoes which are prepared by the planners exclusively assigned to this work.

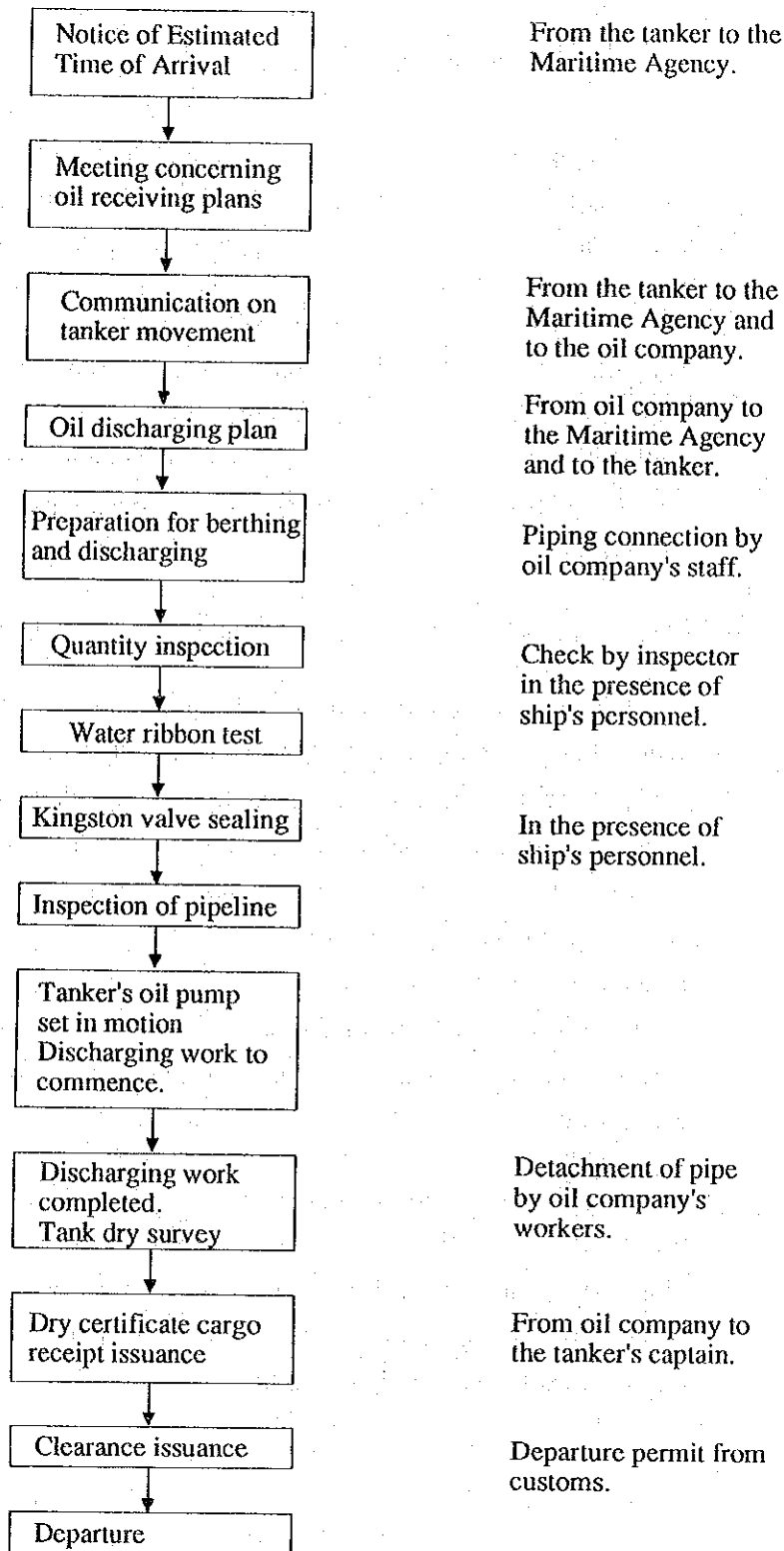


Figure 7-3 Flow of Cargo Handling and Operation

(3) Berth Assignments

In the Port, berth assignment is managed on a first-come-first-served basis. Any ship arriving considerably behind the entry schedule is required to wait until a berth is vacated, because any vacant berth is preferentially assigned to other ships arriving at the Port even if its entry is scheduled at a later date. In order to avoid unnecessary movements of the cargoes between stock yards and berths, ship owners can make request previously to PAID for assigning of a berth close to the stock yards.

For the application of a port entry permit, ship owners shall submit the entry schedule to the Port Master of the Maritime Affairs Division at least 7 days prior to the entry, so that PAID can arrange pilots and assign berth to the ships. The Maritime Division provides the entry schedule for the coming month. In any case, the port users shall report to PAID on their confirmed time for arrival and submit necessary documents 24 hours prior to their arrival. Ship owners are required to pay before hand the tariffs and cargo handling charges to PAID. Unless ship owners pay these charges beforehand, they are not permitted to use the berth.

Berth No. 12 has been used preferentially for oil transfer because of its water depth (-12 m), its location close to oil storage tanks, and more case of use of the pipelines than other berths. Berth No. 11 has been used as a supplemental berth to Berth No. 12. The numbers of oil tankers which used the Port facilities in 1992 are as follows:

| Berth | Number of Tankers |
|--------------|-------------------|
| Berth No. 10 | 1 |
| Berth No. 11 | 13 |
| Berth No. 12 | 74 |
| Berth No. 13 | 3 |
| Anchored | 24 |
| Total | 115 |

Note, Source: PAID

(4) Development Plan

The development plan for Djibouti was established in May 1992 by the Planning Department of the President and is shown in "Socioeconomic Development Guideline (1991 - 1995)". The Guidelines stipulates the targets, including, improvement of PAID's managing capability, and promotion of port-related private sector business. More specifically these include the following plans:

- 1) Restructuring of PAID's organization, including work system, regulations for management, charging system, etc.
- 2) Training of PAID's employees, and training of managing staff in the fields of technical, economics and administration.
- 3) Ease of various government's restrictions to develop the port related private enterprises, provision of free zone, planning for increase of productivity, etc.
- 4) Developing of various service levels relative to export operations.

In addition to the above, the mid-term development program for the year 2002 plans, the improvement of the Port Office building.

7.1.4 Present Operation and Management Problems

(1) Organization

In order to further promote the use of the Port and secure a superior position to such competing ports as Aden, Jedda, and Suez, it is mandatory that the Port provides easier access and more attractive settings for the users both in the port facilities and operation and management system. This necessitates PAID to find out users' needs quickly, widely and systematically, and reflects the needs to the actual development, and operation and management of the Port. It is also important to render useful information to the users so as to promote the use of the Port. When the competition among the ports becomes more competitive the importance of these functions and effectiveness of the Port will be increased. However, PAID has no such section having these functions at present.

(2) Control of Incoming and Outgoing Vessels

During the monsoon season of the Khamsin from June to September, there are some problems to secure the safe navigation of large vessels, in such case that two or more ships are maneuvering at the same time. Also, the present tight schedules for pilotage and tugboat operation tends to cause some delay for entry and departure of vessels.

(3) Dredging

During the 3-year period from 1989 through 1991, a total of 20,000 m³ sea bottom has been dredged with a suction dredger in front of Berth Nos. 10 through 14, and 8,000 m³ in front of Berth No. 15 in 1993. The dredged depth of the sea bottom at both locations was -12 m, and the dredged material was disposed at offshore areas of -19 and -20 m depth through a pipeline. As there has been no littoral drift in Djibouti Port, it is not necessary to periodically dredge the channel bottom; however, there is a shoal in front of Berth No. 13 thereby berthing to Berth No. 14 was occasionally hampered while a vessel was berthing at Berth No. 13, and dredging of the ship's channel is required to maintain safe navigation.

(4) Demolition of Pipeline

The pipeline presently not used were those determined in 1986 by the Committee for their removal, and the demolition works of such pipelines are now underway. Although the removed pipe materials are being transported to the warehouse of Mobil, some of the materials are left at the sites. The demolition works are to be completed at the earliest possible time so that the works will not hinder the cargo handling works.

(5) Transfer of Cargo

For the cargo transfer, interchanging of various documents is required among the Maritime Agency, Oil Company and the tanker. As well as the customs clearance, this is a part of reasons for a delay of the beginning of handling work. Some more simplification and effective procedure should be considered.

(6) Insufficient System for General Cargo Handling Plans

Plans for the general cargo handling are not made by PAID, but are prepared manually by the shipping agencies. Computer system has not been adopted yet.

This makes it difficult to establish immediately a consistent general cargo handling plan.

(7) Oil Handling

Quantities of oil discharged from tankers to the onshore oil base depends on the pump capacity of the tanker. Also, the three different types of oil cannot be discharged simultaneously. Since the time required for oil discharging fully depends on the tanker's pumping capacity, the discharging time can hardly be shortened.

Presently, the oil discharge rubber hoses are connected and disconnected by manual operation by 5 and 3 personnel at each side of the berth and oil storage tank respectively. This operation time could be shortened in the future when loading arms are equipped at the berths. The provision of the loading arms is under consideration at present among the three oil companies.

(8) 24-Hour Operation System

As a sales point, the Port has been adopting the 24-hour operation system. Although this kind of delicate service is evidently important to the ship owners, oil companies, etc., the berthing and the associated operations during nighttime may possibly endanger the safe navigation of ships. To avoid this kind of risk, the provision of more adequate lighting system and rehabilitation of the harbor radar system are mandatory. Also, for the safety of workers, all the port workers are required to wear helmets and safety shoes regardless of whether they are working at night or day.

(9) Communication System

The communication system currently used between PAID and users do not appear to be satisfactory due to the shortage of the available telephone circuits. The effective distance of UHF for the communication between PAID and vessels is limited to approximately within 20 miles, which seems to be a rather narrow range in the light of the international standards. The harbor radar system, now out of use, is also to be repaired immediately.

(10) Computerization

The PAID's computer system is now adopted in the container terminals for the cargo operation and control systems, but for the operation and navigation control work for the berths, the computer system has not been introduced yet.

7.1.5 Improvement Measures for the Present Operation and Management

As previously discussed, although some deficiencies are found in the control and management system, PAID seems to have been functioning relatively well. However, the following measures are considered necessary to be taken into account to improve the present conditions of PAID:

(1) Recording System

In the light of the present conditions of the oil berths left without receiving any improvement until today, it is considered that a periodical recording system be established to grasp the actual conditions of the damage or repairs of port infrastructures, based on which the necessary steps for rehabilitation, reconstruction, or repairs are to be taken.

(2) Assignment of Engineers

In order to implement the above measures, an experienced port and harbour engineer should be assigned to the presently vacant post of the Technical Adviser. It is necessary to select appropriate engineers among the engineers of the Division Infrastructures to be dispatched to a port engineering training institution to gain the knowledge in the field of port engineering.

(3) Establishment of New Sections for Port Sales

It is recommended that there should be any staff members in PAID, who is mainly responsible for promotion of port business, grasping the any needs from users, i.e., Oil Companies, Maritime Agencies and Crew and Captain of Tankers, and offering them useful information. In this respect, reinforcement of the Commercial Division by rearranging the business staff members will be effective.

(4) Improvement of Tugboats Capability

In order to meet the requirements for the pilotage of larger size vessels and for securing the safety of navigation outside the port area, tugboats should be well maintained. In particular, stock of necessary spare parts, daily inspection and maintenance for equipped facilities should be compulsory done by Harbor Master's Office and the Workshop Division.

(5) Develop Cargo Handling Plan

To secure efficient and safe cargo handling, PAID is to establish a unitary cargo handling plan, in which a time limit for such changes as cargo ships and shipment places should be set up.

(6) Simplify Documentation Procedures

Procedures for documentation to apply for incoming and outgoing of vessels and cargo handling need to be simplified for smoother implementation of the computerization.

(7) Improve Communication System

The number of telephones and telephone circuits should be increased so as to improve the present deficiencies in communication system and to establish an efficient control and management system.

7.1.6 Financial Status of PAID

PAID is to bear all operational, administrative expenses required for which the following funds are to be appropriated as financial resources:

- (1) Port dues.
- (2) Handling charges of import, export and transit of cargoes.
- (3) Port charges to cover expenses to be incurred for the maintenance of anchorage, channels and water area.
- (4) Revenue from the port charges as compensation for the services rendered by PAID to ensure safety of the crew, passengers and cargoes, to maintain cleanliness of the area within the port limits or the area under the direct supervision, and to maintain the public security.
- (5) Usage fees of the public facilities either owned/controlled or leased by PAID.
- (6) Allocated charges from a self-governing body, the Chamber of Commerce & Industry, other public institutions, or private sectors to cover part of PAID's expenditures.

In addition, employment of the funds is to include all expenses to be incurred for the establishment, reconstruction, renovation or expansion of the structures and facilities as well as disbursement of loans, for which the following resources are to be appropriated:

- (1) Depreciation gains.
- (2) Transfer from reserve accounts.
- (3) Gains by transfer of movables and immovables.
- (4) Allocated charges from the self-governing body, the Chamber of Commerce & Industry, other public organizations, or private sectors to cover part of PAID's expenditure, as required.
- (5) Government funds either as capital contribution or annual dues.

