6.1.2 Organization to Prevent Marine Disasters

If and when large scale oil spills or fires occur, the DGSC, namely KPLP, is to primarily control the operations by mobilizing the equipment and materials from Pertamina (Perusahaan Pertambangan Minyak dan Gas Bumi Negara: State-owned oil company) and other sources under the coordination of the DGSC and when necessary the BASARNAS will coordinate the national disasters.

The on-scene commanders are to be appointed from the KPLP units or captains of the maritime safety rescue ships to assume the operational responsibilities on the scene.

Pertamina is the technical support body to provide the equipment and materials for combatting marine pollution and disasters.

6.1.3 Marine Disaster Combatting Ships, Equipment and Materials, and Specialists

(1) Combatting Ships

There are currently no ships exclusively used for the recovery of spilled oil (oil recovery ships, oil boom expansion barges) owned by the DGSC. Pertamina has 13 fire-fighting ships, while the DGSC owns no such ships.

(2) Equipment and Materials for Oil Pollution Combatting

The main equipment and materials currently owned by Pertamina and partly by the DGSC and others amount in total to about 20 km of long oil booms, 49 oil skimmers and about 27-kiloliters of chemical dispersant.

Owners	Oil Boom (meter)	Oil Skimmer (units)	Chemical Dispersant (liter)
Pertamina	19,755	45	17,200
DGSC	200	1	-
Private Co.	500	3	10,000
Total	20,455	49	27,200

(3) Specialists

In KPLP, 25 persons have completed the special courses for marine pollution, and 18 persons for fire-fighting.
In Pertamina there are 15 supervisors qualified for anti-pollution activities.

6.2 Analysis

6.2.1 Forecast for Tankers in 2005

The number of Indonesian flag tankers is forecast to total 492 with an average gross tonnage of 7,263 tons, while the number of tanker accidents (including those of other nations' ships) is estimated at 23.

6.2.2 Hypothetical Occurrence of Tanker Accident

A hypothetical occurrence of a tanker accidents is assumed for a tanker of 9,490 gross tons in an area 10 miles from port.

The result of calculations made based on the provisions of the Protocol of 1978 relating to MARPOL 1973 is as follows:

- Hypothetical outflow of oil from side damage : 1,696 m^3
- Hypothetical outflow of oil from bottom damages: 1,585 m^3

If fire is assumed to have broken out at the time of collision, the maximum surface area of the fire on two wing tanks positioned side by side is calculated to be 166 m^2.

6.2.3 Necessary Quantity of Equipment and Materials

(1) Basic Assumption

As a result of the hypothetical accident involving the model tanker, with a hypothetical outflow of 1,696 m^3 of oil, with a 80% of the spilled oil will be recovered and the remaining 20% will be chemically dispersed. The extension work of oil booms for the above will be completed in 3 hours, and all the work will be carried out in two days.

With two wing tanks on fire (166 m^2), fire fighting operations are to be commenced two hours after the fire breaks out.

(2) Calculation of Necessary Quantity

The result of the calculation of the necessary equipment and materials to cope with the accident assumed above is as follows:

- Oil booms : 1,784 m
- Oil skimmer : 120 m^3/hr
- Tank capacity of oil barge : 700 m^3
- Chemical dispersant : 70 kiloliters
- Water discharging capacity of chemical dispersant : 1,700 lit/min.
- Foam concentrate : 1,992 lit
- Discharging capacity of foaming water : 2,490 lit/min.

6.3 Long-term Plan

6.3.1 Necessity of Disaster Prevention Setup

Marine disasters can occur anytime, anywhere. Fortunately, neither big oil spills nor oil fires on tankers have recently happened along the coasts in Indonesia.

However, as can be seen from the past examples of marine disasters which occurred in other countries, large-scale accidents on tankers and especially dangerous cargo vessels could possibly lead to immense losses and damages.

In view of the present situation that private sector task forces hardly exist except for Pertamina's, it is necessary for the national authority to be equipped with a centralized system to combat disasters, in which the authority will coordinate other forces such as Pertamina's.

It is, therefore, desirable and important for the concerned government authorities to plan for the disposition of the minimum requirements of disaster prevention units (maritime safety rescue ships, equipment and materials, specialists, etc.) at main areas together with necessary manning in order to cope with any conceivable disasters.

6.3.2 Allocation of On-shore Bases

In addition to the allocation of important bases for maritime safety rescue ships, on-shore bases for the disposition of marine disaster prevention units should be allocated with consideration given to locations of marine accidents.

Under the above conditions, on-shore bases for marine disaster prevention units should be located at the following nine ports:

Belawan, Tg.Uban, Tg.Priok, Palembang, Surabaya (Tg.Perak), Cilacap Balikpapan, Ujung Pandang and Bitung.

6.3.3 Fundamental Approaches for Preventing Marine Disasters

A causer shall assume prime responsibility for taking immediate action as possible to prevent disasters.

In cases where it is feared the provisional measures taken by the ship-owners or shipping companies are insufficient or they can not take immediate measures, the national authority will have to take necessary countermeasures.

6.3.4 Marine Disaster Prevention Unit

(1) Marine Disaster Prevention Units

It is advisable to establish Marine Disaster Prevention Units at each base, under KPLP units, which will be deployed according to real time operations.

Each of the Marine Disaster Prevention Units consists of:

a. Maritime safety rescue ship: 1

b. Equipment and Materials
   - Foam concentrate: 2 kiloliters
   - Chemical dispersant: 70 kiloliters
   - Dry chemical powder: 2 tons
   - Fire-fighting devices: 30 sets
   - Safety devices for dangerous chemicals: 3 sets
   - Gas indicator: 2 sets
   - Oil boom: 1,800 m
   - Oil skimmer: 100 kilolit/hr x 1 set, 30 kilolit/hr x 1 set
   - Handy oil recovery devices: 10 sets

(2) Operation Procedures of Marine Disaster Prevention Units

(i) The maritime safety rescue ships will normally engage in rescue activity, and at the time of arrival and stevedoring of large tankers, etc., they will be mobilized to take precautionary measures to prevent oil spills and fires or to control disasters when casualties occur.

(ii) A maritime safety rescue ship should be operated together whenever an oil recovery barge is mobilized in order to be able to expand oil booms, to be engaged in oil recovery work, to be in charge of telecommunications and so forth.

(3) Exercise and Training for Marine Disaster Prevention Units

Joint exercises by the 9 Disaster Prevention Units and separate exercises by the individual Units are necessary for controlling possible disasters.

For this purpose, it is advisable to foster Indonesian instructors through training on a practicable level.

As a means of doing this, it is desirable to nominate those who previously received overseas training and send them to the Maritime Disaster Prevention Center in Japan and the training institutes in other nations recommended by IMO for their further education as instructors.

7 Maritime Safety and SAR Communications and Information System

7. 1 Present Situation

7. 2 Long-term Development Plan

Section 7 Maritime Safety and SAR Communications and Information System

7.1 Present Situation

7.1.1 Maritime Safety and SAR Communications

The coastal radio stations belonging to the DGSC is set up according to the Radio Regulations (RR 1-6 38). A coastal station is defined as "a land station in the maritime mobile service" and purpose of its operation is to provide ship stations with radio communications service.

In particular, the highest priority in operation of coastal radio stations is given to all telecommunications concerning safety at sea.

Major services of telecommunication in coastal station are as follows:

1) Maritime Safety telecommunications service
2) Port operations service
3) Ship movement service
4) Public correspondence service

There are 73 coastal radio stations, and their watch hours by station class are as follows:

1st Class Station ...	9 stations:	24 hours
2nd Class Station ...	8 stations:	10 hours
3rd Class Station ...	11 stations:	8 - 15 hours
4th Class Station ...	45 stations:	8 hours or less

The distress messages received at a coastal radio station are directed to the KPLP unit in the area responsible for maritime SAR operations, and the Head of the relevant KANWIL and the Director General of DGSC are simultaneously notified by telephone.

For the smooth flow of messages concerning SAR and command and control, a maritime SAR telecommunications system is presently being established through the first phase implementation of the project to be completed in June, 1989.

The system structurally comprises the overall networks linking KANWILs and the DGSC by utilizing the existing public communications networks, and the area communications covering mainly KPLP units within the individual KANWIL areas.

The area communications networks, both the present ones and the ones being established, are shown in dotted lines in Fig. 7.2.5.

Within each area, the communications networks are being established through installation of a dedicated telephone system.

The information and communications links between the DGSC and BASARNAS are mostly through public telephone lines except for a part of the areas where the first phase study is being implemented.

7.1.2 International Movement in SAR Communications

The SAR Convention was adopted by the International Conference on Maritime Search and Rescue with the ultimate objective of establishing a global plan for maritime SAR, and the Conference urged development of a Global Maritime Distress and Safety System (GMDSS) including telecommunications provisions for effective operation of the search and rescue plan prescribed in the SAR Convention.

The fundamental objective of the GMDSS is to improve the existing maritime distress and safety system through the introduction of modern satellite technology and digital techniques, so that the search and rescue plan provided for in the SAR Convention may be effectively carried out, and the full introduction of the GMDSS becomes effective in February, 1992.

GMDSS provides for, as follows:

Sea Area A1 - An area within the coverage of VHF coast stations.
Sea Area A2 - An area, excluding sea area A1, within the coverage of MF coast stations.
Sea Area A3 - An area, excluding sea areas A1 and A2, within the coverage of INMARSAT satellites.
Sea Area A4 - The remaining sea areas outside sea areas A1, A2 and A3.

The GMDSS communications system is shown in Fig. 7.1.1 as an example.

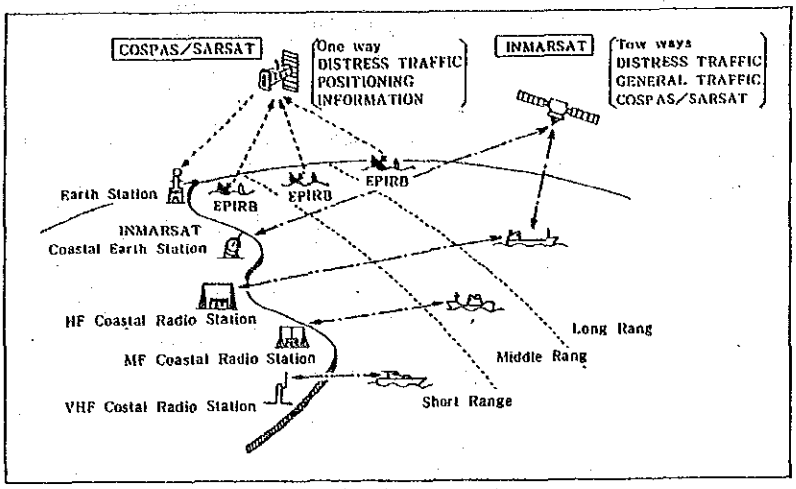

Fig. 7.1.1 Example of GMDSS Communications

7.2 Long-term Plan

7.2.1 Basic System Plan

(1) Maritime Safety and SAR Telecommunications System

(i) Establishment of COSPAS/SARSAT LUT

The distress-alerting system needs to be established to automatically relay the alert transmitted by a satellite EPIRB (Emergency Position Indicating Radio Beacon) using two frequency bands of 121.5/243 MHz and 406 MHz via the near polar-orbiting satellite and determining the location through the system to be transmitted to the SAR authorities.

If this system is implemented the present EPIRB generation may be replaced by the EPIRB of the new generation utilizing SAR satellite.

The geographical configuration of Indonesia requires the siting of two LUTs, one in Jakarta, the central-western area of Indonesia, and the other in Ambon, the eastern area.
A communications link shall be made between the LUTs and the SAR communications network to send the position data and EPIRB ID, etc., to the Mission Control Center (MCC).

The service coverage of LUTs is shown in Fig. 7.2.1.

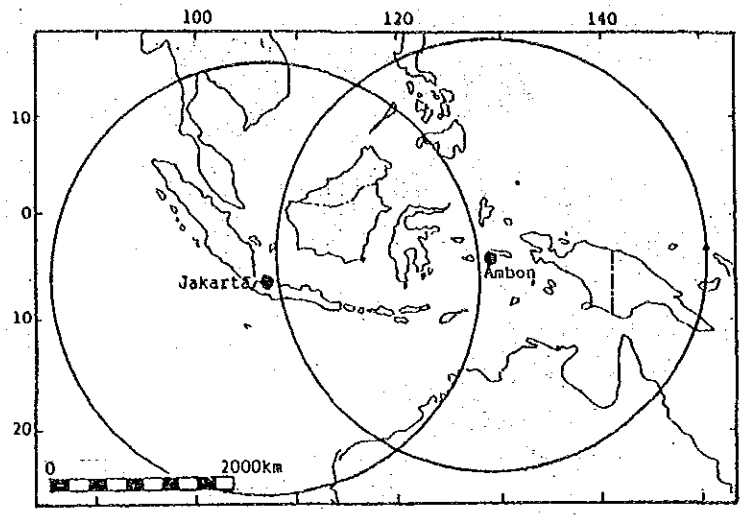

Fig. 7.2.1 Service Coverage LUTs

(ii) Establishment of A1 Areas = VHF DSC communications Facilities =

Ships operating in the areas of 20 - 30 miles off shore shall transmit distress messages on 156.525 MHz (CH 70).
Therefore, VHF communications facilities need to be established to automatically watch CH 70 by DSC in order to cover the gateway port areas.

(iii) Establishment of A2 Areas = MF DSC/NBDP Communications Facilities =

In the MF band, 2187.5 kHz will be used for the distress alerts and safety calls by DSC and 2,182 kHz for distress and safety traffic by radiotelephony including search and rescue coordinating functions and on scene communications.
Therefore, the installation of MF DSC/NBDP for automatic calls and printing is planned.

Fig. 7.2.2 shows the A2 area coverage.

(iv) Establishment of A3 Area

a) HF DSC/NBDP Communications Facilities

Frequencies in the HF bands will be used for long range service. The frequencies have been designated on the 4, 6, 8, 12 and 16 MHz bands to provide the means for transmitting and receiving distress alerts and safety calls, and for passing distress and safety traffic.

As DSC will form the basis for distress alerting and safety calling, ships shall maintain watch on 8,414.5 kHz and one of the other dedicated frequencies, and have the DSC/NBDP in HF.

b) Establishment of INMARSAT Ship Earth Station (SES)

The Indonesian waters are within the service coverages of the Indian Ocean and Pacific Ocean satellites of INMARSAT.

The Ship Earth Stations need to be established in Jakarta and all KANWIL areas to cope with long distance distress traffic in the vast water areas.

(v) Establishment of NAVTEX

NAVTEX is an international direct-printing service for promulgation to ships of navigational and meteorological warnings and other urgent marine safety information pertaining to coastal waters.
Transmission will be made on the MF band (518 kHz) by Narrow-Band Direct Printing (NBDP) for the ships to receive the messages automatically printed.

Accordingly, the plan is made to establish the NAVTEX system at the SAR coastal radio stations located in the main areas together with installation of receivers on board the DGSC ships as they should have all the maritime safety information on hand.

The coverage plan of NAVTEX is shown in Fig. 7.2.3.

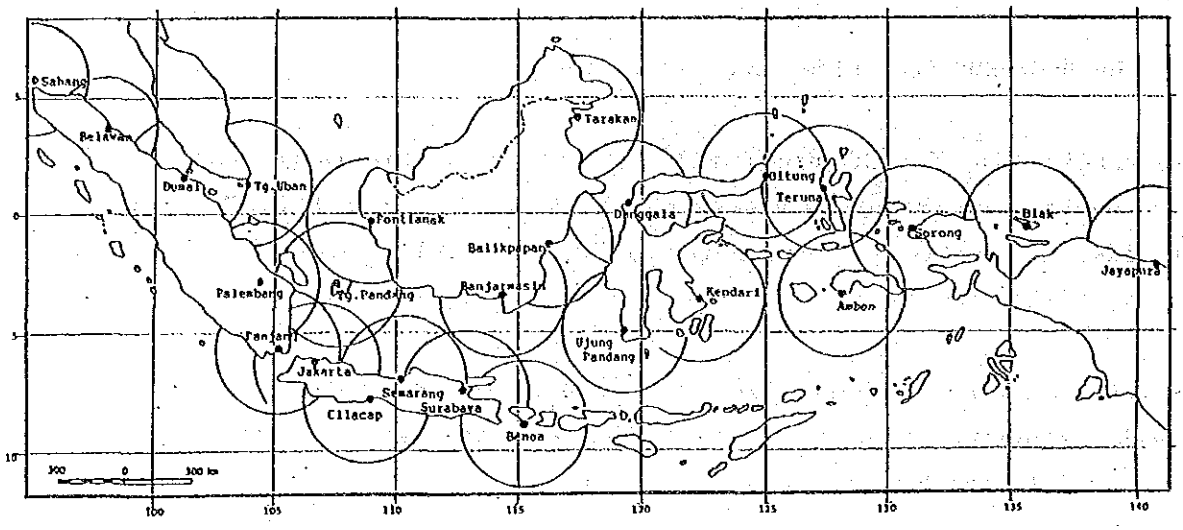

Fig. 7.2.2 A2 Area Coverage

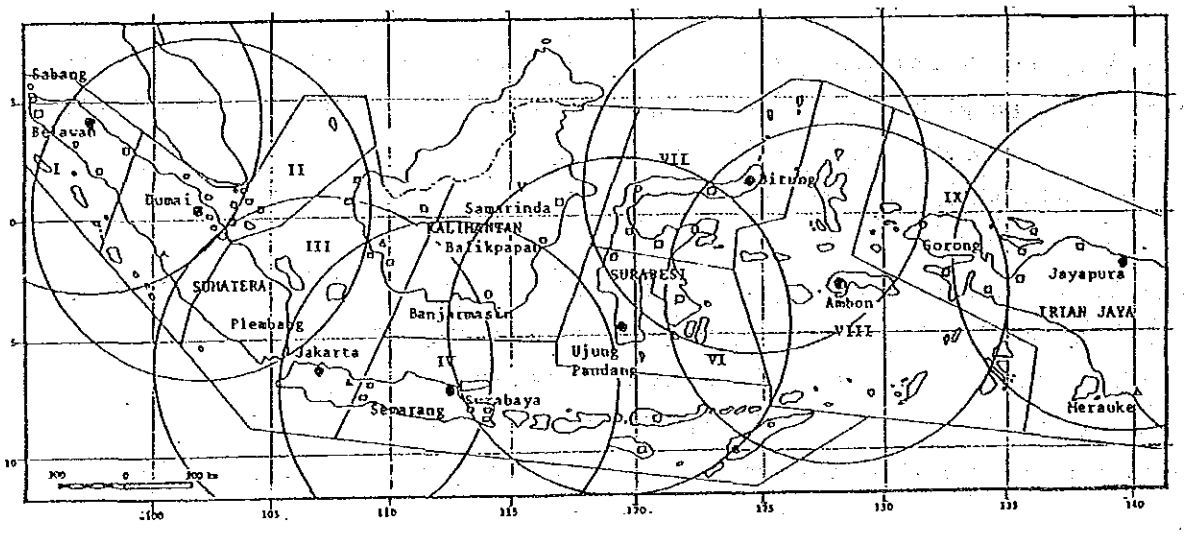

Fig. 7.2.3 Coverage Plan for NAVTEX

(2) Establishment of Maritime SAR Information Networks

(i) Establishment of Trunk Line Networks Utilizing PALAPA Satellite Transponders

It is expected that the volume of information to be dealt with in the Directorate General of Sea Communication will increase in the future due to the promulgation of on-board radio installations, to the development of ports and harbours, to the introduction respectively of the GMDSS and a ship reporting system as a part of the Wawasan Nusantara concept and so forth.

For this reason, a study needs to be made to establish a new information system between the DGSC and KANWILs for smooth transmission and processing of SAR related information.

As a means of implementation of the above, two alternatives may be considered; implementation of high speed communications by the existing HF and use of the communication networks of the PALAPA satellite.

a) High Speed Communications by HF

This system is to secure the promptness of information processing through speedup and automation improving the existing HF system of low speed at 50 b/s, time division and manual processing.

The implementation of this system is considered useful as an immediate deployment due to the fact that the necessary costs for construction and operation are comparatively low and the volume of SAR message presently being handled is rather limited.

b) Communications System Exclusively Using the PALAPA Satellite

This system totally solves the typical system disadvantages of HF communications; securing stable HF communication links may not often be guaranteed due to ionospheric conditions.

It is required for a process system for SAR information that smooth, reliable and stable handling of information be always maintained properly coping with any increase in volume of such messages. In this context, introduction of the PALAPA system should be planned as a final alternative.

This system constitutes the information and communications networks through the use of transponders of the PALAPA satellite establishing a central earth station at the DGSC and local earth stations at each KANWIL. This system will be connected with the existing telephone exchange and also with the teletype automatic exchange system planned in this report for direct and immediate exchange and processing of SAR information between the DGSC and KANWILs by telephone/fax and data/message communications.

Exclusive use of the satellite transponder will be required in this system for SAR, and for this purpose necessary operation costs (in Rupiah budget) for the exclusive use need to be secured. In this case, an information and communications system is to be linked with the DGSC area information and communications networks being established in FTA-193.

Fig. 7.2.4 shows the network line.

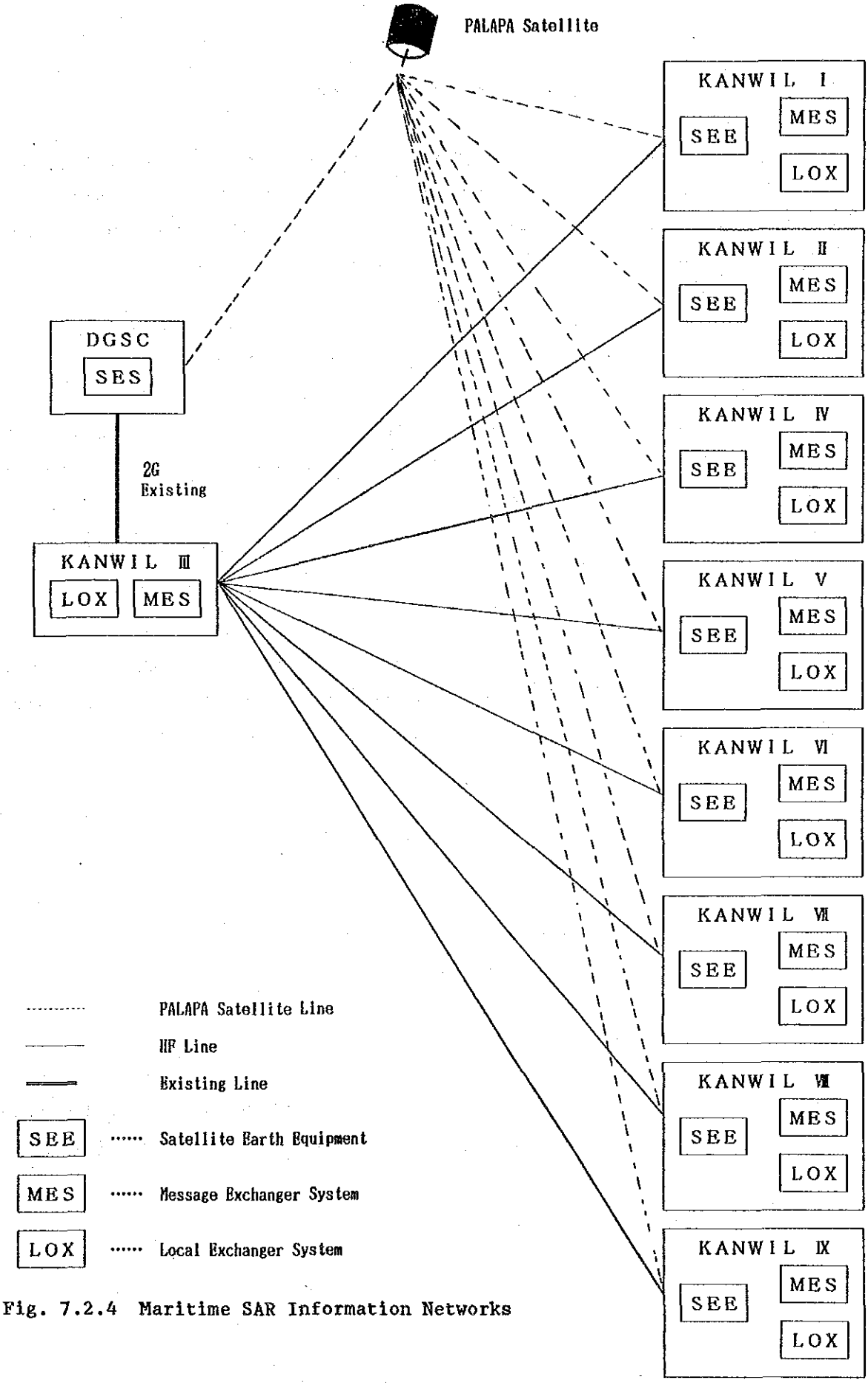

Fig. 7.2.4 Maritime SAR Information Networks

(ii) Establishment of Area Information Networks

a) The introduction of the GMDSS requires the establishment of DSC, NBDP and NAVTEX, the links with which need to be established for smooth and reliable transmission of SAR information. For this purpose the P-P information networks by MF/HF will be established.

b) The area information networks mainly by the TDMA on 2 GHz need to be improved to link with local units of the DGSC, KKR, SKR, etc.

The links will also be made with the NAVTEX, traffic control system and the MIS for transmission and exchange of messages on ship movement and the relevant information and data.

(iii) Network Links with New Establishment Proposed

Following the long-term plan for the organizational and rescue system for maritime safety and SAR, the relevant development plan is made to link the offices and units concerned in order to secure the efficient and prompt flow and exchange of maritime safety and SAR information and messages.

- Operations Office
- Establishment of Maritime Safety Air Operation
- Establishment of Special Rescue System
- Establishment of MCC
- Establishment of Traffic Control System
- Establishment of Maritime Safety Education System

(iv) Improvement of Tg.Uban Radio Station

The establishment of DSC and NBDP by the introduction of the GMDSS necessitates the improvement in communication facilities for the Tg.Uban radio station.

(v) Establishment of Aeronautical Communications

The communications with aircraft are usually made on the 130 MHz band of VHF and Air HF.

The VHF and Air HF will be installed at each KANWIL and the KPLP units in main areas and also on board the relevant patrol ships.

(vi) Establishment of Marine Radio Direct Telephone System (MRDTS)

A marine radio direct-dialling system will be established to exchange information on maritime safety and SAR between the on-shore units and the DGSC ships.
The frequency band of 150 MHz will be used between the ships and the on-shore units.

The main radio direct-dialling system will be linked with the area information networks so that the maritime safety and SAR units within the area may directly dial the ships.

The overall links of trunk line and area information networks are shown in Fig. 7.2.5.