PAID is financed by the above resources, and according to its fiscal year 1993 budget, FD 2,990.5 million is appropriated for operating income and FD 2,293.9 million for capital gains & expenses. The fiscal year 1992 actual budget was FD 3,167.8 million for operating income and FD 2,804.7 million for capital gains & expenses. Some additional details on financing are shown in Table 7-3 PAID's Budget (1989 to 1993) and Table 7-4 Balance Sheet (1989 to 1992).

Table 7-3 PAID Budget (1989 ~ 1992: Actual, 1993: Provisional)

(Operating Income & Expenses) (Unit: FD million)

| Income | | | | | | Expenses | | | | | |
|----------------------|----------------|----------------|----------------|----------------|----------------|--|----------------|----------------|----------------|----------------|----------------|
| Item | FY '89 | FY '90 | FY '91 | FY '92 | FY '93 | Item | FY '89 | FY '90 | FY '91 | FY '92 | FY '93 |
| | Actual | Actual | Actual | Actual | Provisional | | Actual | Actual | Actual | Actual | Provisional |
| Port Charges | 741.1 | 825.8 | 1,058.3 | 1,168.8 | 1,026.2 | Materials, parts, etc. purchases | 165.9 | 221.2 | 299.3 | 352.6 | 402.8 |
| Various service fees | 912.5 | 1,028.5 | 1,948.8 | 1,794.7 | 1,731.5 | Personnel expenditure | 888.6 | 968.9 | 1,202.4 | 1,343.8 | 1,268.1 |
| Facility lease, etc. | 128.5 | 128.1 | 126.6 | 129.0 | 131.5 | Dues | 1.6 | 1.3 | 0 | 3.6 | 3.5 |
| Ferry income | 16.8 | 15.4 | 26.6 | 3.4 | 15.0 | Maintenance fee | 239.8 | 270.3 | 270.9 | 422.9 | 508.3 |
| Other income | 18.4 | 15.3 | 14.5 | 19.5 | 5.8 | Transportation fee, travel expenses | 21.1 | 12.6 | 16.2 | 32.3 | 24.4 |
| Funds employment | 117.3 | 100.9 | 84.2 | 52.4 | 80.0 | Management fee | 74.7 | 79.6 | 87.5 | 107.9 | 103.6 |
| | | | | | | Interests & commission | 53.7 | 65.6 | 121.0 | 141.2 | 130.0 |
| | | | | | | Appropriation for depreciation reserve | 326.3 | 364.4 | 768.1 | 720.8 | 360.0 |
| | | | | | | Other expenditures | | | | | 20.0 |
| | | | | | | Provisional return | 162.7 | 130.1 | 493.6 | 42.7 | 169.3 |
| Total | 1,934.6 | 2,114.0 | 3,259.2 | 3,167.8 | 2,990.0 | Total | 1,934.6 | 2,114.0 | 3,259.2 | 3,167.8 | 2,990.0 |

(Capital Income & Expenses) (Unit: FD million)

| Income | | | | | | Expenses | | | | | |
|----------------------------|----------------|--------------|----------------|----------------|----------------|--------------------------|----------------|--------------|----------------|----------------|----------------|
| Item | FY '89 | FY '90 | FY '91 | FY '92 | FY '93 | Item | FY '89 | FY '90 | FY '91 | FY '92 | FY '93 |
| | Actual | Actual | Actual | Actual | Provisional | | Actual | Actual | Actual | Actual | Provisional |
| Borrowings | 2.3 | 37.5 | 641.4 | 1,954.0 | 1,589.0 | Property acquisition | 818.6 | 139.4 | 931.1 | 2,458.8 | 1,972.9 |
| Reserve for depreciation | 998.7 | 369.9 | 756.7 | 337.0 | 360.0 | Repayment | 238.8 | 239.8 | 239.4 | 345.9 | 321.0 |
| Provisional return | 178.0 | 138.9 | 602.1 | 214.4 | 169.3 | Loan and advance payment | | 100.0 | | | |
| Savings of revolving funds | | | | 299.3 | 175.6 | operation funds | 121.6 | 67.0 | 829.7 | | |
| Total | 1,179.0 | 546.3 | 2,000.2 | 2,804.7 | 2,293.9 | Total | 1,179.0 | 546.3 | 2,000.2 | 2,804.7 | 2,293.9 |

Note: Based on the fiscal year 1993 budgets.

Table 7-4 Balance Sheet (1989 - 1992)

(Unit: FD million)

| | Assets | | | | | Liabilities | | | |
|----------------|--------|-------|-------|--------|----------------------------------|-------------|-------|-------|--------|
| | '89 | '90 | '91 | '92 | | '89 | '90 | '91 | '92 |
| Fixed assets | 3,859 | 3,762 | 4,356 | 9,070 | Capital | 5,551 | 1,906 | 1,580 | 2,719 |
| Current assets | 2,043 | 2,154 | 2,563 | 2,053 | Reserves | - | 1,182 | 1,783 | 1,021 |
| Reserves | - | - | - | 74 | Mid-term liabilities | 208 | 2,360 | 2,541 | 6,455 |
| | | | | | Short-term liabilities | - | 358 | 533 | 695 |
| | | | | | Profits | 142 | 110 | 482 | 40 |
| | | | | | Reserves | - | - | - | 69 |
| Total Assets | 5,901 | 5,916 | 6,919 | 11,197 | Total of Liabilities & Net Worth | 5,901 | 5,916 | 6,919 | 11,197 |

According to the financial statements for fiscal years 1989 through 1993, PAID paid taxes based on the revenue earned, thereby contributing to the national administration. The relevant profits are shown in Table 7-5:

Table 7-5 Profits of PAID 1989 - 1991

(Unit: FD million)

| Fiscal Year | Profits |
|-------------|---------|
| 1989 | 142 |
| 1990 | 110 |
| 1991 | 482 |
| 1992 | 40 |

The investment for expansion of the port facilities or renovation of deteriorated facilities and repayment of loans were costly, except in 1990 when the Gulf War broke out, resulting in PAID's financial difficulty.

Acquisition of property appropriated as the expenditure for the capital gains & expenses was due to construction of a container terminal, its expansion, and expansion and/or renovation of other port facilities and equipment. Relation between property acquisition and repayment is shown in the following table:

Table 7-6 Properties Acquired and Repayments

| (Unit: FD million) | | | |
|--------------------|-------------------|-----------|---------|
| Fiscal Year | Property Acquired | Repayment | Remarks |
| 1989 | 818.6 | 238.8 | Actual |
| 1990 | 139.4 | 239.9 | Actual |
| 1991 | 931.1 | 239.4 | Actual |
| 1992 | 2,458.8 | 345.9 | Budget |
| 1993 | 1,972.9 | 321.0 | Budget |

The large scale facility investment is expected to end in 1993, but it is anticipated that depreciation costs associated with facility investments will increase, affecting the PAID management.

A proposal to increase the port charges by 80 % to improve PAID's financial conditions has been brought before a cabinet meeting, followed by the approval of the PAID's Board of Council. The revenue anticipated by the increased port charges is FD 164,849,519 according to the fiscal year 1991 financial statements.

7.1.7 Overview of PAID's Financial Conditions

As can be seen from Table 7-3 Capital Income & Expenses, the borrowings tend to increase after 1991. Until 1990 the repayments were larger than the borrowings. In 1991, however, the repayment stood at FD 239.4 million while the borrowing was FD 641.4 million.

The increments of the borrowings in the years 1991, 1992 and 1993 are; FD 641.4 million - FD 239.4 million = FD 402 million, FD 1,954 million - FD 345.9 million = FD 1,608 million, and FD 1,589 million - FD 321 million = FD 1,268 million (budget) respectively.

As the borrowings and fixed assets increased, so too were the depreciation reserves. From the view point of raising funds, this condition involves no financial problem since the repayment of DF 239.4 million in 1991 was within the amount of depreciation reserves.

The actual profit in the 1992 settlement account was DF 42.7 million, which accounts for only 20 percent of the originally estimated profit in the budget of DF 214.4 million. This can be explained by the fact that the actual appropriation for depreciation reserves made in 1992 was DF 720.8 million, which was more than double the originally estimated amount of DF 337 million.

A total of FD 169.3 million was appropriated in the 1993 budget as the profits, while FD 360 million was earmarked for the appropriation of depreciation reserves. As the 1992 settlement of accounts has indicated, it is a matter of course that profits will vary according to the increase or decrease of appropriation for depreciation reserves.

7.2 Anti-Disaster and Safety Management

7.2.1 Present Port Activities

Present disaster management and control system were observed through inspections and interviews with Harbor Master's Office, a captain of oil tanker discharging cargo oil at Berth No. 12, ships agents and oil companies.

(1) Port Approaches

(a) Communications to the Port

Before the arrival at Port of Djibouti, the following information will be transmitted to the Port by telex or V.H.F.:

- 4 days before arrival, send estimate time of arrival (E.T.A.)
- 3 hours and 1 hour before arrival, notice of E.T.A. to the Port

(b) Approaches to Anchorage

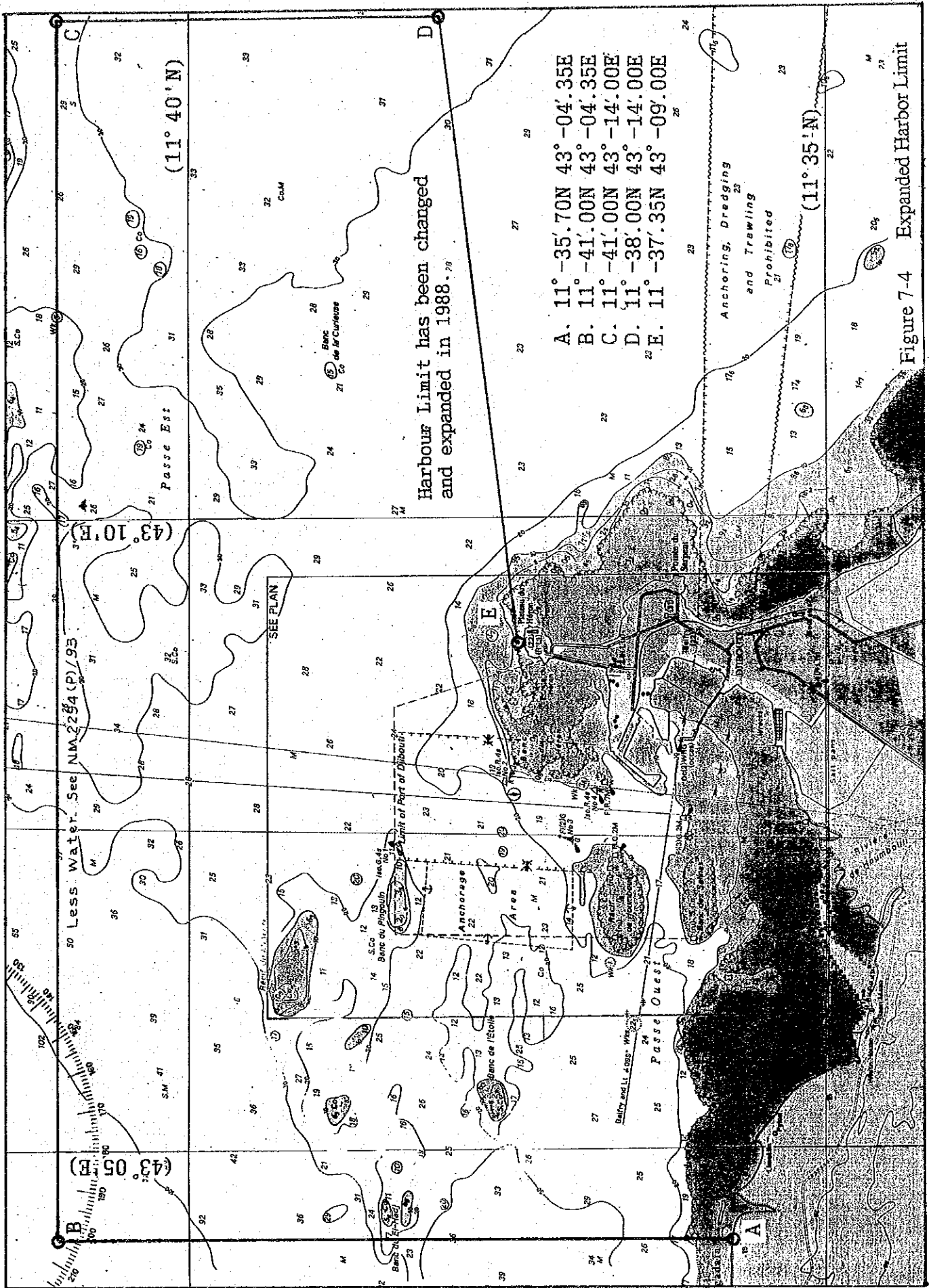
Once the ship arrives at the Port of Djibouti, the ship enters into the anchorage through approaches in accordance with the following navigation procedures.

After fixing the ship's position by "RAS BIR" light house (11° 59' N, 43° 02' E) which is located at the entrance of "GOLFE DE TADJOURA (Bay of Tadjoura)", the vessel proceeds abeam to "ILE MASKALI" light house and observes the hill "GISI" 194 m altitude, which is located 3 miles south of Port of Djibouti and then finds the leading light on one line transit. It is very easy to the approaches to the anchorage. The anchorage for berth waiting is located between "BANC DU PINGOUIN" and "RECIF DE HOUMBOULI"

Anchorage: Length: 2,200 m, Width: 1,100 m, Depth: 13 to 22 m

Soil characteristics of sea bottom: mud, holding is excellent.

Remarks: Harbor limit has been changed and largely expanded in 1988 (refer to Fig. 7-4)



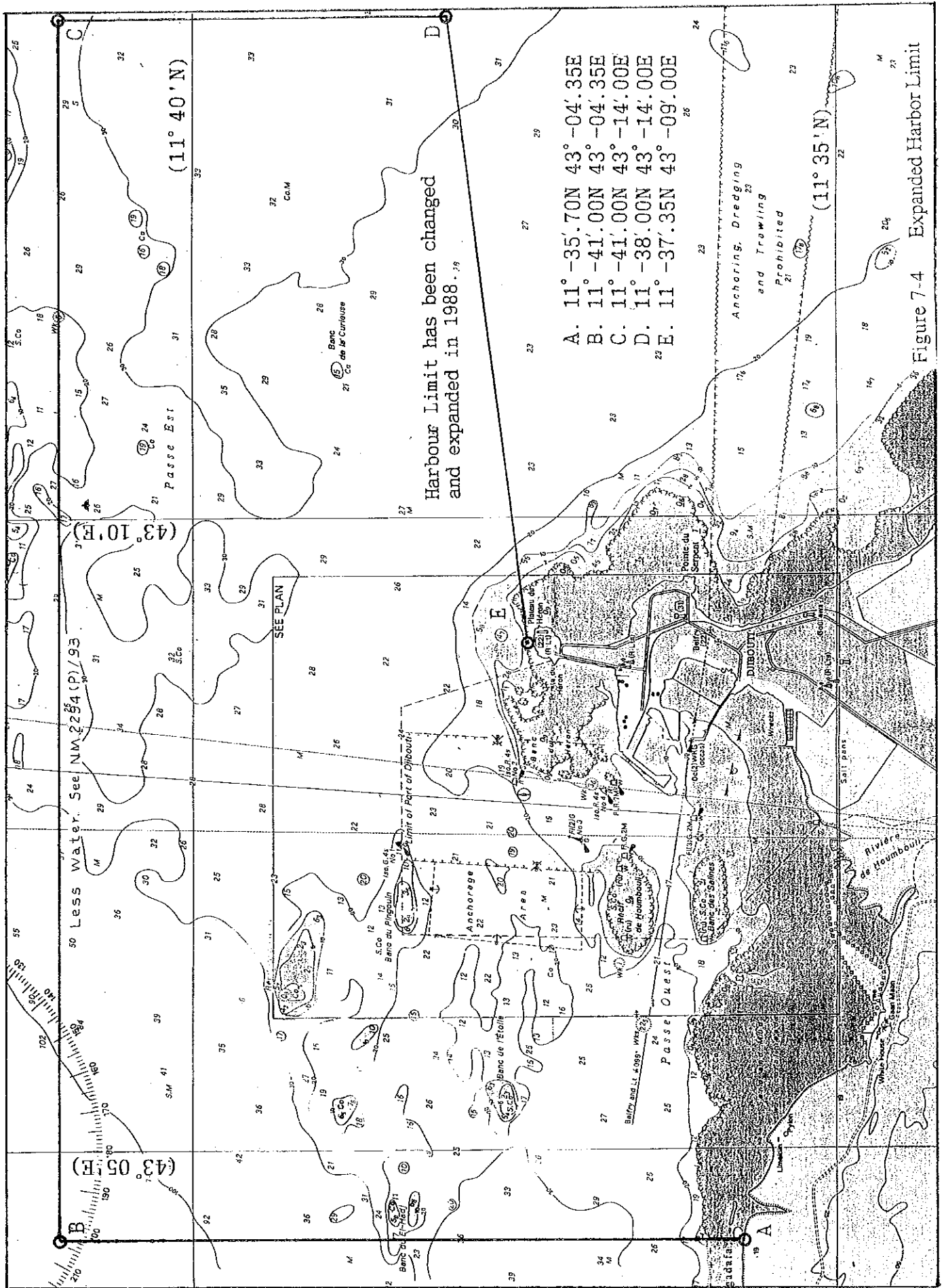


Figure 7-4 Expanded Harbor Limit

(c) Approach Channel to Berth Nos. 11 and 12

- i) Channel: Length = 3,000 m, Width = 750 m, Depth = 15 to 25 m

Allowable under-keel clearance: 10 % of draft

Proceeding to the Berth is very easy, because of wide approach channel and established remarkable well maintained navigational aids.

- ii) Turning Basin: sufficiently wide as shown in Fig. 7-4.

(d) Pilotage

The Port has seven (7) pilots available 24 hours a day throughout the year. Pilotage is compulsory for all ships with a net tonnage in excess of 300 tons.

Training of pilots started about 15 years ago, selected candidates among the high school graduates are dispatched to France for pilot training. All pilots, an average age of about 35 years, are officials of PAID and assigned to the Harbor Master's Office. The skill of the pilots for maneuvering of vessels is satisfactory.

(e) Tide, Wind and Draft

- i) High Tide : +2.90 m

Mean Sea Level : +1.60 m approximately

Low Tide : +0.20 m

- ii) Tidal currents are very weak in the Bay and rarely exceed 1 knot.

- iii) During June-August, north-westerly wind blows, on the route to the Berth, experienced lee way is 3 to 5 degrees.

- iv) All vessels are prohibited to move when strong wind blows over 20 m/sec.

- v) Allowable max. draft: 10.9 m at Berth Nos. 11 and 12

(2) Berthing

(a) Actual Practice for Berthing

- i) All vessels should be assisted by a tug boat, a pilot boat and a mooring line boat. The list of tug boats available at Port of Djibouti is shown in Table 7-7.

Table 7-7 Service Crafts in Port of Djibouti

| Name | Capacity/Size | Built | Fire Fighting Equipment | Owned By |
|------------------------|------------------|-------|-------------------------|----------|
| 1. Tug Boat | | | | |
| Abdu Baker Pacha | 1500 HP | 1965 | none | HMO |
| Arthur Rimbaud | 1800 HP | 1975 | none | ditto |
| Bab-El Mandeb | 2200 HP | 1988 | water/foam | ditto |
| 2. Pilot Boat | | | | |
| Etoile | L=12 m | 1989 | none | ditto |
| Ras Syan | L=8 m | 1965 | none | ditto |
| 3. Mooring Line Boat | | | | |
| Dorale | L=8 m | 1989 | none | ditto |
| Asseyla | L=8 m | 1965 | none | ditto |
| Ali-Adde | L=8 m | 1965 | none | ditto |
| 4. Oil Collection Boat | | | | |
| Vega | L=10 m | 1989 | none | ditto |
| 5. Rescue Boat | | | | |
| Bourhan Ali Warki | 3300 HP, 253 GRT | 1989 | foam | DAM |
| 6. Coast Guard Ship | | | | |
| Ali Oudom | L=18.5 m, 51 GRT | 1989 | none | CGO |

Note: HMO: Harbor Master's Office

DAM: Director of Maritime Affairs

CGO: Coast Guard Office

Source: Harbor Master's Office of PAID

- ii) For ship lengths over 170 m, two (2) tug boats must be employed.
- iii) Ships line is used for tow-line.
- iv) Number of crew and working hours of pilotage is tabulated below:

| Work Item | Number of Crew | Working Hours |
|--------------------|----------------------|--|
| Tug Boat | 6 to 7 each per team | 3 teams/2 shifts (08:00 to 18:00 and 18:00 to 08:00) |
| Pilot Boat | 3 to 4 " | |
| Mooring Line Boat | 2 to 3 " | |
| Shore Line Handler | 18 in total | |

(b) Mooring

- i) In ordinary starboard berthing, the mooring head is undertaken at Berth Nos. 11 and 12.
- ii) Use ship's mooring line, the number of lines is: Fore and Aft lines (2); Breast lines (4); Spring lines (4); Total (12) lines.

(3) Entry Procedure and Documentation

(a) Documentation

Required ship documents for the port entry procedure are enumerated below.

Number of Copies of Document

i) Quarantine Office

- a. Radio Pratique ----- None
- b. Maritime Declaration of Health ----- (1)
- c. Vaccination List ----- (1)
- d. Crew List ----- (1)

ii) Immigration Office

- a. Harbor Immigration Djibouti ----- (1)

- iii) Customs Office
 - a. Cargo Manifest ----- (1)
 - b. Crew List ----- (1)
- iv) Maritime Agency
 - a. Crew List ----- (4)
 - b. Cargo Manifest ----- (5)

(b) Free Pratique

Immediately after berthing, a quarantine officer goes on board to inspect and to grant "Free Pratique" to the Captain. Without issuance of "Free Pratique", nobody including immigration and custom officers are allowed on board.

(c) Notice of Readiness (N/R)

Following the granting of "Free Pratique", a maritime agency personnel goes on board for the arrangement of N/R and an arrival notice is prepared by the Captain. The flow of Ship's Documents, is shown in Fig. 7-5.

(4) Cargo Oil Handling Works

Oil cargo is handled by the three oil companies, namely Shell, Total and Mobil, in the procedure described below:

(a) Preparation (refer to Fig. 7-6)

- i) The oil company arranges a wharf watchman to be on alert with a CO₂ bottle 30 minutes before ship's arrival.
- ii) After mooring at the berth, five (5) workers of oil company come on board and commence hose connection work with ship's officer. Upon completion of hose connection work, confirm with a transceiver the condition of pipeline and shore tank yard where three (3) other workers of the oil company are deployed.