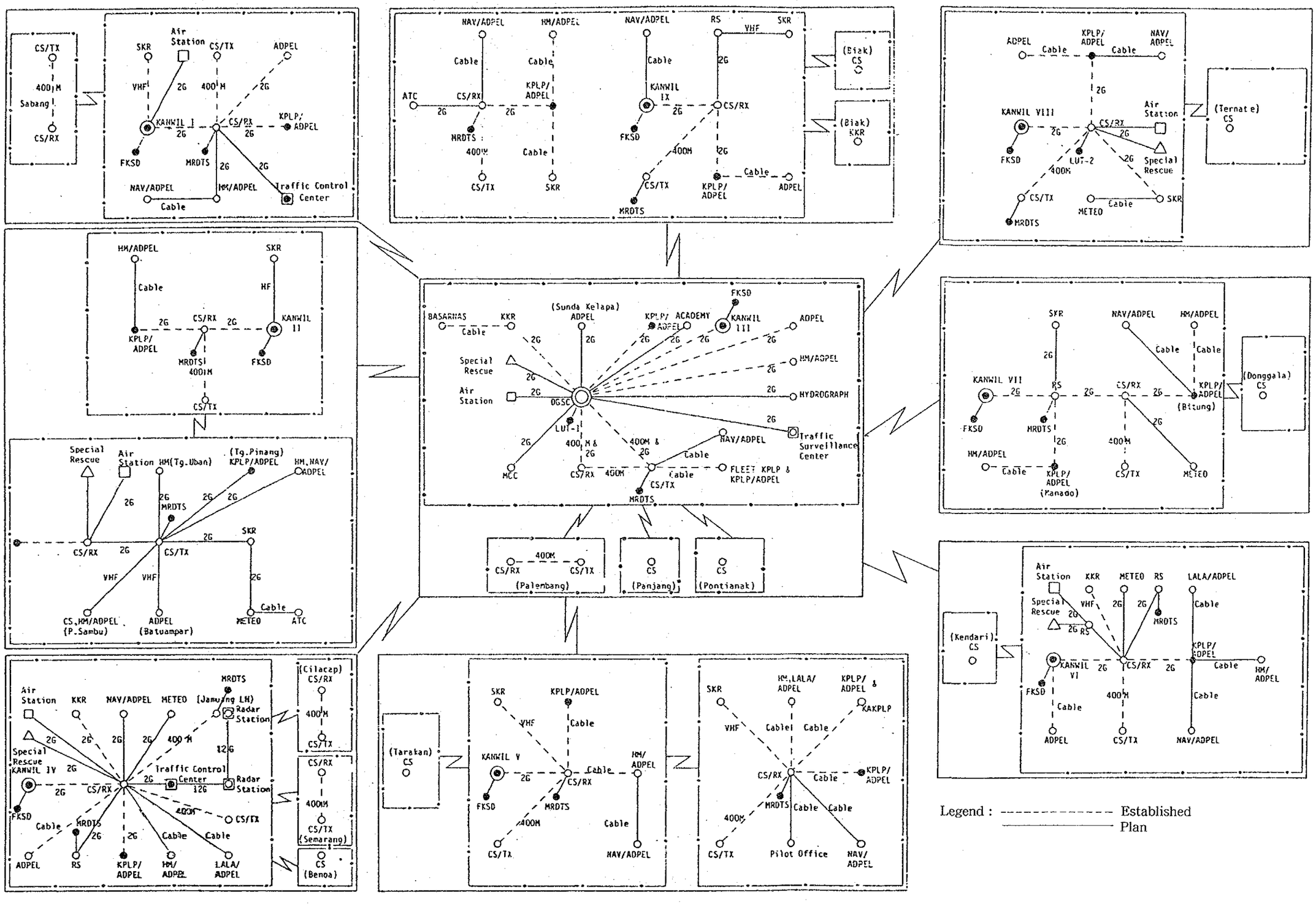

Fig. 7.2.5 Overall Links of Trank Line and Area Information Network

(3) Establishment of Command and Control Communications System including Ship-Reporting System

(i) Establishment of Message Exchange System (MES)

The MES is to automatically secure the prompt and reliable exchange of teletype messages with a computer system.
The MES functions as an integrated part of the SAR communications networks consisting of the trunk line and area networks.

All the SAR-related information will be processed for automatic transmission and exchange.

(ii) Management Information System (MIS)

The MIS will output the necessary data via an on-line system as the terminal of the MES.
The information on the ship reporting system and traffic control system will be input into the MES for SAR activity.

(iii) Area Communications Terminals

In the relevant operation units, direct dial telephones, facsimile and teletypewriters (terminal for MES) will be installed to link with the area information networks for the exchange of maritime safety and SAR information and command and control messages.

(iv) Ship Reporting System

The ship reporting system is to regularly receive reports from ships at sea on the positions, speed, bearing and so on for their process by a computer, and to swiftly and promptly decide, in case of accidents, the search areas as well as to select ships nearby which rescue assistance may be requested to.

As regards the information links and operational functions to be required for effective execution of this system, they consist of the following.

a. Collection of Data and Information on Whereabout and Movement of Ship

Necessary data and information on whereabout and movement of ships at sea pertaining to their positions will be received through direct contact made by radio communications with the ships using the telecommunications equipment of coastal radio stations.

The information on those at Anchorage will be requested to ship-owners, agents and so on for its submission to DGSC's local units.

- Ships movement (position, course, speed, etc.)
- Departure from port (destination, volume and type of cargoes, number of crew and passengers, etc.)
- Entering into port
- Ships data (name of ship, tonnage, length, draft, owners, operator, etc.)

b. Transmission of Data and Information

The data and information on whereabout and movement of ships at sea, to be received at coastal radio stations and DGSC's local units, will be transmitted to the DGSC operation center via the existing telecommunications facilities of DGSC.

Also, the data output to be required by DGSC local units will be transmitted via the same facilities.

c. Centralized Data Management Function

A centralized data management will be made for the data and information on whereabout and movement of ships at sea to be collected at DGSC through necessary processing and storage.

Upon necessity, the relevant data will be output through operators output handling after necessary processing and editing.

The data to be output from the terminal equipment are as follows:

- List of data on ships whereabout and movement
- Data on estimated positions of ships
- List of ships in the vicinity of an accident scene/surface picture
- Ships data
- Other necessary data and information

(4) Associated Installations

(i) Electronic Chart

An electronic chart will be installed at the Operation Offices of the DGSC and KANWILs to display the information on ship movement and other necessary data on maritime safety and SAR, and on input for the relevant sources, in order to plan for effective and prompt maritime safety and SAR.

(ii) International Telex

An international telex will be installed at both the DGSC and the MCCs for the exchange of information on SAR with such other systems as AMVER and so on in other countries.

(iii) UPS and EPD

For the purpose of securing the uninterrupted operations of maritime safety and SAR, Un-interrupted Power Supply Systems (UPS) and Equipment Protection Devices (EPD) will be installed at the SAR coastal radio stations, KANWILs and the DGSC.

7.2.2 Development Plan

(1) Maritime Safety and SAR Telecommunications System

(i) Establishment of LUT

a) Location plan : Jakarta and Ambon

b) Facility/Equipment Plan: LUT system; Transmitter Receiver for data transmission; Power Supply; Shelters; Antenna system.

(ii) Establishment of VHF DSC Communications Facilities

a) Location plan

a. On-shore: Jakarta/Transmitting station; Surabaya/Receiving station; Ujung Pandang/Receiving station; Belawan/Receiving station.

b. DGSC ships: Total of 60 ships comprising 34 KPLP patrol ships; 26 NAVIGASI ships;

b) Facility/Equipment

a. On-shore: VHF transceiver/DSC; Console; Antenna system

b. DGSC ships: VHF transceiver/DSC; Antenna system.

(iii) Establishment of MF DSC/NBDP Communications Facilities

a) Location Plan

a. On-shore: 25 SAR coastal radio stations will be equipped with MF DSC/NBDP as shown in Table 7.2.1.

b. DGSC ships: Total of 22 ships comprising 9 KPLP patrol ships; 13 NAVIGASI ships.

b) Facility/Equipment Plan

a. On-shore: MF transmitter DSC/NBDP; Antenna system; Receiver; DSC/NBDP Console;

b. DGSC ships: MF Transmitter DSC/NBDP; All wave receiver

(iv) Establishment of HF DSC/NBDP Communications Facilities

a)	Location plan:	Jakarta coastal radio station
b)	Facility/Equipment:	HF Transmitter DSC/NBDP; Antenna System; Receiver DSC/NBDP; Console.

(v) Establishment of INMARSAT SES for SAR Operations office

a)	Location plan:	DGSC and all KANWILs except KANWIL III
b)	Facility/Equipment:	INMARSAT system; Antenna System

(vi) Establishment of NAVTEX

a)	Location Plan		
	a.	On-shore:	SAR coastal radio stations as shown in Table 7.2.1.
	b.	DGSC ships:	Total of 22 ships comprising 9 KPLP patrol ships; 13 NAVIGASI ships.
b)	Facility/Equipment Plan		
	a.	On-shore:	NAVTEX transmitter; NAVTEX console; Antenna system.
	b.	DGSC ships:	NAVTEX receiver.

(2) Establishment of Maritime SAR Information Networks

(i) Establishment of Trunk Line Networks Utilizing PALAPA Satellite Transponders

(i)-1 High Speed Communication by HF

a)	Location plan:	DGSC and all KANWILs.
b)	Facility/Equipment plan:	HF Transmitter/Receiver; Console (including ARQ Equipment); Antenna system.

(i)-2 Communications System exclusively using PALAPA Satellite

a)	Location plan:	DGSC and KANWILs
b)	Facility/Equipment plan:	Central Earth Station; Local Earth Station; Antenna System and Transponder of PALAPA Satellite (lease line)

(ii) Establishment of Area Information Networks

(ii)-1 Area Information Networks

a)	Location plan:	Sabang; Tg.Uban; Tg.Pandang; Palembang; Pontianak; Semarang; Benoa; Balikpapan; Sorong; Cilacap; Panjang; Kendari; Biak; Ternate; Donggala, and Tarakan radio stations.
b)	Facility/Equipment plan:	HF Transmitter/Receiver; Console (including ARQ Equipment); EGS and Antenna system.

(ii)-2 2 GHz TDMA

a)	Location plan:	Local units of DGSC, KKR and SKR, etc.
b)	Facility/Equipment plan:	DRCS SS; SSB Radio Transmitter/Receiver; VHF Radio Link Equipment; HF Radio Link Equipment and Antenna system.

(iii) Network Links with New Establishments Proposed

a) Location plan

a.	Operations Office:	DGSC; all KANWILs and KPLP/ADPEL.
b.	DGSC Air Stations:	Medan; Tg.Uban; Jakarta; Surabaya; Ambon and Ujung Pandang
c.	Special Rescue Station:	Tg.Uban, Jakarta (Tg.Priok), Surabaya (Tg.Perak), Ujung Pandang, Ambon
d.	MCC:	Jakarta
e.	DGSC Academy:	Jakarta

f. Harbour Traffic Control: Surabaya, Belawan, Jakarta

b) Facility/Equipment plan

a. Operations Office: Console and Terminal Device

b. DGSC Air Stations: DRCS SS and RS; Operation console; 130 MHz Air VHF; HF Transmitter/Receiver; NAVTEX Receiver; UPS; Antenna System; Terminal Device and Shelter for operation, RS and UPS

c. Special Rescue: DRCS SS; Operation console; Antenna system; Shelter for operations and EGS; EGS and Terminal Device

d. MCC: DRCS SS; Operation console; Electronic Chart; UPS; Antenna system; shelter for operation and UPS and Terminal Device

e. DGSC Academy: DRCS; Terminal Device and Antenna System

f. Harbour Traffic Control: DRCS; Terminal Device and Antenna System

(iv) Improvement of Tg.Uban Radio Station

a) Location plan: Tg.Uban

b) Facility/Equipment plan: Transmitting and receiving stations will be separated. The equipment is comprised of: MF Transmitter/Receiver; Console; Antenna system; UPS and Shelter for operation room and UPS

(v) Establishment of Air VHF and Air HF

a) Location plan

1. On-shore: as shown in Table 7.2.1

2. DGSC ships: Total 22 ships comprising 9 KPLP patrol ships and 13 NAVIGASI ships

b) Facility/Equipment plan: 130 MHz Air VHF TRX; Air HF Transmitter/Receiver; Power Supply and Antenna System

(vi) Establishment of Marine Radio Direct Telephone System (MRDTS)

a) Location plan
   a. On-shore: as shown in Table 7.2.1
   b. DGSC ships: Total 115 ships comprising 68 x KPLP patrol ships; 47 x NAVIGASI ships

b) Facility/Equipment plan: MRDTS Base; MRDTS Signal Converting Equipment; MRDTS Mobile; DRCS SS; EGS and Shelter TRX and EGS

(3) Establishment of Command and Control Communications System

(i) Establishment of Message System (MES)

a) Location plan: as shown in Table 7.2.1
b) Facility/Equipment plan: MES system

(ii) Management Information System (MIS)

a) Location plan: DGSC
b) Facility/Equipment: Personal CPU; Operation console and Communications terminals

(iii) Area Communications Terminals

a) Location plan: Local units of DGSC
b) Facility/Equipment plan: TP; TTY and Facsimile

(iv) Ship Reporting System

Facility/Equipment Plan: MES, MIS and Area Communication Terminals

(4) Associated Installations

(i) Electronic Chart

a) Location plan: as shown in Table 7.2.1
b) Facility/Equipment plan: Electronic Chart

(ii) International Telex

a) Location plan: DGSC and MCC
b) Facility/Equipment plan: International Telex

(iii) UPS and EPD

a) Location plan
   a. UPS: DGSC; All KANWILs; Coastal radio TX, RX of KANWIL
   b. EPD: DGSC; All KANWILs; Coastal radio TX, RX of KANWIL; KPLP/ADPEL of KANWIL
b) Facility/Equipment plan: UPS and EPD

Table 7.2.1 List of Equipment for Maritime Safety and SAR

KANWIL	AREA	MF DSC/NBDP	NAVTEX	AIR VHF AIR HF	MRDTS	MES	Electronic Chart
I	Medan/Belawan	Sabang Belawan	Belawan TX	KANWIL I	Belawan RX	Belawan RX	KANWIL I
II	Dumai	Dumai	Dumai TX	KANWIL II	Dumai RX	Dumai RX	KANWIL II
	Tg.Uban	Tg.Uban		KPLP	Tg.Uban TX	Tg.Uban RX	
III	Jakarta	Palembang Jakarta Pontianak Tg. Pandang Panjang	Jakarta TX	KANWIL III	Jakarta TX	DGSC	DGSC KANWIL III
IV	Surabaya	Surabaya Semarang Benoa Cilacap	Surabaya TX	KANWIL IV	R.S Jamuang L.H.	Surabaya RX	KANWIL IV
V	Banjarmasin	Banjarmasin		KANWIL V	Banjarmasin RX	Banjarmasin RX	KANWIL V
	Balikpapan	Balikpapan Tarakan		KPLP/ADPEL	Balikpapan RX	Balikpapan RX	
VI	Ujung Pandang	Ujung Pandang Kendari	Ujung Pandang TX	KANWIL VI	Kudingren L.H.	Ujung Pandang RX	KANWIL VI
VII	Manado/Bitung	Bitung Donggala	Bitung TX	KANWIL VII	Makawenbeng RS	Bitung RX	KANWIL VII
VIII	Ambon	Ambon Ternate	Ambon TX	KANWIL VIII	Ambon RX	Ambon RX	KANWIL VIII
IX	Jayapura	Jayapura Biak	Jayapura TX	KANWIL IX	Jayapura TX	Jayapura RX	KANWIL IX
	Sorong	Sorong		KPLP/ADPEL	Sorong RX	Sorong RX	
TOTAL		25	8	12	13	12	10

8 Harbour Traffic Control System

Section 8 Harbour Traffic Control System

8.1 Present Situation

Surveys were carried out from the viewpoint of developing a traffic control system mainly for the following six ports.