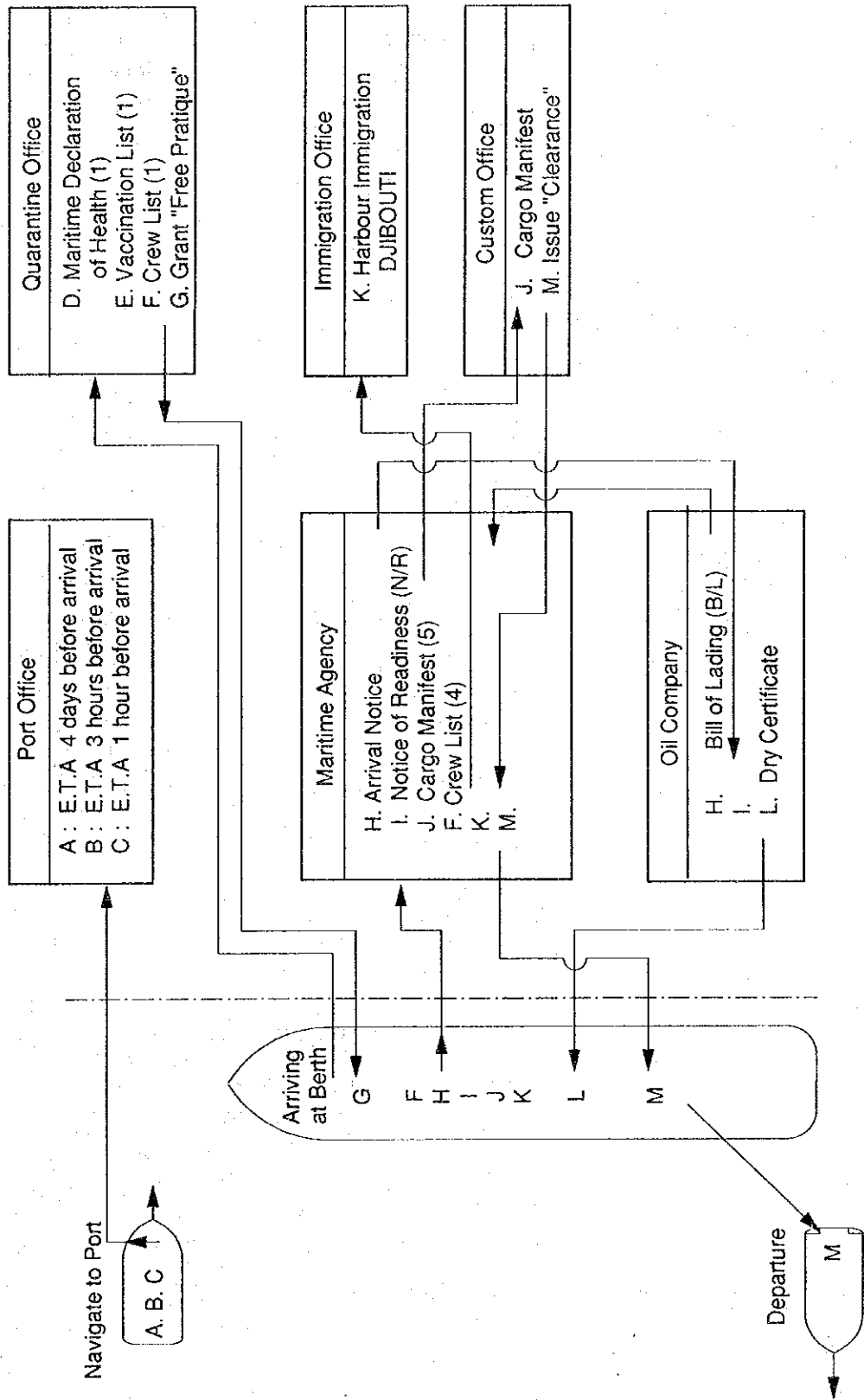


Figure 7-5 Flow Chart of Ship's Documents

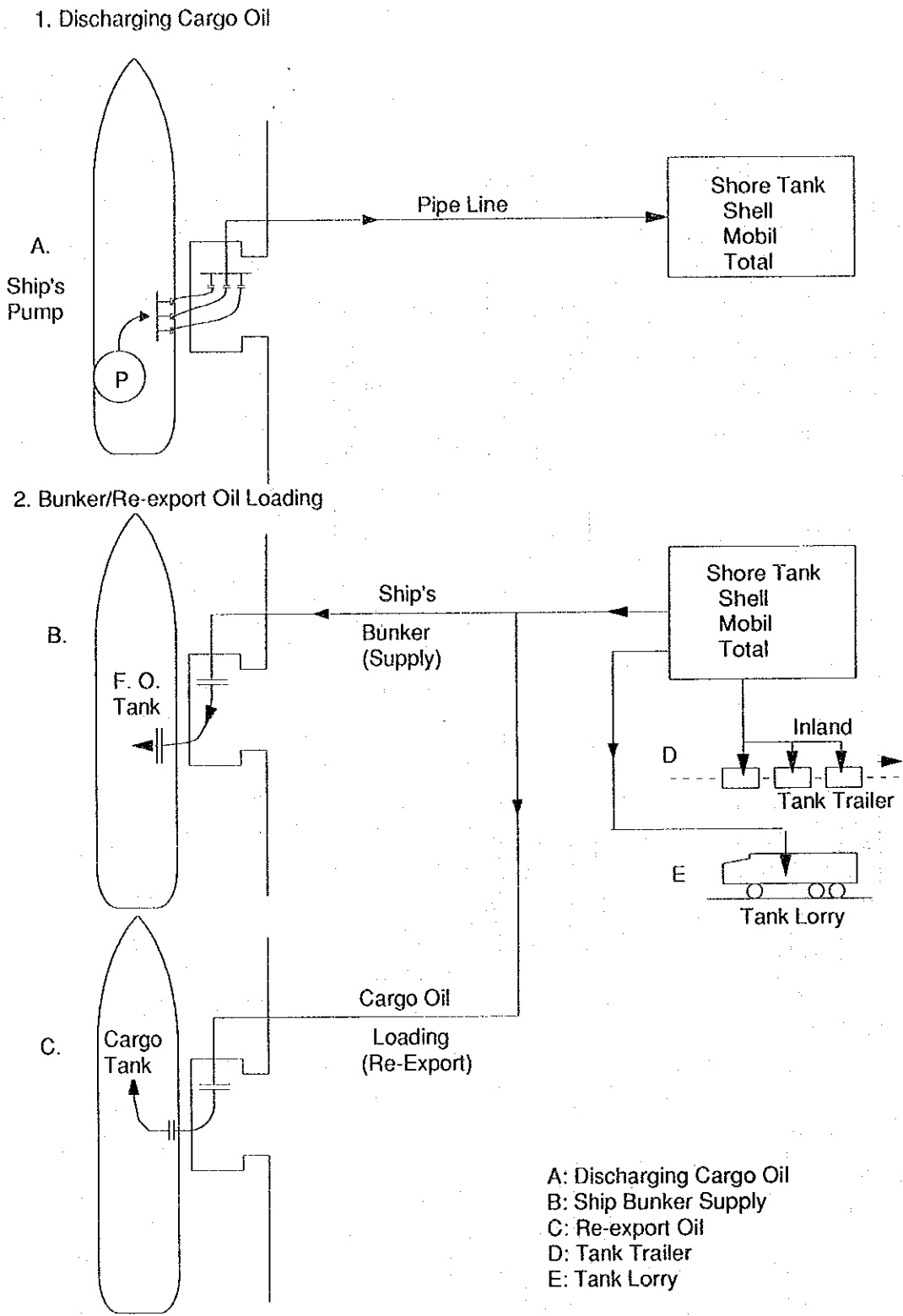


Figure 7-6 Cargo Oil Flow Chart

(b) Commencement of Oil Discharging

After the completion of hose connection work, inform ship's officer and opening the valves, start oil pumping.

Then, three (3) wharf watchmen are deployed, one each from PAID, Fire Department and oil company.

(c) Completion of Oil Discharging

Upon completion of oil pumping, tank inspection is conducted with a ship's officer and a surveyor, and a "Dry Certificate" to the Captain is issued. Hose is disconnected from the ship's manifold, and oil discharging work is completed.

(5) Ship's Departure

The maritime agency goes on board and gives a "Clearance" to the Captain. The pilot goes on board, stands by a tug boat and a line man, confirms ship's condition of departure, and starts the operation of ship departure, if the ship has a bow thruster, the number of tug boats may be reduced.

(6) Organization of Harbor Master's Office (PAID)

(a) The organization chart of Harbor Master's Office is shown in Fig. 7-7.

(b) Under the Harbor Master, there are an assistant harbor master, seven (7) pilots and other staff. It consists of Port Control Dept., Security Dept., Tugs and Mooring Boat Dept., Water Supply Dept., Crew Employees Management Dept. and Landing Craft Dept.

7.2.2 Present Condition of Anti-Disaster and Safety Management

(1) Emergency Operation System (refer to Fig. 7-8)

Through the above mentioned port activities, in case of an disastrous incident such as fire and oil spill, an emergency system is established of which members consist of PAID, the oil companies, the City Fire Department, the Civil Protection Department and Bureau of Maritime Affairs, who will take immediate emergency actions to minimize the disaster.

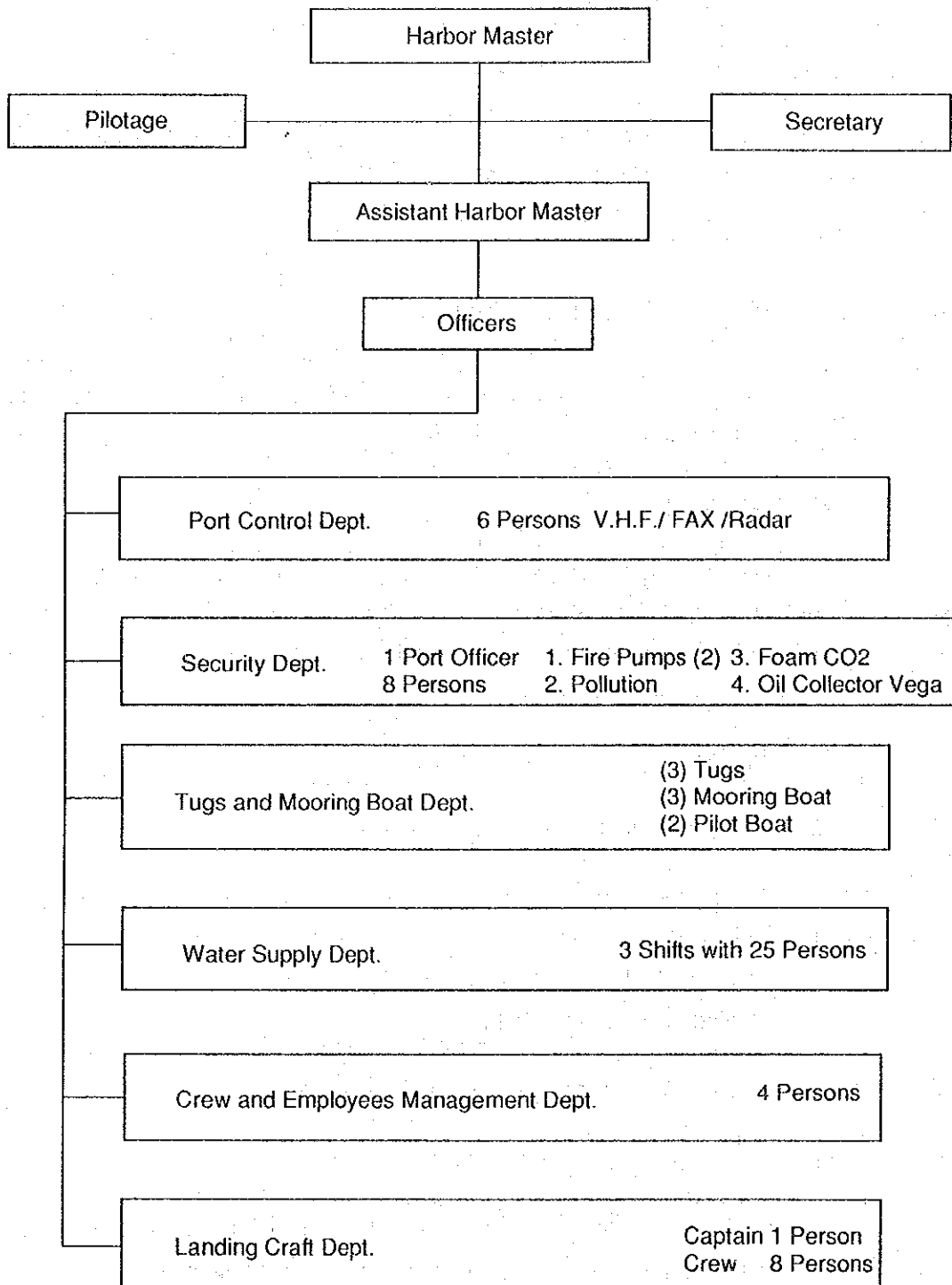


Figure 7-7 Organization Chart of Harbor Master's Office (Capitainerie)

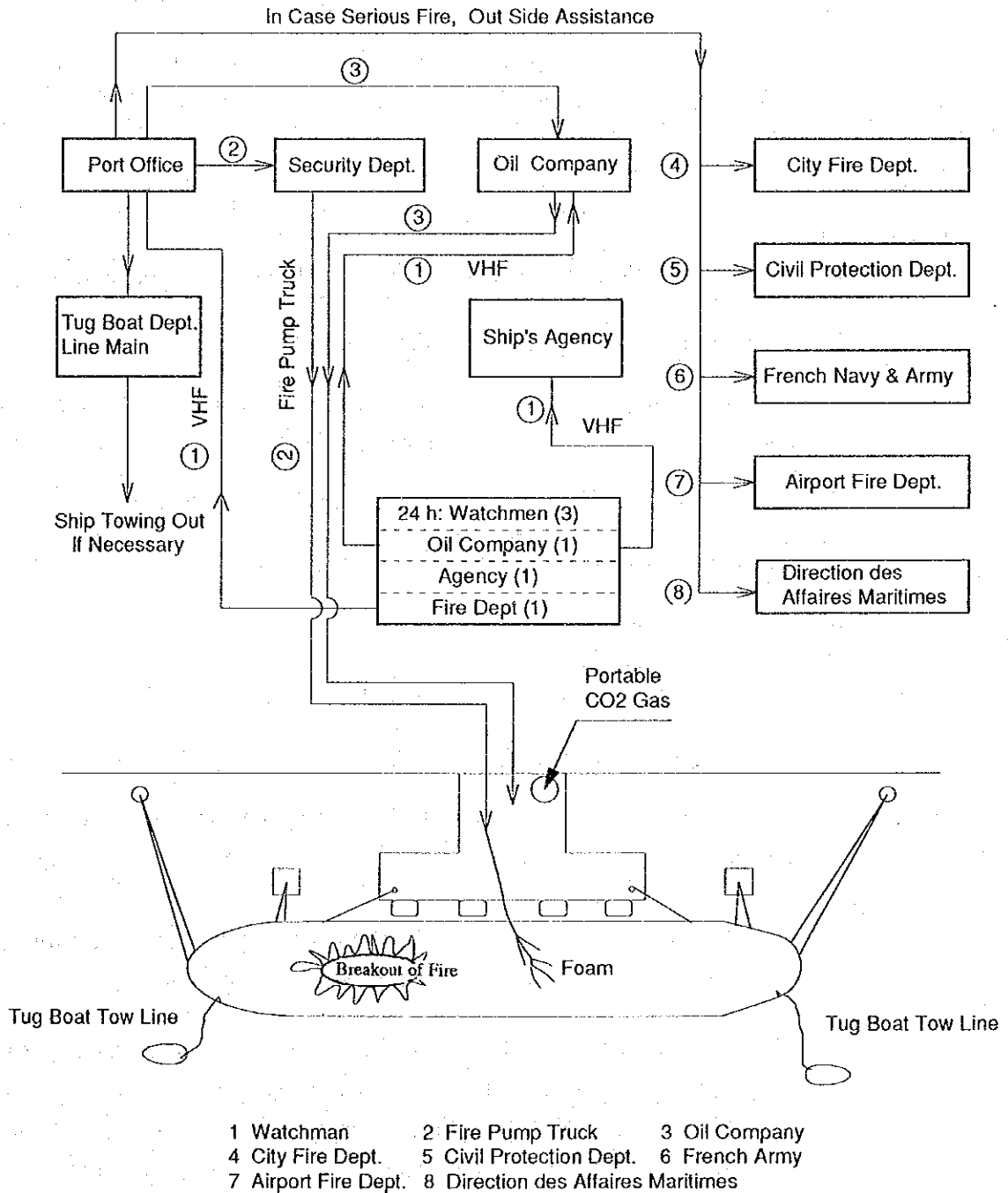


Figure 7-8 Emergency Operation System

Depending on the scale of disaster, PAID requests the assistance of emergency system from outside of the Port.

(2) Present Conditions of Anti-Disaster and Safety Equipment and Materials

(a) There are no site patrol system, fire detectors, or alarm system. Communication among office and personnel concerned are made by using V.H.F, transceivers and telephones.

(b) Fire Fighting Equipment

i) at Oil-Berth Nos. 11 and 12, one each portable CO₂ bottle provided.

ii) at Security Section (PAID Fire Dept.)

a. Fire Pump Trucks : two each with capacity of water 2 kl,
Foam 1 kl

b. Foam Liquid Tank : 1 kl x 2 tanks, 20 l x 25 cans

c. Portable CO₂ Bottle : 20 units

(c) Equipment for Oil Spill

i) No equipment provided for oil spill at Berth Nos. 11 and 12

ii) At Security Section (PAID Fire Dept.)

a. Oil Powder : 250 l x 20 bags (IMAX made in Holland)

b. Oil Catcher : 60 m

c. Oil Collector : "VEGA" (L: 10 m x B: 4 m, built in
Japan 1989)

iii) Rescue Boat "BOURHAN ALI WARKI" built in Japan 1989, belongs to Direction of Maritime Affairs. Equipped with 800 m oil fence and some oil solvent. The vessel is mainly despatched upon request of the IMO (International Maritime Organization). [Gulf Coast Three (3) Country-Conference]

(d) Fire Fighting and Anti-Oil Pollution Equipment and Materials

The information below has been given by MOBIL Oil Djibouti.

1) Fire Department of PAID

- Movable Automobile Pump (120 cu. m/h) with 800 m hose (dia. 100/110 mm)
- Fire Pump Truck with 60 cu. m/h and two (2) 60 cu. m/h Foam Nozzles
- Emulsion Truck with 1,000 l (20 minutes continuous operation)
- Tug Boat "Bab-el Mandeb" with two (2) Foam Nozzles 1,000 l/min. & one 5,000 l Emulsion Tank
- Rescue Boat "Bourhan Ali Warki" with two (2) Foam Nozzles 1,000 l/min. & one 5,000 l Emulsion Tank

2) Oil Companies Coordination

2-1) MOBIL

- Two (2) Movable Nozzles 2,000 l/min.
- One 180 m Hose (dia. 4")
- One 400 m Hose (dia. 2")
- Four (4) Foam Generators
- Sixteen (16) 200 l Emulsion Drums

2-2) SHELL

- Movable Foam Nozzle 2,000 l/min. & 1,800 l/min. one each
- One Foam Nozzle
- One 260 m Hose (dia. 2" 1/2)
- 36 Emulsion Drums 200 l
- 16 Emulsion Buckets 26 l
- One Drum Carrier
- Ten (10) Emulsion Breakers with 200 l capacity
- Four (4) Emulsion Breaker Buckets 25 l capacity

2-3) TOTAL

- Two (2) Movable Foam Nozzles 1,000 l/min.
- One 400 m Hose (dia. 2" 1/2)
- One 200 m Hose (dia. 2")

- 23 Emulsion Drums 200 l capacity

2-4) Pool MOBIL & TOTAL at Airport d'Ambouli

- One 200 m Hose (dia. 2")
- One Movable Foam Nozzle 2,000 l/min.
- 10 Emulsion Drums 200 l capacity

2-5) Fire Department at Airport d'Ambouli

- Two (2) Water/Emulsion Trucks with one Nozzle 450 l/min., one 6,000 l Water Tank & one 720 l Emulsion Tank
- One Water/Emulsion Truck with one Nozzle 450 l/min., one Nozzle 3,000 l/min., one 6,000 l Water Tank & one 720 l Emulsion Tank
- 21 Emulsion Drums 200 l capacity

2-6) SHELL at Airport d'Ambouli

- One Foam Nozzle 1,800 l/min.
- 4 Emulsion Drums 200 l capacity
- 4 Emulsion Buckets 20 l capacity
- One 40 m Hose (dia. 2" 1/2)

3) Equipment and Materials for Anti-Oil Pollution

3-1) Program of Gulf of Aden Protection for Oil Pollution

- Oil Fence 500 m, Type BUH 2H36DF
- Two (2) Oil Skimmers Mantaray Transvac 500D Type with one Thermal Pump, one 50 m Floating Hose, one 30 m Discharge Hose and two (2) Reserve Tanks 1,000 l capacity
- One "Slickbar" Submergible Pump 200 cu. m/h with one 40 m Hose
- 40 Emulsion Breakers 200 l
- 20 Personnel Protective Clothing
- Five (5) Breathing Apparatus
- One Motor Generator
- Eight (8) Walkie-talkies

3-2) SHELL Storage

- 40 bags of Camsorb Powder (50 l)
- 10 Emulsion Breaker Drums 200 l
- 4 Emulsion Breaker Buckets 25 l

3-3) MOBIL Storage

- 4 bags of Absorbing Powder

3-4) TOTAL Storage

- Two (2) Emulsion Breaker Drums 200 l
- Two (2) Emulsion Breaker Buckets
- Absorbing Materials

7.2.3 Others

- (1) Access to/from the ship and the shore is by ship's gangway only, several times very dangerous conditions were noted.
- (2) Proper personal safety gear such as hard hats and life jackets are not provided except for some of oil company's workers.
- (3) The Government of Djibouti ratified SOLAS.

7.2.4 Recommendations on the Anti-disaster and Safety Management

In order to up-grade the present condition of anti-disaster and safety management system, the following improvement measures are recommended:

Those individual items recommended hereunder are examined and concluded from the viewpoint of the international level of safety, based on the present situations as described in the Sections hereinbefore.

(1) Safety Precaution and Emergency Procedure

a) Terminal Emergency Plan

A terminal emergency plan which covers all aspects of the action to be taken in the event of an emergency should be developed by the terminal. This plan should be drawn up in consultation with the port authority, the fire station, the police, etc. It is essential that the terminal emergency plan makes absolutely clear the person, or persons in order of priority, with overall responsibility for dealing with the emergency. The responsibility, under that person, for the actions of those parts of the terminal organization which may be called upon to participate in the effort to contain and control the incident must also be clearly established.

b) Terminal Regulations

A bulletin board showing a notice of harbour regulation extract should be put up at the entrance of Oil-Berth Nos. 11 and 12.

For example:

NOTICE

1. NO UNAUTHORIZED PERSON
2. NO SMOKING
3. NO NAKED LIGHT
4. INFLAMMABLE SUBSTANCE PROHIBITED

In addition, portable notices which meaning "Loaded Flammable Cargo" should be displayed at the ship's both side.

(2) Safety Check List

The Ship/Shore Safety Check List is for the safety of both ships and terminals and of all personnel and should be completed jointly by the responsible officer onboard and the terminal representative. This will entail a physical check by the two persons concerned and will be conducted jointly where appropriate. It is emphasized that some of the items on the Check List will require several physical checks or even continuous supervision during the operation. The check list should be referred to the "International Safety Guide for Oil Tankers & Terminals (ISGOTT)". The extracted copy of the checklist and related guidelines are shown in Appendixes A-7 to A-9 for ready reference.

(3) Fire Training and Drill

All personnel working at the terminals and oil berths should receive instructions in fire prevention and fire fighting techniques. Periodic Drills related to fire fighting and prevention of oil pollution should be performed about twice a month.

(4) Fire Alarm

Fire alarm systems are needed on the working platform at the Oil Berths to notify directly to the Harbor Master's Office (hereinafter called as the Office). In case that an emergency accident e.g. fire or oil spill happens, the first action against such accident might be taken more effectively and the spread of disaster can be prevented by the firestation and related bodies.

(5) Electric Currents Between Ships and Shore

Large currents can flow in electrically conducting pipework and flexible hose system between the ship and the shore. There is a very real danger of an ignition spark when the ensuing large current is suddenly interrupted during the connecting and disconnecting of the flexible hose at the tanker manifold. To prevent an ignition spark, an insulating flange should be inserted within the length of the flexible hose strings to the shore pipeline system. Typical insulating flange joint is shown in Appendix A-10 for reference. In addition, flexible hose strings should include in each string a single length of non-conducting hose.

(6) Fire Extinguisher

There is a portable CO₂ bottle with wheels on Oil Berth Nos. 11 and 12 each at present, however these bottles are too big and are inconvenient for handling. Smaller bottles which could be carried on the shoulder might be more convenient and about 5 bottles for each berth should be desirable as equipment against minor electrical fires. CO₂ bottles should be weighed and the contents should be checked periodically.

Foam concentrates of foam extinguishers may deteriorate with time depending on the storage conditions. Samples of the foam concentrate should, therefore, be tested and evaluated periodically.

(7) Approaching Ship's Position

The communication between a ship and the Office is being performed by VHF and/or telephone systems and it is functioning well. However, due to breakdown of the old type of radar at the Port, the Office has been forced to observe approaching ships mainly by binoculars only and it sometime causes delay for arranging pilots and/or tugboats. Maintenance of the radar is necessary to ensure the port efficiency and vessel's safety.

(8) Wharf Ladder

Ship's gangway is utilized as a passage between the ship and the shore. However, due to the inconveniences of the berth structure, the gangway is lowered at a distance from the berth and there are cases where it constitutes a very dangerous situation. A permanent wharf ladder with safety net or the extension of the working platform of the berth is necessary to maintain a safe passage between the ship and the shore.

(9) Mooring Equipment

Quick release hooks are recognized as the effective way to release a ship quickly from the berth in an emergency, e.g. fire. In the circumstances of Djibouti, the berth is faces the open sea and the height of the quay is not so high, therefore sea water can come up to the quay by the seasonal wind or Khamsin. For this reason, maintenance of the hooks is very difficult. In European and/or American countries, troubles with quick release hooks have occurred, therefore, axes or knives are provided for cutting mooring lines in case of emergencies. This work is accompanied with danger for the line men. In addition, the subject tanker vessel size is 35,000 DWT, and conventional pier equipment such as mooring bitts will be useful for Berth Nos. 11 and 12.

A berthing vessel takes a total 12 mooring lines at present, however vessels of over 20,000 DWT are better to take 16 mooring lines namely three (3) head lines, three (3) stern lines, three (3) forward breast lines, three (3) aft breast lines, two (2) forward spring lines, and two (2) aft spring lines to ensure more safety.

(10) Electric Crane

An electric crane, which has a working load 1 M/T, a height about 15 meters and an out-reach about 10 meters, is needed around the center position on each berth. This crane can help workers to connect shore cargo hoses to ship's manifold because ship's crane sometimes cannot be used, moreover this crane can help workers to prepare wharf ladders which is placed manually when the ship's crane is not able to be used.

(11) Oil Fence

There are many cases where the port regulations prescribe the preparation of oil fence to encircle tankers during cargo handling operations. At Djibouti, the regulation which prescribes the preparation of an oil fence to encircle the tanker during the cargo handling operation should be established.

(12) Oil Treatment Equipment

Oil treatment equipment, e.g. oil catcher, oil powder etc., which are placed in store at present, should be regularly placed on the working platform at Berth Nos. 11 and 12 to take emergency action for oil spills.

(13) Lighting Equipment

Explosion proof lighting equipment, which ensure enough luminous intensity for safe cargo handling operations at night time, should be installed at the oil berths including the mooring bits.

(14) Others

a) Emergency Tow Away Cable

Tow away cable of adequate strength and condition should be made fast to bollards on the tanker, forward and aft, and their eyes run out and maintained at, or about, the waterline. On tankers alongside the berth, the cables should be hung in position where tugs can reach them without difficulty, usually on the offshore side. In order that sufficient cable can be paid out to enable the tugs to tow the tanker effectively, enough slack should be retained between the bollard and the chock onboard and to prevent from running out by a rope yarn or other easily broken means.

The arrangement varies with the place or ports, therefore, the master onboard should be advised of the local requirements.

b) Drainage

Upon completion of the oil handling operation, the residual oil in the connection hose should be drained into fixed drain tanks or portable drip pans. It is desirable to provide an oil pit on each working platform at Berth Nos. 11 and 12.

Chapter 8 Project Appraisal

CHAPTER 8 PROJECT APPRAISAL

8.1 General

The purpose of this chapter is to appraise whether development effects of the Reconstruction Project of Oil Berth Nos. 11 and 12 in the Port of Djibouti (hereinafter referred as the "Project") could be satisfactorily expected from a viewpoint of the national economy of the Republic of Djibouti, and whether the administration and operation of the reconstructed berths could be performed appropriately or not from an analysis of the expected relevant costs and benefit of the Project.

In the economic analysis, the national development effect of the implementation of the Project was evaluated using a cost benefit analysis where the benefits were defined as the difference between a case in which the Project would not be implemented, so only Berth No. 10 can be used for oil tankers and a case in which the reconstruction project will be implemented so that Berth Nos. 10, 11, and 12 berths can be used for tankers and other "Non-Commercial" vessels. Factors regarding the development effect of the Project which cannot be quantified are also described herewith.

The financial aspect of the Project was described by comparing the revenues with the expenditures of the PAID relevant to the Project in the year of 2010 with the analysis of the port charges, tariffs on cargoes and maintenance, administration, and operation expenses relevant to the implementation of the Project.

8.2 Cost and Benefit Aspects for the Project

8.2.1 Economic Analysis

The appraisal of the Project was made by utilizing the Economic Internal Rate of Return (EIRR) derived from analyses of the case in which the Project would not be implemented. The economic benefit of the Project is defined here as the difference between the case with the Project (hereinafter called "Project Solution" case) and the case without the project (hereinafter called "Reference Solution" case).