8.1.1 Shipping Routes to the Major Ports

(1) Belawan

The Belawan channel is approximately 8 miles long and about 8 meters deep. The buoys are well established and maintained.

The fairway between No. 1 and No. 11 buoys, extending about 6 miles, is fairly narrow and the least width is about 100 meters.

(2) Palembang

The river channel extends into the Musi River for about 53 miles from the outer bar with a number of bends throughout.
The water depth in the channel has been maintained at about 6 meters through dredging.

(3) Jakarta (Tg.Priok)

The routes are open, and there are no specifically defined routes until just before reaching the entrance.

(4) Surabaya (Tg.Perak)

There are two routes to Tg.Perak. The West Channel, which is presently the main and only route to Tg.Perak for shipping, extends from Tg.Perak to the north entrance of the channel.
The Channel has been under continuous maintenance works with dredging to keep the water depth of 9 meters. The fairway especially about 10 miles

between No. 5 and No. 6 buoys is narrow, about 100 meters at its narrowest. The West Channel Is fairly well equipped with lighted buoys.

In the East Channel, only ships of less than 3 meters draft may pass, and there is presently no definite plan for dredging.
Buoys are installed but are used only in daytime.

(5) Banjarmasin

The channel extends to the Barito River for about 20 miles from the outer buoy No. 1 and the channel out at sea is fairly narrow and shallow, especially for about 7 miles from No. 1 to No. 3 buoys. The entrance to the channel is so narrow that precautions must be taken. Dredging work is being continuously carried out in order to maintain the depth of about 5 meters.

(6) Ujung Pandang

The Western Fairway is the main channel to Ujung Pandang, passing through a number of reefs.
Although there are two others, the Northern and Northwestern Fairways, they have not been mine-swept.

8.1.2 Pilotage System

The pilotage system in the main ports is summarized in Table 8.1.1.

Table 8.1.1 Pilotage System in the Major Ports

Item / Port	Pilotage Area		Ship Requiring Pilot	Pilot Station
	Sea Pilot	Harbour Pilot		
Belawan	Outer buoy to anchorage point	Anchorage point Inwards	88 G/T and upward	Belawan
Palembang	Outer buoy to anchorage point	Anchorage point inwards	70 G/T and upward	Tg.Buyut (River) Sungai Gerong (Harbour)
Jakarta (Tg.Priok)	-	1 mile before entrance of port inwards	88 G/T and upward	Tg.Priok
Surabaya (Tg.Perak)	West Ch. No. 5 buoy to anchorage point in Tg.Perak	In Tg.Perak	88 G/T and upward	Karang Jamuang (Sea) Tg.Perak (Harbour)
Banjarmasin	Outer buoy No. 1 to port	In port	88 G/T and upward	Tg.Pedadatua (River) Trisakti (Harbour)
Ujung Pandang	-	Outside port Inwards	70 G/T and upward	Ujung Pandang (Harbour)

Source: DGSC Data

8.1.3 Ship Calls to the Major Ports

The ship calls to the major ports is summarized in Table 8.1.2.

Table 8.1.2 Ship Calls to the Major Ports

(1986) (Unit: No. of ships)

Port / Line/Type	Belawan *	Palembang	Jakarta (Tg.Priok)	Surabaya (Tg.Perak)	Banjarmasin	Ujung Pandang
Ocean-going	389	292	2,843	1,008	176	241
Inter island	1,058	2,028	4,609	2,434	265	1,142
Special	1,014	-	410	656	722	366
Local	359	2,337	-	2,161	1,024	307
Sailing	-	588	-	2,910	2,174	1,408
Total	2,820	5,245	7,862	9,169	4,361	3,464

Source: DGSC Data

Note: * data in 1984

8.1.4 Marine Accidents in the Major Ports

The marine accidents which occurred in the major ports are shown in Tables 8.1.3 and 8.1.4.

Table 8.1.3 Number of Marine Accidents by Kind in the Major Ports

- 1982 to 1986 -

(Unit: No. of Ship)

Kind / Port	Collision		Stranding	Fire	Flooding	Sunk	Engine Propeller	Drifting	Human Loss	Others	Total
	S-S	Other									
Belawan	8		1	2	1				5	1	18
Palembang	6	2	2			1				1	12
Tg.Priok	1		1		1		1	1		2	7
Surabaya	11	2	3	8	2	3			3		32
Banjarmasin	3		3	2	1	1					10
Ujung Pandang	3	4	2	2	5	2	3	1	2		24
Total	32	8	12	14	10	7	4	2	10	4	103

Source: DGSC Data

Table 8.1.4 Number of Marine Accidents by Size in the Major Ports

- 1982 to 1986 -

(Unit: No. of Ship)

Tonnage / Port	0-30	30-100	100-300	300-500	500-1000	1000-3000	3000-10000	10000-20000	Unknown	Total
Belawan	1			2	4	5	6			18
Palembang	2	4	3			1	2			12
Tg.Priok	1	1		1	1		3			7
Surabaya		3	6	2	7	5	6	3		32
Banjarmasin	1	3	3	2		1				10
Ujung Pandang	1	4	9	1	1	4	2	1	1	24
Total	6	15	21	8	13	16	19	4	1	103

Source: DGSC Data

8.1.5 Traffic Control System in Indonesia

In the 6 major ports, an assistance to navigation has been provided by the pilotage system through the Harbour Masters which was implemented according to the relevant provisions of the 1925 Harbour Regulations, Inland Collision Regulations, Pilot Service Ordinance, Pilot Service Order and so on.

In 2 out of the 6 ports, the control has been in practice when occasions require: in Palembang, thick haze prevails about 3 to 4 times a year during the dry season and reduces the maximum visibility to about 25 meters. In such cases, one way traffic is enforced, one day for 'out' and the other for 'in', to avoid the risk of collision. In Banjarmasin, there are signal stations to furnish information to mariners in the following cases. When navigation is restricted, a red ball mark is displayed in the

daytime and a red light in the nighttime. When navigation is free, a white cone and white light is displayed in the daytime and nighttime, respectively.

8.1.6 Traffic Control System in Other Countries

The vessel traffic management systems currently in use in other countries are categorized according to the degree of control as given below:

a. Information service
b. Traffic separation scheme
c. Pilot dependent management system
d. Vessel movement reporting system
e. Signal control
f. Vessel entering system requiring permission

8.1.7 International Tendencies

The Guidelines for Vessel Traffic Services were adopted in 1985 by IMO to improve safety and efficiency of traffic and protection of the environment within a port or waterway.

8.2 Analysis

8.2.1 Method

A forecast is made for the basic factors of ship calls and major accidents in 2005 to plan for a traffic control system in the main ports in terms of priority locations and level of installations.

Based on the result of the priority study, the features of relevant ports are analyzed to establish an appropriate system through a comparative study with reference to ports in other countries where traffic control systems have been in service.

The priority index is represented by the product of the following two elements which are converted into a standard type of ship:

a. Number of collisions and strandings in a year
b. Number of ship calls in a year

8.2.2 Analysis of Each Port

(1) Comparison of Priority Index

The priority index for the respective ports in 2005 is given In Table 8.2.1 showing the priority in comparative order.

(2) Analysis of Collisions and Environmental Conditions

The frequency of collisions in ports is dependent on the environmental factors given below (other factors common to each port such as pilotage are omitted):

a. Traffic density
b. Channel size (average sailing distance and average width)
c. Composition of ships flag
d. External affects such as strong wind and current
e. Visibility
f. Restriction in the channel

The above factors are analyzed as shown in Table 8.2.2.

Table 8.2.1 Comparison of Priority Index in 2005

	Ships call (A)*	Marine Accidents			Priority Index	
		Collision	Stranding	Total (B)	(A)x(B)*	Comparative Order
Belawan	5.7	7.2	0.2	7.4	42.2	5
Palembang	11.2	2.4	0.8	3.2	35.8	4
Jakarta	10.8	1.6	0.2	1.8	19.4	2
Surabaya	11.2	11.4	0.8	12.2	136.6	16
Ujung Pandang	3.6	3.6	0.2	3.8	13.7	2
Banjarmasin	4.0	1.6	0.5	2.1	8.4	1
Nagoya	129.9	1.2	0	1.2	155.9	19

Note: * x 1,000

Table 8.2.2 Degree of Collision Risk in Major Ports in 2005

	Traffic Density (A)	Channel Size (B)	(A)x(B)	Ship's Flag	Wind/ Current	Visibility Impact	Impact by Restriction in Channel
Belawan	2.07	2.04	4.22	Same Impact	A	Nil	A
Palembang	0.02	14.40	0.29	"	A	C	A
Jakarta	2.28	0.26	0.60	"	B	Nil	C
Surabaya	3.63	2.72	9.87	"	A	Nil	A
Ujung Pandang	0.07	4.30	0.30	"	C	Nil	B
Banjarmasin	0.05	6.90	0.35	"	A	Nil	A
Nagoya	1.00	1.00	1.00	"	-	-	-

Remarks 1) The figures in (A) and (B) are analyzed with reference to the figure Nagoya-1.
2) A, B and C show the degree of impact in such order.

8.2.3 Result of Analysis

According to the comparative order given in Table 8.2.1, the priority index of Surabaya is remarkably high, and it is more or less similar to Nagoya port in Japan, where a traffic control system has been in service. On the other hand, the index for other ports is quite low.

Consideration is then given to the narrowness of channels, which is one of the main features of Indonesian ports.

The product of traffic density and channel size is indicated in Table 8.2.2/2, which shows the figures of Surabaya and Belawan to be higher than those of Nagoya. As regards the other factors shown in the above Table, Palembang, Belawan, Banjarmasin and Surabaya are in a high impact group. Accordingly, it should be concluded, from the two fundamental aspects of priority index and degree of collision risk, that a traffic control system needs to be established in Surabaya and Belawan.

Concerning the other 4 ports, the data in Tables 8.2.1 and 8.2.2 show that developing a new traffic control system may not be justified. However, further development of Tg.Priok port is highly likely. It will, therefore, be necessary to assist with pilotage and to plan for traffic surveillance by radar in order to smooth the traffic.

In Palembang, both the priority index and the product of traffic density and channel size show low figures. In addition, the majority of ship accidents involve ships which may not be suitable, in terms of size and category, to be placed under traffic control. In conclusion, it is difficult to justify developing a new system which would require an enormous amount of investment.

Banjarmasin has a narrow and shallow channel, especially around the channel entrance where the density of collisions and strandings is high, and higher priority should be placed on improvement in channel conditions before a traffic control system is considered.

In Ujung Pandang, the availability of three fairways should be taken advantage of to improve the safety of traffic. For example, a separation plan may be adopted: the Western Fairway is for incoming only and the North and North-western Fairways are for outgoing use.

As a result, proper traffic control systems will be established in Surabaya, Belawan and Tg.Priok.

8.3 Long-term Plan

8.3.1 Traffic Control System for Three Ports

(1) Surabaya

(i) System Consideration

In order to overcome the problems of channel conditions and congestion at the anchorage, the face to face navigation of over a certain size of ships should be avoided in the West Channel and Tg.Perak, and proper arrangements are to be made for anchorage.

(ii) System Configuration

A Traffic Control Center to be established at Tg.Perak will perform control and information services through surveillance and monitoring of the traffic in the West Channel by a chain of radar stations.

The system configuration is shown in Fig. 8.3.1.

(iii) Facility/Equipment Plan

a) Traffic Control Center:
   1. Operation and control consoles
   2. Radar station system including image link
   3. Radar image composer and processing system
   4. Information management system
   5. Signal station system
   6. Communications system

b) Radar Station
   1. Radar station system including image link

c) Signal Station
   1. Signal station system

(iv) Main Services

The following main services will be carried out at the Traffic Control Center:

a) Information Services

Information services will be provided on the movement of ships, dredging work, situations at anchorage, and so on.
A ship reporting system will be adopted to monitor and control the ships of over a certain size, through establishment of a reporting line within the coverage.

b) Control Signal

The face-to-face navigation of a certain size of ships will be controlled by the signals remotely controlled at the Center according to the control plan, which will be produced based on the reports on estimated time of arrival (ETA) at a specified point.

(v) Organization

The Traffic Control Center will be properly manned as planned in Section 10, while the Radar and Signal Stations will be unmanned with remote control operation from the Center.

(vi) Size of Ships to be Controlled

It is assumed appropriate, under the considerations of channel conditions and ships requiring pilotage, that the face-to-face navigation be avoided between ships of 500 G/T and upward and 88 G/T and upwards, and also between ships of 1,000 G/T and upward and all other types.

(2) Belawan

(i) System Consideration

Consideration similar to that for Surabaya applies.

(ii) System Configuration

A radar station will be established to cover the area and to control the traffic at the Control Center by signals.
The system configuration is shown in Fig. 8.3.2.

(iii) Facility/Equipment Plan

a) Traffic Control Center
   a. Operation and control consoles
   b. Radar station system

c. Radar image processing system
d. Information management system
e. Signal station system
f. Communications system

b) Signal Station
a. Signal system

(iv) Main Services

The main services to be provided at the Traffic Control Center will be the same as those to be conducted at Surabaya.

(v) Organization

The Traffic Control Center will be properly manned as planned in Section 10, while the Signal Stations will be unmanned with remote control operation from the Center.

(vi) Size of Ships to be Controlled
(Same as Surabaya)

(3) Jakarta (Tg.Priok)

(i) System Consideration

In order to smooth the traffic and cope with congestion at anchorage, it will be effective to monitor the ship movement in and outside the port and to provide some ships with pilots and other ships with information services.

(ii) System Configuration

A surveillance center will be established and equipped with a radar station to monitor the traffic and to provide the information service. The system configuration is shown in Fig. 8.3.3.

(iii) Facility/Equipment Plan

a) Traffic Surveillance Center

a. Surveillance console

b. Radar station system

c. Information management system

d. Communications system

(iv) Main Services

The information services will be provided on the movement of ships, traffic situations, risk of collisions and so on.

(v) Organization

The Traffic Surveillance Center will be manned as planned in Section 10.

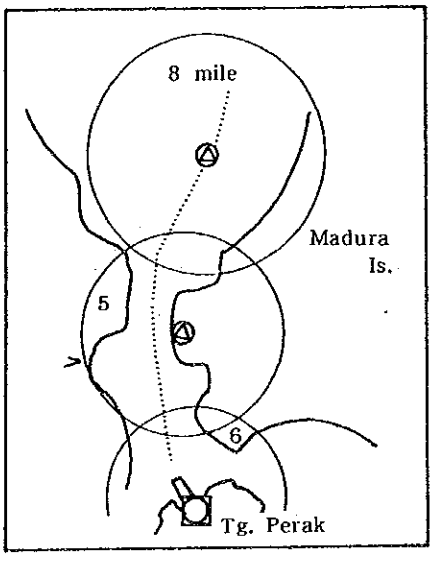

Fig. 8.3.1
Configuration for
Traffic Control
System in Surabaya

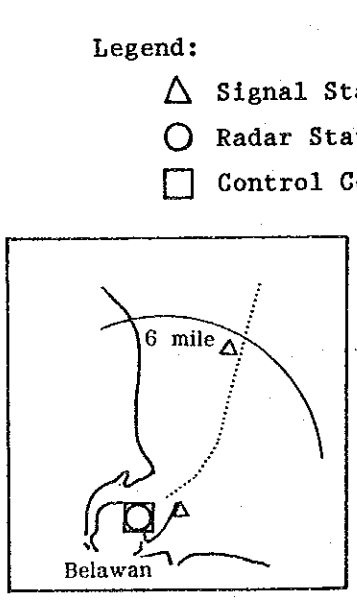

Fig. 8.3.2
Configuration for
Traffic Control
System in Belawan

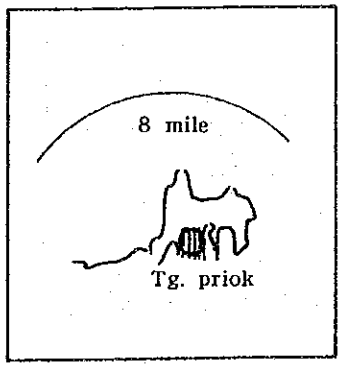

Fig. 8.3.3
Configuration for
Traffic Surveillance
System in Jakarta

8.3.2 Necessity of Legislation

In order that the traffic control system may operate surely and effectively, legislation and/or revision of the related regulations is needed.

9 Education and Training System for Maritime Safety and SAR Personnel

Section 9 Education and Training System for Maritime Safety and SAR Personnel

9.1 Present Situation

9.1.1 Maritime Safety Personnel

The DGSC has the sole responsibility for the maritime safety services represented primarily by the three maritime safety related Directorate of Sea and Coast Guard, Navigation and Marine Safety.

The personnel in these three Directorates number 10,225 and account for about 78% of the whole personnel of the DGSC to constitute its main pillar in manpower.

Most of the maritime safety personnel in the Directorates are graduates from the Naval Academy and Merchant Marine Academies, and those from general education junior and senior high schools. Therefore there are not so many personnel who have acquired the competent knowledge and skill required specifically for maritime safety and SAR services.

The issue of shortage in the number of the competent maritime safety officers and in facilities is a crucial matter.

9.1.2 Maritime Safety Personnel and Their Education and Training

(1) Education and Training of Maritime Safety Personnel

Presently, there is not an education system and an institute established for the specific purpose of educating and training maritime safety officers.

Short-term training had previously been conducted for the newly recruited personnel, but it is not carried out at present.

(2) Education and Training of Seamen

The educational system for seamen in Indonesia is under the responsibility of the Ministry of Communications represented by the Education and Training Agency, and the Education and Training Center of Sea Communication is the responsible authority for the national and private merchant marine institutes and schools for the education and training of seamen.

9.2 Issue of Education and Training for Maritime Safety and SAR Personnel

The pressing problem of physical and human imbalances has been recognized by Indonesia, and this has inevitably become apparent due to the recent rapid advance in the physical development in Indonesia accelerated by ever advancing technology.

Maritime safety and SAR require professional and specialized qualifications.

Necessary countermeasures are urgently required to overcome this problem through appropriate assessments of future needs for personnel and staffing especially in the maritime safety supporting fields.

For the sole purpose of accomplishing the establishment of a competent maritime safety and SAR hierarchy in Indonesia, it is important to systematically project the education and training in this field in the long run, i.e. establishment of a special institute.

Maritime safety education and training cover the specific fields not only of seamen affairs but also of maritime administrators. Accordingly, the graduates of other institutes such as Merchant Marine Academies can not be expected to execute those duties.

For such reasons, the maritime safety authorities in other nations have established their own academies such as the U.S. Coast Guard Academy, Maritime Safety Academy in Japan, and so on.

9.3 Long-term Plan

9.3.1 Establishment of DGSC Academy

(1) Necessity of Establishing DGSC Academy

In order to cope with the diversifying situation of society and changing marine environment in Indonesia with its expansive waters and precisely perform administrative affairs of the DGSC on the basis of the philosophy for maritime safety. A high level of knowledge and experience in SAR activities, maritime traffic safety, environmental protection, communications and information, maintenance and establishment of aids to navigation is required.

It is proposed that a DGSC Academy be established to secure personnel in diversifying expertise and that maritime safety personnel be systematically educated under the administration and operation of the DGSC. It may be appropriate that the DGSC Academy should be placed in the highest institutional position in the field of maritime safety in Indonesia.

If the key personnel from the ASEAN countries participate in the DGSC Academy, the Indonesian Government would discharge its duties as a leader in maritime safety, and abilities for international SAR activities will be improved.

(2) Annual Number of Cadets to be Accepted

The graduates of the DGSC Academy will be assigned mainly to the services covered by the maritime safety related three Directorates of Sea and Coast Guard, Navigation and Marine Safety.

By taking this into consideration, the number of annual recruitment for the cadets, "X" is estimated in accordance with the following formula:

$$X = \frac{(A + B) \times C}{(1 - E) \times D - (1 - E) \times D \times F} = 38 \text{ persons}$$

where, the following factors are applied:

A: Existing number of persons in the three Directorates of DGSC ..... 10,225 persons

B: Number to be increased in the three Directorates of DGSC by 2005 year ..... 1,773 persons

C: Occupancy rate of Academy graduates is estimated at 9% of the whole DGSC organization

D: The total period in service; ..... 33 years

E: Leaving rate of Academy cadets, while at study 10%

F: Leaving rate of Academy graduates from the DGSC between graduation and retirement 3.8%

Additional requirements to the above will be:

(i) The graduates of the DGSC Academy will also be assigned to jobs in Directorates other than the three Directorates specified. The number estimated will be in the range of 5 to 10 persons.

(ii) The courses of the DGSC Academy will be made available for the cadets from other ASEAN countries. The number estimated will be in the range of 5 to 10 persons.

Therefore, the total number of about 50 cadets will be admitted annually by the DGSC Academy.

(3) Admittance Qualifications and Requirements

Those qualified for admittance as candidate cadets of the DGSC Academy will be graduates from senior high school and should be in strict conformity with the spirit and basic philosophy forming the basis of the establishment of the DGSC Academy with emphasis on total development as persons and as leaders.
Accordingly, the admittance requirements for candidate cadets for the DGSC Academy are much the same in practice as those of the Merchant Marine Academies and Naval Academy from the viewpoint of national standardization.

(4) Duration of Education and Curriculum

In consideration of the special features of the DGSC Academy as the institute for education and training of maritime safety experts, the duration and curriculum should be on a university level which is the same as the U.S. Coast Guard Academy and the Maritime Safety Academy in Japan have implemented. Accordingly, the DGSC Academy will provide a 4-year education.

The curriculum of the DGSC Academy will cover subjects which will lead to a Bachelor of Science degree and a commission as a junior officer of maritime safety.

The proposed curriculum and number of minimum units for the DGSC Academy are given below:

	Subjects	No. of Units	Compulsory/Elective
a.	General Education		
	- Humanities	(8)	Compulsory
	- Social Science	(8)	"
	- Natural Science	(8)	"
	- Foreign Language	(12)	"
	- Health and Physical Education	(4)	"
	Sub total	40	

	Subjects	No. of Units	Compulsory/Elective
b.	Basic Professional Subjects	(54)	Compulsory
	Sub total	54	
c.	Professional Subjects		
	- Navigation Course	(52)	Elective
	- Engineering Course	(52)	"
	- Communications Course	(52)	"
	Sub total	52	
d.	Training	(15)	Compulsory
	Sub total	15	
	Total	161	

(5) Cruise Training

One year of cruise training will be conducted during the 4-year education period at the DGSC Academy.

(6) Status of Cadets and Compulsory Dormitory

(i) Status of Cadets

The cadets of the DGSC Academy will receive special education with the sense of purpose to work for their nation after graduation as maritime safety officers, assuming responsible duties for securing the public order and assuring the safety in and around Indonesian waters, with a status similar to that of the cadets of the Naval Academy.

Therefore, it is advisable that the cadets be provided with the following:

a) The status of national public service personnel (Government employees of the DGSC).
b) Monthly salary and other remuneration in accordance with the stipulation on salary of national public service personnel.

c) Expenses such as entrance fee, tuition and dormitory cost to be borne by the Government.

d) Uniform, bed and clothes, etc., to be provided free of charge.

(ii) Compulsory Dormitory Life

It is necessary to provide the cadets with a sense of leadership, cooperativeness and positiveness which are fundamentally required for the proper performance of maritime safety services, and those senses will be developed through group life in the compulsory dormitory.

An example of daily activities for the cadets is as follows:

5:00 - 6:00	Getting up & doing physical exercise, and preparing for daily tasks
6:00 - 6:30	Breakfast
6:30 - 7:00	Morning roll call
7:00 - 13:00	Morning classes
13:00 - 14:00	Lunch
14:00 - 16:00	Sleeping/private time
16:00 - 17:00	Sport, club and social activities
17:00 - 18:00	Bath
18:00 - 18:30	Dinner
18:30 - 21:00	Evening classes
21:00 - 22:00	Evening study
22:00 -	Putting out lights & sleeping

(7) Future Job Course and Qualifications after graduation

After graduation, the cadets as a rule go on board patrol vessels, and thereafter they alternately experience on-shore and on-board duties, through which they acquire field knowledge of maritime safety administration.

Going through such steps, they will advance toward middle and senior rank officers of the DGSC. Opportunities will also be provided for them to advance into the aviation field to be air pilots and ground engineers, as well as to attend various kinds of expertise training.

The graduates of the DGSC Academy should be provided with favorable status which is even higher than the graduates of STRATA-A, ("grade" in Dutch referring to the education system), since they will have completed an additional expertise curriculum.

(8) Location Plan

The DGSC Academy will be established in the Jakarta area.

(9) Facility and Equipment Plan

The facilities and equipment required for the DGSC Academy comprise the main buildings and associated facilities, and educational equipment and materials.

(i) Facility Plan

The facility plan is made to accommodate 200 cadets comprising:

a. Main hall, classroom, laboratories
b. Auditorium/gymnasium
c. Library
d. Dormitory, dining room, medical room
e. Pier
f. Swimming pool
g. Fire fighting facilities for vessels
h. Training facilities for disaster prevention
i. Boat house and garage
j. Others

(ii) Educational Equipment and Materials

The plan for educational equipment and materials is made in accordance with the stipulations of the STCW Convention, with reference to the standards established by the relevant maritime educational institutes in order countries and by taking the curriculum of the DGSC Academy into due consideration.