The life of the Project is assumed to be set at 30 years starting from 1995. The Project Solution case is assumed to be the case in which Oil Berth Nos. 11 and 12 would be reconstructed in 1995 and 1996 respectively, and the Reference Solution case is the one in which Berth Nos. 11 and 12 would not be reconstructed and would not be put in use

after 1995 owing to the deterioration now in progress. Accordingly, oil tankers would be handled only at Berth No. 10 to be reconstructed in 1994, and other "Non-Commercial" vessels be handled at the other berths with demurrage equivalent to two days due to the expected congestion in the port.

The economic benefits of the project are identified as follows:

- a) Accommodation of tankers otherwise diverted to Assab or other ports because of the difficulties of berthing at the Port of Djibouti which would have only Berth No. 10 as the oil berth. All tankers which could not be accommodated in the Port of Djibouti are assumed basically to carry cargoes for transshipment to Ethiopia.
- b) Revenues of railway fares to transport cargo to Ethiopia which would be lost when the cargo would be diverted to Assab for transportation to Ethiopia by road.
- c) Avoidance of demurrage of "Non-Commercial" vessels other than tankers which would be caused by the circumstances in which Berth Nos. 11 and 12 would not be reconstructed.
- d) Ease of operation of tankers and other "Non-Commercial" vessels by utilising three oil berths instead of one.
- e) Reductions of risk for pollution and accidents resulting from the congestion of the one oil berth operation at the port.
- f) Strengthening of competitive ability of the Port of Djibouti against other competing ports such as Jeddah and Aden, and good publicity effects for clients based on the three oil berth operation rather than only one.
- g) Profit of local oil companies, local maritime agencies, and local companies engaged in the port operation accrued from the three oil berth operation.

Of these economic benefits, those of a), b), and c) are quantified in order to calculate the EIRR based on the following assumptions:

- a) Accommodation of diverted tankers

In the Reference Solution, since oil tankers can only be accommodated at Berth No. 10 due to the increased deterioration of Berth Nos. 11 and 12, tankers have to be berthed only at Berth No. 10 so that vessels for "Non-Commercial" operations and bunker supply will be gradually driven away from Berth No. 10 as the number

of tankers calling at Berth No. 10 increases. After 2008, even tankers cannot be accommodated at No. 10, and some of the tankers carrying transshipment cargo to Ethiopia will be obliged to be diverted to other ports such as Assab for road transportation. Table 8.1 illustrates the overflow of oil tankers and "Non-Commercial" vessels from Berth No. 10. "Non-Commercial" vessels calling at Berth No. 10 will be all pushed out in 2008 and after as tankers will fully occupy Berth No. 10.

Table 8.1 Overflow of Oil Tankers and "Non-Commercial" Vessels in the Reference Solution

Unit: Days

| Year | Oil Tankers | | "Non-Commercial" Vessels | |
|------|------------------------|------------------------|--------------------------|-----------------|
| | Required Berthing Time | Diverted to other Port | Required Berthing Time | To other Berths |
| 1995 | 120 | | 361 | 316 |
| 1996 | 120 | | 361 | 316 |
| 1997 | 121 | | 361 | 317 |
| 1998 | 122 | | 361 | 318 |
| 1999 | 122 | | 361 | 318 |
| 2000 | 123 | | 361 | 319 |
| 2001 | 128 | | 361 | 324 |
| 2002 | 133 | | 361 | 329 |
| 2003 | 139 | | 361 | 335 |
| 2004 | 145 | | 361 | 341 |
| 2005 | 151 | | 361 | 347 |
| 2006 | 157 | | 361 | 353 |
| 2007 | 164 | | 361 | 360 |
| 2008 | 170 | 5 | 361 | 361 |
| 2009 | 177 | 12 | 361 | 361 |
| 2010 | 185 | 20 | 361 | 361 |
| 2011 | 194 | 29 | 361 | 361 |
| 2012 | 204 | 39 | 361 | 361 |
| 2013 | 213 | 48 | 361 | 361 |
| 2014 | 224 | 59 | 361 | 361 |
| 2015 | 233 | 68 | 361 | 361 |
| 2016 | 242 | 77 | 361 | 361 |
| 2017 | 252 | 87 | 361 | 361 |
| 2018 | 261 | 96 | 361 | 361 |
| 2019 | 272 | 107 | 361 | 361 |
| 2020 | 281 | 116 | 361 | 361 |
| 2021 | 290 | 125 | 361 | 361 |
| 2022 | 300 | 135 | 361 | 361 |
| 2023 | 309 | 144 | 361 | 361 |
| 2024 | 320 | 155 | 361 | 361 |

Notes: Average Berthing Time Tanker: 1.5 days
 Other Vessels: 2 days
 Annual Berth Working Days considering Berth Occupancy Rate of Berth No. 10 165 days

In the Project Solution, those tankers diverted to other ports can be berthed at the Port of Djibouti utilizing the three oil berths.

The benefits of the Project Solution include revenue to PAID from port charges, such as port fee, beacon fee, pilotages, tugboat towing fee, mooring fee, and sanitary fee, and tariffs on petroleum products shown in Table 8.2 and 8.3 respectively in addition to profits from supplies of water (about 3 FD/MT). Total port charges in Djibouti port for an average size tanker of 20,979 GT carrying 6,050 tons of oil cargoes become 246,086 FD per vessel and are 41FD per cargo ton, and average tariffs on oil cargoes are 365FD per import cargo ton and 179 FD per transit cargo ton. Table 8.4 shows the benefits of recovered revenues from the tankers for the operation of the reconstructed Berth Nos. 11 and 12 related to the port revenues.

Table 8.2 Port Charges for Tankers

| | |
|---|---|
| Gross tonnage: | 20,979 (90/92 average) |
| Cargo tonnage: | 6,050 |
| Average anchoring time: | Harbor-40 hours 21 minutes Quay -36 hours 23 minutes |
| 1. Port fee (1 unit equals to 12 hours) | |
| Harbor 2 units | 1.50FD x 20,979 GT. = 31,469FD |
| Berth 1 unit | 1.32FD x 20,979 GT. = 27,692FD |
| 1 unit | 1.05FD x 20,979 GT. = 22,028FD |
| Total | 81,189FD |
| 2. Beacon fee | 4,860FD |
| 3. Pilotage | 3.04FD x 20,979 GT. = 63,776FD |
| Night surcharge (25 %) | 7,972FD |
| Holiday surcharge (25 %) | 2,710FD |
| Total | 74,458FD |
| 4. Towing fee | 54,100FD |
| Night surcharge (25 %) | 6,763FD |
| Holiday surcharge (25 %) | 2,299FD |
| Total | 63,162FD |
| 5. Mooring fee | 16,200FD |
| Night surcharge (25 %) | 2,026FD |
| Holiday surcharge (25 %) | 688FD |
| Total | 18,914FD |
| 6. Sanitary fee | 3,000FD |
| Night surcharge | 375FD |
| Holiday surcharge | 128FD |
| Total | 3,503FD |
| Grand Total | 246,086FD /vessel |
| (Per gross tonnage) | 12FD) |
| (Per cargo ton) | 41FD) |

Table 8.3 Revenues from Tariffs on Oil Cargoes in 2010

| Type of Oil Products | FD/ton | Quantity (ton) | Amount (1,000 FD) |
|-----------------------|--------|----------------|-------------------|
| Import | | | |
| Gasoline | 750 | 23,990 | 17,993 |
| Kero/Jet | 750 | 128,896 | 96,672 |
| Gas Oil | 170 | 142,206 | 24,175 |
| Fuel Oil | 170 | 159,183 | 27,077 |
| Total | | 454,275 | 165,917 |
| (Per cargo ton | | | 365FD) |
| Transshipment | | | |
| Gasoline | 360 | 5,542 | 1,995 |
| Kero/Jet | 360 | 65,267 | 23,496 |
| Gas oil | 120 | 175,487 | 21,058 |
| Fuel Oil | 120 | 40,725 | 4,887 |
| Total | | 287,021 | 51,436 |
| (Per cargo ton | | | 179FD) |

Table 8.4 Revenues of Port from Diverted Transshipment and Import

| Year | Transshipment Diverted (ton) | Import Diverted (ton) | Port Revenue (1,000 FD) |
|------|------------------------------|-----------------------|-------------------------|
| 2008 | 18,150 | | 4,047 |
| 2009 | 48,400 | | 10,793 |
| 2010 | 78,650 | | 17,539 |
| 2011 | 114,950 | | 25,634 |
| 2012 | 157,300 | | 35,078 |
| 2013 | 193,600 | | 43,173 |
| 2014 | 235,950 | | 52,617 |
| 2015 | 278,300 | | 62,061 |
| 2016 | 308,550 | | 68,807 |
| 2017 | 350,900 | | 78,251 |
| 2018 | 387,200 | | 86,346 |
| 2019 | 429,550 | | 95,790 |
| 2020 | 457,363 | 14,503 | 107,924 |
| 2021 | 474,397 | 27,753 | 117,142 |
| 2022 | 491,342 | 53,068 | 131,294 |
| 2023 | 508,466 | 72,334 | 142,973 |
| 2024 | 525,500 | 97,650 | 157,126 |

Particulars of the port revenues (per cargo ton)

| Revenue | Transshipment | Import |
|--------------------|---------------|--------|
| Port charges | 41FD | 41FD |
| Tariffs on cargoes | 179FD | 365FD |
| Water supply | 3FD | 3FD |
| Total | 223FD | 409FD |

b) Recovery of railway transportation by CDF from Djibouti to Ethiopia

The railway revenues relating to the diverted transshipped oil cargoes to Assab, or the other ports for road transportation to oil consuming centers in the neighboring countries will also be lost due to the congestion of the oil berths in Djibouti port.

The revenues of railway transportation fee which will be lost owing to diversion of the transit oil cargoes in the Reference Solution are from 60,108,000 FD in 2008 to 1,740,325,000 FD in 2024 as shown in Table 8.5.

Table 8.5 Revenues of CDF from Diverted Transshipment (1,000 FD)

| Year | Revenue | Year | Revenue |
|------|-----------|------|-----------|
| 2008 | 60,108 | 2017 | 1,162,093 |
| 2009 | 160,289 | 2018 | 1,282,310 |
| 2010 | 260,469 | 2019 | 1,422,562 |
| 2011 | 380,686 | 2020 | 1,514,672 |
| 2012 | 520,938 | 2021 | 1,571,084 |
| 2013 | 641,155 | 2022 | 1,627,500 |
| 2014 | 781,407 | 2023 | 1,683,912 |
| 2015 | 921,660 | 2024 | 1,740,325 |
| 2016 | 1,021,840 | | |

Notes: Djibouti-Addis Ababa railway transportation: 13,247FD/ton
Profit: 50%, Djibouti's share: 50%

c) Demurrages of "Non-Commercial" vessels

Some of "Non-Commercial" operations vessels and large volume bunker supply are handled at Berth Nos. 10, 11, and 12 at present. In the Reference Solution, these vessels will be gradually pushed away to the other berths, and after 2008, they will be completely diverted away from Berth No. 10 as the number of tankers calling Djibouti port increases. These demerits are expressed as demurrages for

two days per vessel taking the congestions at the other berths into consideration. In the Project Solution, the benefits of the reduction of queuing time for vessels of "Non-Commercial" operation and of bunkering supply at Berth Nos. 11 and 12 will be from 207,673,000 FD in 1996 to 474,680,000 FD in 2007 and after as shown in Table 8.6.

Table 8.6 Demurrages on "Non-Commercial" Vessels

| Year | No. of Vessels | Demurrages* (2 days per vessels) |
|----------------|----------------|-------------------------------------|
| 1996 | 161 | 207,603 |
| 1997 | 162 | 417,925 |
| 1998 | 162 | 417,925 |
| 1999 | 162 | 417,925 |
| 2000 | 163 | 420,505 |
| 2001 | 165 | 425,664 |
| 2002 | 168 | 433,404 |
| 2003 | 171 | 441,143 |
| 2004 | 174 | 448,882 |
| 2005 | 177 | 456,622 |
| 2006 | 180 | 464,361 |
| 2007 and after | 184 | 474,680 |

Note: * Demurrages were calculated based on the following assumptions:
 Rate: 15USS/DWT/Month
 Average vessel tonnage: 7,640GT

Aggregating the above a), b), and c), the result of the calculation of the EIRR is shown in Table 8.7.

On the basis of a 12 % opportunity cost of capital in the developing countries such as Djibouti, and discount rates established by international financial organizations, such as US AID, International Bank for Reconstruction and Development (IBRD), and Asian Development Bank (ADB), the EIRR of 13.21 % is considered to be feasible.

A sensitivity analysis is also made to ensure the feasibility of the Project in case various factors related to the Project vary as follows:

Table 8-7 Project Cash Flow

Unit: 1,000 FD

| Year | Calendar Year | Investment | Ope./Maint. | Total Cost (C) | Tanker | Railways | Non Com. | Total Benefit (B) | (B-C) |
|-------|---------------|------------|-------------|----------------|-----------|------------|------------|-------------------|------------|
| 1 | 1995 | 2,127,767 | | 2,127,767 | | | | | -2,127,767 |
| 2 | 1996 | 2,029,058 | 10,000 | 2,039,058 | | | 207,673 | 207,673 | -1,831,385 |
| 3 | 1997 | | 20,000 | 20,000 | | | 417,925 | 417,925 | 397,925 |
| 4 | 1998 | | 24,000 | 24,000 | | | 417,925 | 417,925 | 393,925 |
| 5 | 1999 | | 24,000 | 24,000 | | | 417,925 | 417,925 | 393,925 |
| 6 | 2000 | | 24,000 | 24,000 | | | 420,505 | 420,505 | 396,505 |
| 7 | 2001 | | 24,000 | 24,000 | | | 425,664 | 425,664 | 401,664 |
| 8 | 2002 | | 28,000 | 28,000 | | | 433,404 | 433,404 | 405,404 |
| 9 | 2003 | | 28,000 | 28,000 | | | 441,143 | 441,143 | 413,143 |
| 10 | 2004 | | 28,000 | 28,000 | | | 448,882 | 448,882 | 420,882 |
| 11 | 2005 | | 32,000 | 32,000 | | | 456,622 | 456,622 | 424,622 |
| 12 | 2006 | | 32,000 | 32,000 | | | 464,361 | 464,361 | 432,361 |
| 13 | 2007 | | 36,000 | 36,000 | | | 474,680 | 474,680 | 438,680 |
| 14 | 2008 | | 36,000 | 36,000 | 4,047 | 60,108 | 474,680 | 538,835 | 502,835 |
| 15 | 2009 | | 40,000 | 40,000 | 10,793 | 160,289 | 474,680 | 645,762 | 605,762 |
| 16 | 2010 | | 40,000 | 40,000 | 17,539 | 260,469 | 474,680 | 752,688 | 712,688 |
| 17 | 2011 | | 40,000 | 40,000 | 25,634 | 380,686 | 474,680 | 881,000 | 841,000 |
| 18 | 2012 | | 40,000 | 40,000 | 35,078 | 520,938 | 474,680 | 1,030,696 | 990,696 |
| 19 | 2013 | | 40,000 | 40,000 | 43,173 | 641,155 | 474,680 | 1,159,008 | 1,119,008 |
| 20 | 2014 | | 40,000 | 40,000 | 52,617 | 781,407 | 474,680 | 1,308,704 | 1,268,704 |
| 21 | 2015 | | 40,000 | 40,000 | 62,061 | 921,660 | 474,680 | 1,458,401 | 1,418,401 |
| 22 | 2016 | | 40,000 | 40,000 | 68,807 | 1,021,840 | 474,680 | 1,565,327 | 1,525,327 |
| 23 | 2017 | | 40,000 | 40,000 | 78,251 | 1,162,093 | 474,680 | 1,715,024 | 1,675,024 |
| 24 | 2018 | | 40,000 | 40,000 | 86,746 | 1,282,310 | 474,680 | 1,843,736 | 1,803,736 |
| 25 | 2019 | | 40,000 | 40,000 | 95,790 | 1,422,562 | 474,680 | 1,993,032 | 1,953,032 |
| 26 | 2020 | | 40,000 | 40,000 | 107,924 | 1,514,672 | 474,680 | 2,097,276 | 2,057,276 |
| 27 | 2021 | | 40,000 | 40,000 | 117,142 | 1,571,084 | 474,680 | 2,162,906 | 2,122,906 |
| 28 | 2022 | | 40,000 | 40,000 | 131,294 | 1,627,500 | 474,680 | 2,233,474 | 2,193,474 |
| 29 | 2023 | | 40,000 | 40,000 | 142,973 | 1,683,912 | 474,680 | 2,301,565 | 2,261,565 |
| 30 | 2024 | | 40,000 | 40,000 | 157,726 | 1,740,325 | 474,680 | 2,372,731 | 2,332,731 |
| TOTAL | | 4,156,825 | 986,000 | 5,142,825 | 1,237,595 | 16,753,010 | 13,096,269 | 31,086,874 | 25,943,449 |

EIRR = 13.21 %
 NPV (10 %) = 1,575,962
 B/C Ratio = 1.55

- Case A: The costs increase by 10 %
- Case B: The benefits decrease by 10 %
- Case C: Case A and Case B combined

The results of the sensitivity analysis are shown in Table 8.8.

Table 8.8 Sensitivity Analysis of EIRR

| Case | EIRR (%) | NPV (10 %) | B/C Ratio |
|-----------|----------|------------------|-----------|
| Base case | 13.21 | 1,575,962,000 FD | 1.55 |
| Case A | 12.16 | | |
| Case B | 12.26 | | |
| Case C | 11.26 | | |

Also, as noted previously, factors in connection with the implementation of the project which cannot be quantified are described as follows:

- d) Smooth operations of tankers and other "Non-Commercial" vessels other than tankers by utilising three berths instead of one

It is possible for Djibouti Port to handle vessels flexibly and safely with three berths rather than with only one berth so that the loss from the one-berth operation could be avoided.

- e) Reduction of possible risks for pollution and accidents resulting from the congestion of vessels in the Reference Solution

In the Reference Solution, even tankers cannot be accommodated at Djibouti oil berth and "Non-Commercial" vessels would have demurrages equivalent to two days due to the congestion. Under such circumstances, probability of risks for oil spills and accidents will be higher. While in the Project Solution, such probability would be lower due to the flexibility of a more comfortable three-berth operations.

- f) Competitiveness and effects of good publicity

Modern facilities and comfortable operations for tankers and other vessels at Djibouti Port will strengthen its competitiveness against other competing ports, such as Jeddah and Aden, and will provide shipping operators and cargo shippers with credibility and confidence for calling at the Port of Djibouti.

g) Benefits to local companies

Other than the above benefits, local companies, such as oil companies, maritime agencies, and stevedore companies will certainly benefit from the project for more speedy and safe operations with three oil berths.

From the foregoing analyses, it is concluded that the Project is feasible from the viewpoint of Djiboutian economy and will be worth implementing.

8.2.2 Financial Aspects

Financial aspects of the Project are described to ensure for PAID to operate and manage Oil Berths Nos. 11 and 12 to be reconstructed properly and effectively. Here, revenues and expenses regarding handling of oil products at the Port of Djibouti in 2010 are analyzed and compared with those in 1992.

The revenues from tanker operations mainly consist of port charges for tankers and tariffs on oil products imported to and in transit at the Port of Djibouti. As noted before, port charges for tankers averaged 246,086FD per tanker with 20,979 gross tons carrying 6,050 tons of oil cargoes as shown in Table 8.2. This is equivalent to 41FD per ton of oil.

Revenues from tariffs on oil products in 2010 are calculated using the present tariff rates as follows:

| | Imported | Transshipment | (FD/ton) |
|----------|----------|---------------|----------|
| Gasoline | 750 | 360 | |
| Kero/Jet | 750 | 360 | |
| Gas Oil | 170 | 120 | |
| Fuel Oil | 170 | 120 | |

As shown in Table 8.9, the combined average tariff on oil products becomes 293FD/ton in 2010, compared with 331FD/ton in 1992. This is due not only to the expected high growth rates of gas oil and fuel oil in the domestic market relative to those of gasoline and kerosine, but to the higher growth rates of transit oil to neighboring countries than those for the domestic market.

Table 8.9 Revenues from Tariffs on Oil Products

| Oil Product | | 1992 | | | 2010 | | |
|-------------|----------|----------------|------------------|-------------------|----------------|------------------|-------------------|
| | | Quantity (ton) | Unit Rate (FD/t) | Amount (1,000 FD) | Quantity (ton) | Unit Rate (FD/t) | Amount (1,000 FD) |
| Import | Gasoline | 13,297 | 750 | 9,973 | 23,989 | 750 | 17,992 |
| | Kero/Jet | 79,395 | 750 | 59,546 | 128,897 | 750 | 96,673 |
| | Gas Oil | 68,265 | 170 | 11,605 | 142,206 | 170 | 24,175 |
| | Fuel Oil | 60,921 | 170 | 10,357 | 159,183 | 170 | 27,061 |
| | Total | 221,878 | 412 | 91,481 | 454,275 | 365 | 165,901 |
| Transit | Gasoline | 2,304 | 360 | 829 | 5,542 | 360 | 1,995 |
| | Kero/Jet | 27,118 | 360 | 9,762 | 65,267 | 360 | 23,496 |
| | Gas Oil | 72,918 | 120 | 8,750 | 175,487 | 120 | 21,058 |
| | Fuel Oil | 16,922 | 120 | 2,031 | 40,725 | 120 | 4,887 |
| | Total | 119,262 | 179 | 21,373 | 287,021 | 179 | 514,37 |
| Grand Total | | 341,140 | 331 | 112,853 | 741,296 | 293 | 217,337 |

On the other hand, the expenses of PAID in connection with the oil handling at the Port of Djibouti in 2010 are estimated by an analysis of the actual results of those expenses in 1989 through 1992.

Table 8.10 Expenses of PAID

Unit: FD

| | 1989 | 1990 | 1991 | 1992 |
|------------------------------|------------------------------|------------------------------|--------------------------------|--------------------------------|
| Purchase | 165,892,077 (106,409,187) | 221,227,172 (117,051,271) | 299,308,300 (117,837,310) | 352,591,783 (109,819,594) |
| Personal | 888,585,555 (399,863,500) | 968,891,713 (436,001,271) | 1,202,396,190 (541,178,286) | 1,343,792,358 (604,706,561) |
| Taxes | 1,632,436 | 1,348,704 | - | 3,609,821 |
| Maintenance | 239,777,846 (214,326,538) | 270,263,739 (248,070,728) | 270,999,170 (242,296,535) | 422,931,181 (380,867,772) |
| Transportation | 21,140,461 | 12,573,174 | 16,248,265 | 32,255,394 |
| Promotion | 74,725,952 | 79,579,231 | 87,464,383 | 107,907,362 |
| Financial | 53,753,436 | 65,616,945 | 121,004,776 | 141,161,483 |
| Amortization | 326,333,853 | 364,391,299 | 768,110,273 | 720,826,192 |
| Total | 1,771,841,616 | 1,983,891,977 | 2,765,531,457 | 3,125,075,574 |
| (Excl. special expenses) (A) | 871,851,510 | 960,241,324 | 1,125,729,655 | 1,380,327,987 |
| Total vessels | 950 | 1067 | 1208 | 1123 |
| of which: | | | | |
| Tankers | 86 | 108 | 98 | 78 |
| Tanker share (B) | 9.1 % | 10.1 % | 8.1 % | 6.9 % |
| Tanker expenses (A) x (B) | 79,338,487 | 96,984,374 | 91,184,102 | 95,242,631 |
| Per tanker | 922,541 | 898,003 | 930,450 | 1,221,059 |
| Per gross ton | 47 | 38 | 42 | 73 |

Note: () shows expenses excluding special expenses

As shown in Table 8.10, expenses of PAID excluding those of special purposes, such as containers were less than half of the total expenses in 1989 through 1992 as follows:

| in 1,000FD | | | | |
|----------------------------|-----------|-----------|-----------|-----------|
| Expense | 1989 | 1990 | 1991 | 1992 |
| Total expense (A) | 1,771,841 | 1,983,892 | 2,765,531 | 3,125,076 |
| Excl. special expenses (B) | 871,852 | 960,241 | 1,125,730 | 1,380,328 |
| (B)/(A) | 49.2 % | 48.4 % | 40.7 % | 44.2 % |

With respect to personnel expenses, if the staff specified to container terminal and other departments is excluded, the number of staff engaged in operations in general including tanker operations is about 45 % of the total staff from an analysis of the job description of PAID staff.

On this assumption, and from the share of tankers in the total vessels, expenses for tanker operations in 1989 through 1992 were calculated at 79,338,000 FD, 96,984,000 FD, 91,184,000 FD, and 95,243,000 FD respectively. These tanker expenses are 47FD per gross ton of tankers in 1989, 38FD in 1990, 42FD in 1991, and 73FD in 1992 respectively.

Then, expenses of PAID relevant to tanker operations at the Port of Djibouti are estimated as shown in Table 8.11 on the assumption of growth rates by items of the expenses described in Table 8.12.

Table 8.11 Forecast of Expenses of PAID in 2010

Unit: 1,000 FD

| Expense Item | 1992 | 2010 |
|---------------------------|------------------------|--------------------------|
| Purchase | 352,592 (109,820) | 881,970 (383,456) |
| Personnel | 1,343,792 (604,707) | 3,453,722 (1,554,175) |
| Maintenance | 422,931 (380,868) | 1,476,740 (1,329,869) |
| Transportation | 32,255 | 164,113 |
| Promotion | 107,907 | 376,776 |
| Total | 2,259,477 | 6,353,321 |
| Financial & Tax | 144,771 | 407,075 |
| Grand Total | 2,404,249 | 6,760,396 |
| Excl. Special Account (A) | 1,380,328 | 4,215,464 |
| Total vessels | 1,123 | 1,890 |
| of which Tankers | 78 | 123 |
| Tanker share (B) | 6.9 % | 6.5 % |
| (A) x (B) | 95,243 | 274,005 |
| Per cargo | 279FD/MT | 370FD/MT |

Note: () shows expenses excluding special expenses

Table 8.12 Main Premises for the Forecast of Expenses

| Item | 1989/1992 | 1992/2000 | 2000/2010 |
|--------------|-----------|-----------|-----------|
| Purchase: | +28.6 % | +3.3 % | +2.4 % |
| Personnel: | | | |
| Personnel | +0.5 % | +2.0 % | +1.0 % |
| Payroll | +14.2 % | +5.0 % | +3.0 % |
| Maintenance: | +20.8 % | +3.3 % | +2.4 % |
| Transport: | +15.1 % | +7.1 % | +4.0 % |
| Promotion: | +13.0 % | +3.3 % | +2.4 % |

From BCEOM's forecast of total cargoes handled at the Port of Djibouti in 2000 and 2010 shown in Table 8.13 most of the items of expenses are assumed to increase by

3.3 % between 1992 and 2000, and by 2.4 % between 2000 and 2010 in accordance with the growth of the total cargoes handled at the Port.