The proposed plan covers educational equipment and materials for the following subjects:

a) Basic subject course
    a. Physics and chemistry
    b. Foreign languages
    c. Health and physical education
b) Basic professional subject course
c) Professional Course
    a. Navigation course
    b. Engineering course
    c. Communications course
d) Training Course

Remarks are made that books of relevant subjects should be prepared.

(iii) Training ship

It is very meaningful for cadets, who are expected to play active roles after their graduation on the front line of maritime safety, to understand various phenomena on the ocean by familiarizing themselves with ship life through practices on-board a ship, which would provide the cadets with the best opportunity to foster not only their familiarization with the sea under severe natural conditions but also human unification, leadership and judgment.

The training ship (more than 1,000 tons) will have enough capacity to endure long-distance navigation overseas through which the cadets will be trained to develop international-minded sense and views.

(10) Administration and Management

(i) Organization

The administration and management of the DGSC Academy shall be in accordance with institutional autonomy under the umbrella of the DGSC. The organization of the DGSC Academy will be much the same in practice as in the Merchant Marine Academies, the U.S. Coast Guard Academy and the Maritime Safety Academy in Japan.

(ii) Number of Instructors and Administration Staff

A reasonable total number of instructors and administration staff will be about 80 persons as described below:

a) Number of Instructors

The curriculum of the DGSC Academy covers a wide area due to the special job characteristics of the graduates having multi-functional assignments as maritime law enforcers, administrators and seamen. In order to cover such a wide area, specialists will have to be made available in many individual fields.

The number of instructors for the DGSC Academy is proposed as follows:

a.	Basic subject course	10
b.	Basic professional subject course	7
c.	Professional course	18
d.	Training course	5
	Total	40 persons

Reference has been made to the approximate ratio of instructors and cadets as shown below to compare the Merchant Marine Academies in Indonesia with the Maritime Safety Academy in Japan.

Institute	No. of Instructors (A)	No. of Cadets (B)	Ratio (B)/(A)
Merchant Marine Academy	260	2,160	8
Maritime Safety Academy	60	300	5

b) Number of Administrators

It is estimated that a reasonable number of personnel required for the administration of the DGSC Academy would be about 40 persons, based on the ratio of instructors/administrators at existing institutes similar in Indonesia and abroad.

(iii) Training System for the Instructors

The instructors of the DGSC Academy will be divided into educational groups of general and professional subjects.

The development and improvement in quality of the instructors of the DGSC Academy will be of cardinal importance in parallel with the establishment of modern educational facilities.

It is recommended that in principle the education for instructors in the basic subjects and the professional subjects be provided according to the existing system of education for instructors in Indonesia, supplemented by the introduction of a new system in which the candidate instructors will be sent abroad for their further study and also specialists will be invited from foreign countries as guest instructors as well.

(11) Running Costs for the DGSC Academy

The running costs for the DGSC Academy may be estimated, on an approximate basis, with reference made to the existing maritime institutes.
As the annual running cost for merchant marine institutes (allocation of 1987 budget), the annual average of about Rp. 1 million per cadet is borne by Indonesia.
The cadets are required to pay about Rp. 600,000 individually per year and further costs such as on-board training are added. The annual total costs to accommodate 200 cadets amount to about Rp. 450 million.
The running cost per cadet is at the highest, Rp. 2.6 million per annum based on the data shown in the guidebook of the Merchant Marine College, Semarang, so that running costs for 200 cadets would be Rp. 520 million.
Accordingly, the annual running costs of the DGSC Academy are estimated to be in the range of Rp. 450 to 550 million for 200 cadets.

As previously proposed, the cadets will be accepted as government employees, and the necessary costs for their education and training, as described above, should be borne by Indonesia except those for meals and textbooks and so on.

9.3.2 Presently Required Education and Training System

For establishment of the maritime safety system in the year 2005, it is considered absolutely necessary to set up the DGSC Academy for training the maritime safety personnel, who have the knowledge and skill of carrying out the task as an administrator at the respective sections of the DGSC.

At present, however, since there is the acute shortage of expertise maritime safety officials together with incompletion of maritime safety facilities and relevant equipment and materials, the structure for maritime safety and search and rescue in Indonesia is observed to be insufficient for securing the safety of human life and property at sea.

The DGSC has steadily improved relevant facilities and equipment under REPELITA IV, and the administrative system is being strengthened to meet today's and future needs.

In order to establish the structure for maritime safety and search and rescue immediately, it is urgently necessary to train the maritime safety personnel, especially junior maritime safety officials who have the knowledge and skill of carrying out the tasks as an administrator engaging at the front line together with improvement of maritime safety facilities and relevant equipment and materials.

Taking these situations into full account, the DGSC should provide a training institution for the purpose of training recruits and retraining of the incumbent personnel to become officials, who carry out the task engaging at the front line, as soon as possible.

10 Maritime Safety and SAR Organizational System

Section 10 Maritime Safety and SAR Organizational System

10.1 Present Situation

10.1.1 Ministry of Communications

The Ministry of Communications has the responsibility for air, sea and land transportation, and the principal organizations are as follows:

a. The Minister
b. Secretariate General
c. Inspectorate General
d. Directorate General of Land Communication
e. Directorate General of Sea Communication
f. Directorate General of Air Communication
g. Research and Development Agency
h. Education and Training Agency
i. National Search and Rescue Agency
j. Meteorology and Geophysics Agency
k. Maritime Court Administration Agency

10.1.2 Directorate General of Sea Communication (DGSC)

The DGSC is the executing agency for maritime safety and SAR with the national coordination carried out by the National SAR Agency.

The DGSC consists of:
a. Secretariate of Directorate General
b. Directorate of Sea Traffic
c. Directorate of Ports and Dredging
d. Directorate of Marine Safety
e. Directorate of Maritime Services
f. Directorate of Navigation
g. Directorate of Sea and Coast Guard

Among the DGSC's responsibilities for maritime safety, the three Directorates of Sea and Coast Guard, Navigation and Marine Safety assume the prime mission responsibilities for maritime safety in the maritime sector.
The Directorate of Sea and Coast Guard covers the security and safety aspects at sea and in ports, and the functions are operationally carried out through KPLP operational units, and their task forces have prime responsibility for execution of maritime safety and SAR activities.

The Directorate of Navigation covers the main functions of planning and managing the aids to navigation and other navigational matters including communications for securing the navigational safety of ships in and around the country, and these functions are operationally carried out through the twenty-four Districts of Navigation.
The Directorate of Marine Safety covers the main functions of planning and controlling the safety aspects in the harbours as well as merchant ship safety, and these functions are operationally carried out mainly through Port Administrators.

As regards the regional and local establishments, KANWILs are responsible for regional administration, operation and coordination of the operational local units.

The Port Administrator offices are classified into two levels of organizational setup: ADPELs I Class are under the control of the Minister of Communications, and ADPELs II to V classes are under the Head of KANWILs.
The functions of KPLP and Harbour Master are integrated into one office and are under the control of the Port Administrator.

10.1.3 National SAR agency (BASARNAS)

The National SAR Agency (BASARNAS), the coordination execution body immediately under the Indonesian SAR Board (BASARI), is responsible for coordinating efforts and activities of searching and assisting rescue for

human and material goods suspected lost or encounter with danger through its local organizations of the Rescue Coordination Center (KKR) and the Rescue Coordination Sub-Center (SKR).

10.1.4 Regional SAR Coordination Forum (FKSD)

The Regional SAR Coordination Forum (FKSD) is a new organization which is in charge of the Province level coordination for SAR. If necessary, the chief of the FKSD, the Governor of the Region will execute the duties, rights and responsibilities for regional SAR coordination in directing FKSD policies by utilizing all SAR potentials available in close contact with KKR and SKR: the members comprise regional representatives of the Ministry of Communications, Ministry of Social Affairs and armed forces, and the Heads of respective KANWILs represent the Ministry of Communications for the coordination of maritime operations, the prime responsibility for which is assumed by the KPLP Maritime Safety Rescue ships.

10.1.5 Public Corporations

There are two public corporations: Public Port Corporation (Perumpel) and Public Dredging Corporation (Perumpen).

Perumpel and Perumpen are state-owned enterprises under the umbrella of the Minister of Communications. The main mission of Perumpel is to provide and manage the facilities and infrastructures of ports, to undertake security and order within the port working environment in the framework of supporting the smooth of flow of ships, goods, passengers and so on.

Perumpen carries out the main activities of dredging for maintenance and construction of sailing channels, harbour basins and so on.

10.2 Analysis

10.2.1 Internationalization in Maritime Safety and SAR in Indonesia

The establishment of an effective maritime safety and SAR hierarchy in Indonesia is of crucial importance for the maritime community in the world because of its important geographic and strategic position. The national maritime SAR system in Indonesia has currently been in conformity with the provisions of the 1979 SAR Convention, and the national system of BASARNAS has been established.

In order that the DGSC may fully and efficiently perform maritime search and rescue operations as prime task forces, overall development is urgently required for Maritime Safety Rescue ships, especially long coverage types and aircraft together with other relevant establishments, among others, a communication and information system and competent manpower.

The accidents which may be sufficiently handled by the DGSC itself should be left for their responsibility as maritime SAR task forces with the full and prompt report thereon made to BASARNAS for their monitoring.

10.2.2 Areas to be Improved

In carrying out the administrative responsibilities of the Directorate of KPLP for the execution of maritime safety and SAR, systematization in the following areas is considered insufficient and needs to be substantially improved:

a. Arrangement for collection and utilization of information on maritime safety and SAR
b. Monitoring the latest status of overall activities of Maritime Safety Rescue ships
c. Command, control, communication and information system link with KANWILs
d. Prevention of disasters including recovery of oil spills

e. Investigation into causes of accidents

f. Preparation for international SAR

The role and management of the Directorate of KPLP and the relevant local organizations are of cardinal importance for such tasks as maritime safety and SAR, and to ensure smooth and rapid flow of the information for maritime safety and SAR, it is advisable that systems for Command, Control, communication and Information in the future should be in one package management system.

KANWILs should assume the position of functioning between the Directorate of the DGSC and local operation units. KANWILs are the highest authorities in the field operation units within the DGSC hierarchy.
The functions of KANWILs are to play a regional role and carry out the management of maritime safety in their individual administrative areas by linking closely with the counterpart organizations of the DGSC.

At the same time, due examination of the existing organizational system related to maritime safety apparently shows that some elements, which make the relevant organizations unable to function effectively and rationally, may be seen in its system, e.g., inadequate authorization entrusted to sub-organizations having administrative authority within a harbour area, and duplication of duties with other sub-organizations, and so on.
It is expected that the existing organizational system and its classified duties will be re-arranged from the viewpoint of the worldwide tendency which features progress in work specialization in order to carry out its duties effectively and smoothly.
The following give some examples in Japan as a reference.

(i) As regards various kinds of safety certificates for ships, the organizations authorized to issue certificates are separated from those which provide control and supervise operational adequacy.

(ii) As such, the organizational system adopted may be easily understood by users and matched with its duties.

10.3 Long-term Plan

10.3.1 Overall Organization Plan for Maritime Safety and SAR and Newly Required Manpower

(1) Overall Organization Plan and Newly Required Manpower

Suggestions and advice are given in the overall plan for the organization of maritime safety and SAR, which is classified into eleven categories as shown in Table 10.3.1.

(2) Conceptual Overall Organization

Fig. 10.3.1 shows the overall organization which is conceptually charted based on the overall plan.
The chart is for reference purposes in relation to the existing organizations of the DGSC, KANWILs and the operation units.

Table 10.3.1 Overall Organization Plan for Maritime Safety and SAR and Newly Required Manpower

Categorized Items of Development Plan	Newly Required Manpower
(i) Establishment of Operations Office System 450p a. Directorate General of Sea Communication : 28 Operations Office to be established b. KANWIL: 17p × 9 = 153 Regional Operations Office to be established c. Operation Unit: 6p × 44 = 264 24 - hour watch group to be established d. Directorate of Sea and Coast Guard: 5 Sub - organization of Planning coordination to be established in Sub - Directorate Sea Patrol and SAR	a. Head, Deputy, 2p × Planning, 3p × Operation, 2p× Information adm, 3p × Information dissemination, 2p × Communications, 2p × PR 3p × Team Leaders, Watchmen 3p × 3 Teams (1p each for Communications) b. Head, Deputy, 2p × Operation, 1p × Information adm, 1p × Information disseminaition, 1p × Communications, 1p × PR 3p × Team Leaders, Watchmen 2p × 3 Teams (1p each for Communications) C. 3p × Team Leaders, Watchman 1p × 3 Teams d. Head, 2p × Planning, 2p × Communication & Control
(ii) Development of Rescue Ships and Ships Maintenance System 1,042p a. Development of Rescue ships (Reinforcement of KPLP Fleet): 49ships (6 × Class 1−A , 5× Class 1−B , 12× ClassII, 22× ClassIII, 4 × ClassIV) 961p×1.08= 1,038 b. Directorate of Sea and Coast Guard: 4 Reinforcement of ships repair and maintenance in manpower for reinforcement of KPLP Fleet	a. Class 1−A : 47p × 6 ships = 282p, Class 1−B : 35p × 5 ships = 175p, Class II : 16p ×12 ships (21− 9) = 192p, Class III : 13p ×22 ships (33−11) = 286p, Class IV : 11p × 4 ships (37−33) = 44p, Class V : 6p ×△3 ships (62−65) = △18p, b. 1p × Administration, 3p × Engineering
(iii) Establishment of Maritime Safety Air System 190p a. Directorate General of Sea communication : 64 DGSC Air Station to be established in KANWIL I, II, III, IV, VI, VIII Fixed wing : Jakarta, Ujung Pandang Helicopter : Medan, Tg. Uban, Jakarta, Surabaya, Ujung Pandang, Ambon b. Directorate of Sea and Coast Guard: 15 Sub-Directorate of Maritime Safety Air Craft to be established c. Development of Aircraft for Air Stations: 102p ×1.08= 111 16 aircraft (Fixed wing; 2×2 bases = 4, Helicopter; 2×6 bases = 12)	a. Large scale (2 × Fixed wing, 2 × Helicopters) 16p × 2 bases = 32p Head, Deputy, 3p×Administration, 2p×Communications, (Fixed wing6÷Helicopter3)p×Maintenance Small scale (2 × Helicopters) 8p × 4 bases = 32p Head, Deputy, 1p × Administration, 2p × Communications, 3p × Maintenance b. Head Sub-Head of Planning, 4p × Planning, 1p × Air Stations Sub-Head of Supply/Logistic, 3p × Supply/Logistic, 1pxCommunications Sub-Head of Air Crew, 1p × Crew Assignment, 1p × Crew Training c. Fixed wing crew: 7p × 3 team × 2 bases = 42p Helicopter crew: 5p × 2 team × 6 bases = 60p
(iv) Establishment of Marine Disaster Prevention System 60p a. Directorate of Sea and Coast Guard: 5 Sub-organization of Marine Disaster Prevention to be established in Sub-Dit of Sea Patrol & SAR b. KANWILS (I, II, III, IV, V, VI, VII): 4p × 7 = 8 Sub-organization of Marine Disaster Prevention to be established in Coast Guard & Sea Patrol Div. c. KPLP Units (Belawan, Tg. Priok, Surabaya, Ug. Pandang, Tg. Ubang, Palembang, Cilacap, Balikpapan, Bitung): 3p × 9 =27 Sub-organization of Marine Disaster Prevention Operation to be established	a. Head, 2p × Planning, 2p × Disaster Prevention b. Head, 1p × Administration, 2p × Disaster Prevention Service c. 3p × Marine Disaster Prevention Operation