Table 8.13 BCEOM's Forecast of Cargoes

| | Unit: Million ton | | | | | |
|-----------|-------------------|---------|----------|-----------|----------|-----------|
| | 1989 | 1990 | 2000 | | 2010 | |
| | | | Low Case | High Case | Low Case | High Case |
| Total | 754.6 | 1,154.4 | 1,135 | 1,744 | 1,522 | 2,334 |
| Excl. Oil | 463.1 | 714.8 | 733 | 1,317 | 918 | 1673 |

Regarding personnel expenses, the number of staff of PAID is assumed to increase 2.0 % p.a. from 1992 to 2000, and 1.0 % p.a. from 2000 to 2010. Payrolls for these staff are also assumed to increase by 5.0 % p.a. from 1992 to 2000 and by 3.0 % p.a. from 2000 to 2010. Thus, the total increase rates of personnel expenses for these periods become 7.1 % and 4.0 % respectively. Since transportation expenses are closely related with the personnel expenses, these expenses also are assumed to increase 7.1 % p.a. in the 1992 - 2000 period and 4.0 % p.a. in the 2000 - 2010 period.

As shown in Table 8.14 tanker related expenses in 2010 are expected to be 370FD/cargo ton against the revenue of 337FD/cargo ton. The resultant deficit of 33FD/cargo ton is a decline by 131FD/cargo ton from the profits of 98FD/cargo ton in 1992. This decline results not only in a decrease of the revenue from 377FD/cargo ton in 1992 to 337FD/cargo ton in 2010, but in an increase of expenses from 279FD/cargo ton in 1992 to 370FD/cargo ton in 2010.

Table 8.14 Forecast of Revenues and Expenses Related to Tankers in 2010

| Item | FD per ton of oil | |
|---------------|-------------------|------|
| | 1992 | 2010 |
| Revenues: | | |
| Port charges | 41FD | 41FD |
| Tariffs | 333 | 293 |
| Water Supply | 3 | 3 |
| Total (A) | 377 | 337 |
| Expenses: (B) | 279 | 370 |
| (A) - (B) | 98 | -33 |

To cope with the situation and keep the present profit level in 2010, efforts in increasing revenues and decreasing expenses of PAID have to be done. The rate of

increase of expenses to PAID from 1989 to 1992 was over 20 % due to the rapid expansion of container business. The rate of increase of the expenses of PAID, however, are estimated at a modest 3.3 % from 1992 to 2000 and 2.4 % from 2000 to 2010, in accordance with the growth rate of cargoes forecast by BCEOM, except personnel related expenses as shown in Table 8.12. To keep the present profit level in 2010 only by raising the rates for port charges and tariffs, PAID will have to increase these rates by 1.2 % p.a., or 3.6 % per every three years, or 7.5 % per every 6 years. If these increases in rates will have a bad influence on the competitiveness of the Port of Djibouti, PAID will have to make every effort in the restraint of the increase of her expenses, especially those of personnel related expenses.

Moreover, water supply to calling vessels has been in the deficit in proportion to the purchased volume of water owing mainly to the leakage and use of water without permission by dhow ships. This should be improved as soon as possible to make profits from the water supply.

Also, most of the tankers calling at the Port of Djibouti do not have bunker oil supply except in case of emergency due mainly to high oil prices there. This could be improved by making use of price information systems more effectively to compete with the other neighboring bunkering ports, such as Jeddah and Aden.

Chapter 9 Conclusions and Recommendations

CHAPTER 9 CONCLUSIONS AND RECOMMENDATIONS

The Oil Berth Nos. 10, 11 and 12 of the Port of Djibouti, are the only existing oil receiving facility in Djibouti, handling many kinds of refined oil products for domestic consumption, bunkering and transshipment.

This transaction of the oil cargo handling plays significant role on Djibouti's economic and social aspects, such as fuel supply for electric power generation and transportation including vehicles, railways and aviation, and the revenue through port and inland transportation activities supports the financial situation of the Djibouti Government.

The transshipment of oil products mainly to Ethiopia, which no longer has a shore-line due to the independence of Eritrea, and some to Somalia, both countries that have quite close relations with Djibouti, has also a significant role in the stabilization of the economic conditions of this region.

The Oil Berths are also serving for bunkering to large size ships and for "Non-Commercial" ship activities such as water supply, spare parts supply, ship repairs, and so on, which makes the port congestion moderate.

Taking into consideration the above mentioned important roles of the Oil Berths and the present situation of port activities revealed through the Study, hereunder are the conclusions and recommendations.

9.1 Conclusions

(1) Existing Berth Structure

The existing structures of Oil Berth Nos. 11 and 12, including all working platforms and breasting dolphins, may collapse any time now by a slight butting or pulling force from berthing ships due to the deteriorated structural integrity and strength, and severe deterioration of the structure. The wooden catwalks and access bridges are also inadequate.

This possible sudden collapse of the berth structure(s) may cause injury to on-shore workers, serious damage to the ship alongside the berth, and also cause marine pollution.

Although Berth No. 10 is now under construction and scheduled to be completed by the middle of 1994, it is not sufficient for the future demand nor for present port activities. Immediate renewal measures are therefore imperative for Berth Nos. 11 and 12.

(2) Demand Forecast

Based on the socio-economic situation of Djibouti and the present oil cargo handling volume, the demand of oil products for the target year 2010 is forecasted as follows:

(in thousand cu.m)

| Description | 1992 | | | | | 2010 | | | | |
|-------------------------------|----------|----------|---------|----------|---------|----------|----------|---------|----------|---------|
| | Gasoline | Kero/Jet | Gas Oil | Fuel Oil | Total | Gasoline | Kero/Jet | Gas Oil | Fuel Oil | Total |
| Domestic Consumption | 17.6 | 15.3 | 31.9 | 50.0 | 114.8 | 31.9 | 40.9 | 85.1 | 146.8 | 304.6 |
| Bunker Supply | 0.4 | 82.2 | 49.1 | 17.7 | 149.4 | 0.7 | 117.5 | 83.6 | 30.1 | 231.8 |
| Transshipment | 3.1 | 33.3 | 86.5 | 18.8 | 141.7 | 7.5 | 80.2 | 208.2 | 45.3 | 341.1 |
| Grand Total | 21.1 | 130.8 | 167.5 | 86.5 | 406.0 | 40.1 | 238.6 | 376.9 | 222.2 | 877.6 |
| (Equivalent to thousand tons) | | | | | (341.1) | | | | | (741.3) |

(3) Reconstruction Plan of the Oil Berths

The required number and size of the Oil Berths for the forecasted oil cargo volume in 2010 are determined taking the following present conditions into consideration, i.e.

- Average size of Oil Tankers: 20,979 GT ('90/'92 Average)
- Average oil cargo handling volume per call: 6,050 ton ('91/'92 Average)
- Average berthing time of oil tanker per call: 36 h, 23 m ('90/'92 Average)
- Average berthing time of "Non-Commercial" vessels: 47 h, 20 m ('92 Average)
- Berth occupancy rate: 50 %
- Annual effective working days: 330 days

Based on the above figures, the number of required berths obtained is 3.31 berths including Berth No. 10, hence the renewal of Berth Nos. 11 and 12 are necessary. The size of the berths are also determined as follows.

Berth No. 10 : For Oil Tankers of 35,000 DWT or above or equivalent "Non-Commercial" vessels with a maximum draft less than 12.0 m.

Berth Nos. 11 and 12 : For Oil Tankers of 3,000 to 35,000 DWT or equivalent "Non-Commercial" vessels with maximum draft less than 11.0 m.

As for the structure of the Berths, a steel sheet pile cellular cofferdam type is recommended as a result of comparative study.

The project cost including engineering services is estimated to be 2,487 million in Japanese Yen, consisting of 1,486 million of local currency portion and 1,001 million of foreign currency portion. Required total duration is 24 months for the construction of Berth Nos. 11 and 12.

(4) Environmental Aspects

- 1) Although the source of the present oil spills and pollution could not be identified, spilt oil was frequently observed at not only the oil berths but also at many places in the harbour basins. The effort for promotion of environmental consciousness to all concerned is not sufficient to solve the problem of pollution.
- 2) Although the Port of Djibouti has pollution control devices such as oil fence and oil absorbing chemicals, they are kept in store and not immediately available for use in emergency operation activities at the Oil Berths.
- 3) The environmental study shows that "during the construction works" impacts which will be caused by the proposed project will not be serious and be within the manageable limit by the constructors efforts. As to "after completion of the project", the negative environmental impacts are also forecasted to be moderated within the tolerable limit depending on the proposed berth facilities, oil handling system and proper discipline of the end users of the facilities.

(5) Oil Berth Operation and Management

- 1) Some records of the Oil Berths activities, such as the records of oil cargo handling time, bunkering time with handling volume, assigned berth numbers, and so on, are now being kept by the individual oil companies with relevant share of oil cargoes, thus total activities as a port is difficult to monitor.

To manage the entire activity of the Oil Berths in connection with the oil storage yards activities, a more comprehensive involvement of PAID for the oil cargo handling activities is necessary.

- 2) Due to the resignation of foreign personnel, who was assigned as a technical advisor of PAID until March 1993, and no definite schedule of replacement, the training of the local technical staff of PAID is imperative instead.
- 3) Control and record system of port maintenance is not adequate.

(6) Anti-disaster and Safety Management

- 1) Emergency alarm devices are not provided on the working platform of individual Oil Berths, which is indispensable to prevent disasters.
- 2) The size of the existing platforms is too small to accommodate the wharf ladders of various sizes of vessels.

(7) Project Appraisal

The following economic benefits are determined in the Study;

- 1) Accommodation of Oil Tankers as a result of the renewal of Oil Berth Nos. 11 and 12.
- 2) Revenues of railways to transport cargoes to Ethiopia.
- 3) Accommodation of "Non-Commercial" vessels by which port congestion will be moderated.
- 4) Ease of operation of oil tankers by utilizing new berths.
- 5) Reduction of the risks for pollution and accidents.
- 6) Good publicity effects for the client together with increased competitiveness against other ports.
- 7) Profit increase to local oil companies, maritime agencies, and other organizations engaged in port operations.

Among the above benefits 1), 2) and 3) are quantified, and the Economic Internal Rate of Return (EIRR) is estimated to be 13.21 %. On the basis of a 12 %

opportunity cost of capital, the Project, as defined by the reconstruction of the structure of Oil Berth Nos. 11 and 12 and relevant miscellaneous facilities, is considered feasible.

(8) Others

1) Due to lack of proper lighting facilities and access way for those mooring bitts along the existing concrete parapet wall, mooring of vessels will be difficult.

Also the strength of some of those mooring bitt foundations are inadequate against maximum mooring force.

2) For construction purposes, the overhead pipelines at the entrance of the Berths should be replaced with underground pipes.

(9) Effects of the Project

By the implementation of these renewal measures of Oil Berth Nos. 11 and 12, the following effects can be expected:

Direct Effects

i) The potential disaster and marine pollution, which could be caused by collapse of the existing structures, will be prevented.

ii) The proposed reconstructed Berth Nos. 11 and 12, together with Berth No. 10 can handle the forecasted oil cargo demand of the year 2010.

The adverse effects on other general and container cargo berths will, therefore, be minimized.

iii) The efficiency of the berthing, mooring and cargo handling activities will be improved by the stable structure, fender system and mooring facilities.

Indirect Effects

i) The potential disaster and marine pollution, which could be caused by collapse of the existing structures, will be prevented.

ii) The stabilized supply of oil products in line with the activities of railway transportation to Ethiopia by CDE, will help to improve the living conditions of the masses in this region.

9.2 Recommendations

(1) Structures for Berth Nos. 11 and 12

All existing structures including Working Platforms and Breasting Dolphins with horizontal support members, access bridges and catwalks should be demolished.

Steel sheet pile cell type structures are recommended for re-construction in lieu of other types.

Coping and pavement of the cell structure and accessway, accessories of the pier such as rubber fenders, mooring bitts, rockmound type accessway should also be re-constructed.

For other miscellaneous facilities the following items are also recommended.

- 1) Provision of lighting poles and ladders for mooring bitts along the parapet wall for night work and easy access of line men.
- 2) Reinforcement of some existing mooring bitts to cope with the mooring force.
- 3) Relocation of overhead pipe lines to underground pipes.

(2) Environmental Control

- 1) Oil spill wall should be provided on the working platform.
- 2) Oil pit and sump should be provided within the oil spill wall.
- 3) Enactment of environmental law and/or regulations for territorial sea pollution.
- 4) The promotion of environmental consciousness by means of training and advertising for all concerned, at both shore and ship sides, should be undertaken.
- 5) The existing pollution control devices should be used or placed near to the Berths for more effective use.

(3) Oil Berth Operation and Management

- 1) Proper oil berth operation recording system for oil berth activities management and control, should be established by PAID.
- 2) Training of technical staff is strongly recommended.

In the absence of a foreign technical advisor, a long term technical training system and relevant schedule, including periodic dispatch system of student(s) studying abroad and arrangement of required budget, should be considered.

3) Proper control and recording system of maintenance activities should be provided.

(4) Anti-disaster and Safety Management

Fire alarm devices should be provided at the working platform.