(v) Establishment of Special Rescue System	130p	
a. KANWILs (II, III, IV, VI, VIII) : Special Rescue Station to be established	23p × 5 = 115	a. Head, Deputy, 1p × Administration, 4p × Team Leaders, 4 Members × 4 Teams
b. KANWILs (II, III, IV, VI, VIII) : Sub-organization of special rescue to be established in Coast Guard & Sea Patrol Div, Sea Patrol & SAR Operations Section	3p × 5 = 15	b. 2p × Administration, 1p × Supply Planning
(vi) Establishment of GMDSS	88p	a. Jakarta 8p (Head, 1p × Administration, 4p × Operation, 1p × Maintenance, 1p × Software) Ambon 7p (Head, 4p × Operation, 1p × Maintenance, 1p × Sofrware)
a. Directorate of Navigation: MCC to be established in Jakarta and LUT to be established in Jakarta & Ambon	15	b. Head, 3p × Planning, 3p × Facilitates, 3p × Administration, 2p × Maintenance × 3 shifts
b. Directorate of Navigation: Sub-organization of information facilities to be established in Sub-Dit of Electronics & Liners Comm.	16	c. d. SAR coastal radio stations located in KANWIL areas 2p × 9 = 18p Other SAR coastal radio stations [10 × TG. UBAN, 1 × SABANG; 3 × TARAKAN, 4 × TG. PANDANG; 1 × PONTIANAK, 3 × BIAK; 1 × SEMARANG, 1 × BENOA; 3 × CILACAP, 3 × KENDARI; 3 × TERNATE, 3 × DONGGALA, 3 × PANJANG] = 39p
c. KANWIL: Development of operation and maintenance system for communications facilities	57	
d. SAR coastal radio stations:		
(vii) Establishment of Harbour Traffic Control System	45p	
a. ADPELS (Belawan, Surabaya) : Harbour Traffic Control Center to be established	37	a. Belawan 16p (Head, Deputy, 12p × Operation, 2p × Maintenance) Surabaya 21p (Head, Deputy, 15p × Operation, 4p × Maintenance)
b. ADPEL (Tg. Priok): Harbour Traffic Surveillance Center to be established	8	b. Head, 6p × Operation, 1p × Maintenance
(viii) Establishment of Investigation System for Marine Accidents	8p	
a. Directorate of Marine Safety: Sub-organization of marine accidents investigation and statistic to be established in Sub-Dit of Harbour & Ship's Crew	8	a. Head, 5p × Statistics, 2p × Data control
(ix) Establishment of Maritime Safety Education System	114p	
a. DGSC (Jakarta) : Maritime Safety Academy to be established	81	a. Administration Personnel 41p (Principal, Deputy, 23p × Administration, 8p × Academy Affairs, 4p × Training, 2p × Library, 2p × Clinic), Instructors 40p
b. Development of Training Ship:	30p × 1.08 = 33	b. 30p × 1ship
(x) Development of Research and Eevelopment System for Maritime Safety facilities	7	a. 7p × Engineers : [1p × Maritime safety and SAR expert; 1p × Maritime communications and information; 1p × Maritime disaster prevention; 1p × Navigation aids; 1p × Traffic control; 2p × Software]
a. Reinforcement of Maritime Safety Technology Center:	7	
(xi) SAR Overseas Special Training		

Total 2,134p

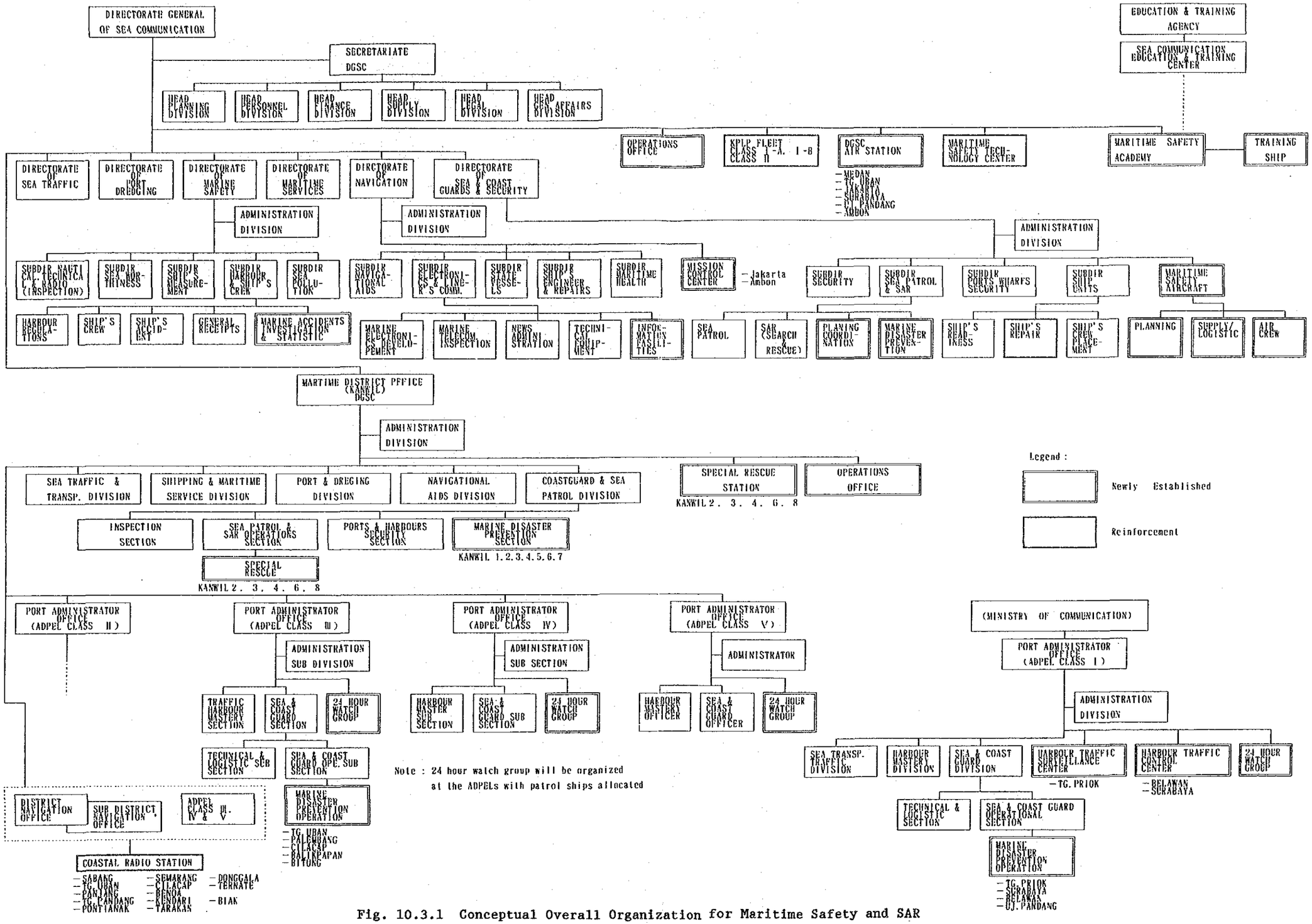

Fig. 10.3.1 Conceptual Overall Organization for Maritime Safety and SAR

10.3.2 Organization Plan

The overall organization plan is described hereunder on various levels.

(1) Directorate General of Sea Communication (DGSC)

The suggestions and advice on the establishment of sub-organizations are made specifically referring to the maritime safety-related three Directorates of Sea and Coast Guard, Navigation and Marine Safety as well as the KANWILs and local operation units.

(i) Sub-Organizations Proposed in the DGSC

Establishment of the Operations Office system will have as an important aim executing centralized functions of all organizations related to maritime safety services, i.e., the central and regional organizations, local operational units, ships, aircraft, etc., and also unifying the system utilization. In order to carry out smooth and effective operation of SAR services in Indonesia with its vast sea areas, it is important to collect and analyze information on SAR, and to achieve a timely flow of command control, instruction and reports to and from ships and aircraft.
The system proposed in the Plan is able to duly meet such requirements.
Routine long range patrols are extremely important for the prevention of marine accidents, and the Operations Office system is also able to play an important role in this field.
For this purpose, the establishment of Operations Office is proposed as shown in Table 10.3.2.

Table 10.3.2 Sub-Organizations Proposed in the DGSC

Level	Sub-Organization	Main Tasks and Responsibilities (as an example)
Sub Directorate Level	Operations Office	a. To be ready for controlling 24 hour operations of maritime safety and SAR b. To establish short to medium range plans for activities of the KPLP fleet, other sections' ships and aircraft c. To control the attachment of the KPLP fleet to on-shore bases d. To monitor the operations of the KPLP fleet, other sections' ships and aircraft e. To control the operations of DGSC air stations and special rescue stations f. To control and coordinate the inter-KANWIL operations office g. To administer information on maritime safety incl. ships h. To collect, store and disseminate maritime safety information i. To have direct access to MCC for operation readiness j. To execute activity coordination for field operations with BASARNAS and other relevant organizations

(ii) Sub-Organizations Proposed in Directorate of Sea and Coast Guard

a) The operational functions of this Directorate need to be improved and reinforced in terms of the fleet and aircraft development to be fully equipped with logistic support.
For this purpose, the establishment of sub-organizations is proposed as shown in Table 10.3.3.

b) Manpower will be reinforced in the Directorate of KPLP, the Sub-Directorate of Ship Units towards the development of long coverage rescue ships.

Table 10.3.3 Sub-Organizations Proposed in the Directorate of Sea and Coast Guard

Level	Sub-Organization	Main Tasks and Responsibilities (as an example)
Section Level	Planning Coordination	a. To perform national coordination for maritime safety and SAR with BASARNAS b. To perform national liaison for maritime safety and SAR with the maritime authorities concerned, namely navy, water police as well as other Directorates within the DGSC c. To perform international liaison for maritime safety and SAR with the relevant maritime organizations
Sub Directorate Level	Maritime Safety Aircraft	a. To establish short to medium terms plans for aircraft development and supporting facilities b. To plan for maintenance of aircraft c. To plan for crew training d. To establish technical guidelines for aircraft operations
Section Level	Marine Disaster Prevention	a. To investigate and plan for methods of marine disaster prevention b. To establish short to medium term plans for development of marine disaster prevention ships c. To establish general policy and planning for procurement of equipment and materials d. To coordinate the training and exercises

(iii) Sub-Organizations Proposed in the Directorate of Navigation

In order to meet the task requirements in electronics and communications/information technology deriving from the development of MCC and MES, the existing relevant organization needs to be reinforced, as proposed below:

Table 10.3.4 Sub-Organizations Proposed in the Directorate of Navigation

Level	Sub-Organization	Main Tasks and Responsibilities (as an example)
Section Level	Information Facilities	a. To plan for development and maintenance of the facilities b. To control information/communications facilities c. To plan for logistic support for the facilities

(iv) Sub-Organizations Proposed in Directorate of Marine Safety

The development of a Marine Accidents Investigation system necessitates the establishment of an organizational stream to link with the Headquarters organization for overall planning and technical support as proposed below.

Table 10.3.5 Sub-Organizations Proposed in the Directorate of Marine Safety

Level	Sub-Organization	Main Tasks and Responsibilities (as an example)
Section Level	Marine Accidents Investigation and Statistics	a. To investigate marine accidents b. To analyze and evaluate the accidents c. To issue statistics

(2) Field Unit of the DGSC

In order for the DGSC to exercise control and supervision of each Directorate and fulfill its duties with high efficiency, it is necessary to establish supporting systems under the responsibility of the DGSC for the service activities of each Directorate.
In other words, it is advisable that establishment of a Maritime Safety Academy and reinforcement of the KPLP Fleet and establishment of Air Stations and reinforcement of the Maritime Safety Technology Centre be proposed from the viewpoint of maritime safety.

These supporting organizations should be administrated and controlled by the relevant Directorates to be assigned in the same way as for the Operations Office system previously proposed in this report.

(i) Reinforcement of the KPLP Fleet

It is considered more practical from the viewpoints of both nation-wide objectives and operation/control to assign the KPLP Fleet with the functions of the national operation plan for the Fleet, central logistic and support, and fleet development plan.

The Maritime Safety Rescue ships to be under the responsibility of the KPLP Fleet are as follows:

Class I-A Maritime Safety Rescue ships : 6	Class II Maritime Safety Rescue ships : 21
Class I-B Maritime Safety Rescue ships : 5	

(ii) Development of a DGSC Air Station

Aircraft are an essential part of maritime safety because of their outstanding mobility and observational capabilities, and joint efforts by Maritime Safety Rescue ships and aircraft are absolute operational requirements for effective search and rescue.
Fixed wing aircraft are primarily suited for searching operations and communication contacts, while helicopters are dispatched for search and rescue activities.

The DGSC Air Stations will be based at 6 areas as described below:

KANWIL	Airplane base	Helicopter base
I	-	Medan
II	-	Batam
III	Jakarta	Jakarta
IV	-	Surabaya
VI	Ujung Pandang	Ujung Pandang
VIII	-	Ambon

(iii) Reinforcement of the Maritime Safety Technology Center (MSTEC)

The existing MSTEC will be reinforced in manpower especially as concerns technical experts towards the development of maritime safety including SAR, marine disaster prevention, navigation aids, traffic control, and maritime telecommunications and information.

(iv) Maritime Safety Academy

The Maritime Safety Academy DGSC will be established as an education and training institute for maritime safety personnel within the DGSC under the authority of the DGSC.
The composition of the internal organization of the Maritime Safety Academy is referred to in Section 9.

(3) Field Units of DGSC Directorates

The field units of DGSC Directorates will be on a Sub-Directorate level.

(i) Development of a Mission Control Center (MCC) under the Directorate of Navigation

An MCC will be established to function as the focal point to collect, maintain and process the data received from floating EPIRBs and to link with maritime SAR networks to perform the functions as summarized below:

- Receive incoming messages from LUTs
- Receive incoming messages from other MCCs
- Store the position data
- Sort and merge the location data to resolve ambiguity
- Generate and transmit outgoing messages
- Collect and maintain statistical information

The MCC will be established in Jakarta and Ambon with the former as its main center.

(4) Maritime District Office (KANWIL)

KANWILs are best situated for the regional coordination and control of all local operational units under their administrative umbrellas. Integration and coordination on the regional level are vitally required from the strategic activity point of view for emergency operations since marine accidents occur at random.
Accordingly, the activities and operations of the local operation units should be under the strict command and control of the relevant KANWILs.

The establishment of the Regional Operations Office in KANWILs is highly recommended to be under the direct responsibility of the Heads to be linked with the command and control line of the Operations Office of the DGSC.
Reinforcement in other relevant fields is also proposed.
The establishment of sub-organizations is proposed in the relevant KANWILs as shown in Table 10.3.6 to 10.3.7.

Table 10.3.6 Sub-Organizations Proposed in KANWIL

Level	Sub-Organization	Main Tasks and Responsibilities (as an example)
Division Level	Regional Operations Office	a. To be ready for controlling 24 hour operations of maritime safety and SAR b. To establish short to medium range plans for activities of Maritime Safety Rescue ships and other sections' ships within KANWIL c. To monitor the operations of Maritime Safety Rescue ships, other sections' ships and aircraft within KANWIL d. To control and coordinate the operations units e. To have direct access to the Operations Office, DGSC f. To administer information on regional maritime safety g. To collect, store and disseminate regional maritime safety information h. To administer information on regional ships movement i. To control the Marine Disaster Prevention Unit (KANWILs I, II, III, IV, V, VI, VII) j. To control the Special Rescue Station (KANWILs II, III, IV, VI, VIII) k. To evaluate and analyze the result of operation by Maritime Safety Rescue ships l. To execute activity coordination for field operations with KKR, SKR and other relevant local organizations

Table 10.3.7 Sub-Organizations Proposed in KANWIL

- Coast Guard and Sea Patrol Division -

Level	Sub-Organization	Main Tasks and Responsibilities (as an example)
Section Level	Marine Disaster Prevention (KANWILs I, II, III, IV, V, VI, VII)	a. To investigate and plan for the Method of Marine Disaster Prevention b. To establish plans for the operation of marine disaster prevention ships c. To establish standards for procurement of equipment and materials d. To establish guidelines for training and exercises

(cont'd)

Level	Sub-Organization	Main Tasks and Responsibilities (as an example)
Sub-Section Level	Special Rescue (KANWILs II, III, IV, VI, VIII)	a. To coordinate the operation plan b. To control activities c. To establish guidelines for operation

(5) Field Units of KANWILs

(i) Special Rescue Stations

Special Rescue Stations will be established in 5 areas, Tg.Uban, Jakarta (Tg.Priok), Surabaya (Tg.Perak), Ujung Pandang and Ambon, under the responsibility of the relevant KANWIL directly under the control of the Heads of KANWIL to carry out special missions as described in Section 5.

(6) Sub-Organizations Proposed in Operation Units

(i) The Harbour Traffic Control Centers will be established at the ADPEL units in Surabaya and Belawan to be under the operational control of the Port Administrator as proposed in Table 10.3.8.

The Harbour Traffic Surveillance Center will be established at the ADPEL unit in Tg.Priok to be under the operational control of the Port Administrator as proposed in Table 10.3.8.

(ii) A 24-hour Watch system will be established at the ADPEL units equipped with Maritime Safety Rescue ships as proposed in Table 10.3.8.

(iii) Marine Disaster Prevention Operation sections will be established in the relevant KPLP units as proposed in Table 10.3.9.

(iv) The manpower of relevant SAR coastal radio stations will be reinforced.

Table 10.3.8 Sub-Organizations Proposed in ADPEL Units

Level	Sub-Organization	Main Tasks and Responsibilities (as an example)
Division Level	Harbour Traffic Control Center (Surabaya & Belawan)	a. To execute 24-hour traffic surveillance b. To advise on the traffic situation c. To control traffic d. To provide meteorologial information
Division Level	Harbour Traffic Surveillance Center (Tg.Priok)	a. To execute 24-hour surveillance of traffic b. To advise on the traffic situation c. To provide a meteorological information
Group	24-hour Watch Team	a. To carry out 24-hour operations for maritime safety and SAR b. To control Maritime Safety Rescue ships c. To control marine disaster prevention ships (KANWILs I, II, III, IV, V, VI, VII) d. To maintain contact with the Regional Operations Office

Table 10.3.9 Sub-Organizations Proposed in KPLP Units

Level	Sub-Organization	Main Tasks and Responsibilities (as an example)
Sub-Section Level	Marine Disaster Prevention Operation(*)	a. To control the administration of the unit b. To plan for logistic support c. To carry out coordination with other bodies such as Pertamina

*: Belawan, Tg.Uban, Tg.Priok, Palembang, Surabaya, Cilacap, Balikpapan, Ujung Pandang, Bitung

10.3.3 Private Sector Participation in Maritime Safety and SAR

The establishment of a maritime safety and SAR system more or less in a complete form will be extremely costly and moreover beyond the practical reach of its accomplishment to cover all the waters in and around Indonesian.
A practical and reasonable approach to solve this unmanageable issue is to invite the private sector to participate in this field to serve in the interest of national development, namely, in this case, maritime safety.

It is advisable to establish a maritime safety-related body in Indonesia, on a quasi-governmental basis, which will carry out the supporting services, and to organize, as auxiliary task forces, a mutually cooperative system of the national maritime safety and SAR authorities and the private sector such as the Royal Life Institute in the UK, the Lifeboard Institute in Japan, etc.
The services to be provided will include the maritime safety campaign and guidance and dissemination of maritime safety leaflets, providing the volunteers with the rescue training, arranging doctors and nurses for first-aid, on-board rescue-ship dispatch for rescue operations, and so forth.
Operations of the private body will be based on volunteer participation from fishermen and people's shipping and such small ships as have nation-wide distribution.

10.3.4 Special Overseas Training for SAR

Maritime SAR involves an international nature in its execution and requires cooperative and coordinated operations in its activities. Special overseas training for SAR should be conducted for the key personnel of the DGSC and KANWILs who will be sent to SAR institutes in advanced maritime nations in order that they may update and advance their professional knowledge on an international level.
A plan is made that the special overseas training be provided to 20 personnel, 2 persons each selected from the DGSC and KANWILs, for one month.

11 Cost Estimate

Section 11 Cost Estimate

The cost estimate is made based on 1988's price quotations without consideration given to future cost escalation.

Table 11.1 gives the summary of cost estimation.

Table 11.1 Summary of the Cost Estimation for Long-term Plan

(Unit: Rp. million)

	Unit	Total Amount
1. Operations Office		13,918
a. Large Console		8,990
b. Medium console		2,115
c. Small Console		2,813
2. Maritime Safety Rescue Ships & Rescue System		472,211
a. Maritime Safety Ships		471,719
Class I-A	6	185,040
Class I-B	5	115,650
Class II	12	92,520
Class III	22	72,084
Class IV	4	6,425
b. Moorage Piers		492
Class I-A	3	322
Class I-B	2	170
3. Air Operations		214,803
a. Air Stations		32,846
Large Scale	2	19,900
Small Scale	4	12,946
b. Communications Facilities	6	11,623
c. Aircraft		170,334
Fixed Wing	4	77,849
Helicopters	12	92,485
4. Disaster Prevention Units	9	19,197
5. Special Rescue System		19,625

(cont'd)

(Unit: Rp. million)

		Unit	Total Amount
6.	Maritime SAR Communication and Information System		202,181
	a. SAR Telecommunication System		65,356
	LUT		9,072
	VHF DSC		8,661
	MF DSC/NBDP		24,441
	HF DSC/NBDP & INMARSES		10,460
	EPIRB	6,600	12,722
	b. SAR Information Network		101,232
	Trunk Line Networks		42,199
	Area Information Networks		30,917
	Aeronautical Communication Office		28,116
	c. Command Control Communication System		14,674
	MES		8,738
	MIS		1,002
	Area Communication Terminal		4,934
	d. Associated Installations		20,919
7.	Harbour Traffic Control		66,695
	a. Surabaya		37,021
	b. Belawan		19,512
	c. Jakarta		10,162
8.	Maritime Information Control System, NAVTEX		6,142
9.	SAR Overseas Training		1,284

(cont'd)

(Unit: Rp. million)

	Unit	Total Amount
10. Maritime Safety Training Center		45,700
a. Building		20,600
b. Facility		9,100
c. Materials		16,000
Total Investment		1,061,756

12 Development Plan

Section 12. Development Plan

12.1 Past Development Plans in the Transport Sector

The Transport and Tourism sector has achieved its development targets and played an important role in unifying the people and the nation.

In Pelita II, special emphasis was placed on rehabilitation of existing facilities, improvement of transport efficiency and establishment of transportation systems for the development of the transport sector. Sea transport was a good success in migration, pilgrimages and tourism.

The annual growth rate of the transport sector ought to have reached over 10% per year in order to accomplish 6.5% growth, the target rate of annual economic growth through Pelita III.

The development budget for Pelita III amounted to Rp. 21,849.4 billion which was, 2.4 times bigger than that for Pelita II, and was 6.3 times that for 1979/1980. The budget for sea transport occupied about 16% of the development budget for a transport and tourism sector. (Refer to Table 12.1.1)

Table 12.1.1 Allocations of Development Budgets for the Communications and Tourism Sector

(Rp. billion)

Communications/Tourism	1979/1980	Pelita III	
Roads	272.8	1,666.5	49.2%
Land Transport	58.4	338.8	10.0%
Sea Transport	113.6	524.4	15.5%
Air Transport	52.7	468.5	13.8%
Telecommunications	6.4	340.4	10.1%
Tourism	8.3	45.7	1.4%
Total	512.2	3,384.3	100.0%

Source: Pelita III

12.2 Existing Development Plans and Their Perspectives in the Future

12.2.1 Budgets for Sea Transport in Repelita IV

In the whole development budget for Repelita IV, the transport tourism sector occupies approximately 13%, out of which the sea transport sector accounts for 2.5% approximately. A ratio of the sea transport sector among the transport sectors is about 20% which increased slightly in comparison with the 16% of Pelita III.

Table 12.2.1 Breakdown of Development Budgets for Sea Transport Sector

(Unit: Rp. million)

	Sea Transport	1984/1985	%	Repelita IV	%
a.	Development of port facilities	107,046.0	39	925,161.5	47
b.	Dredging	10,167.0	4	184,769.0	9
c.	Development of maritime safety facilities	18,765.0	7	150,120.3	8
d.	Development of armada	136,202.3	49	687,569.3	35
e.	Maritime services	2,244.7	1	16,788.4	1
		274,425.0	100	1,964,408.5	100

Source: Repelita IV

The achievement rate of these funds for Repelita IV will be assumed by calculation as follows:

- Source of funds: the "Rolling Plan", May 1987, shows Rp. 0.651 trillion as the realized funds (Domestic: Rp. 0.205 & Foreign: Rp. 0.446) for four years (84/85-87/88). Provided that 1988/89 is the same as the annual average of 84/85-87/88, Repelita IV is to reach Rp. 0.814 compared to Rp. 1.964 for the whole sector, which is a ratio is 41.45%.
- Development expenditure budgets of Sea Transportation:

1984/85	1985/86	1986/87	1987/88	1988/89	Total
274.4	274.7	146.3	161.0	(161.0)	1,017.4

$$\text{Share in calculation: } \frac{(1.017 \times 100)}{1.964} = 51.78\%$$

12.2.2 Funds for Repelita V

The development program for Repelita V was prepared under the following conditions.

(1) The economic growth rate during Repelita V is not assumed to be higher than that of Repelita IV, 1.9-3.3% GDP per year and the share of the Sea Transport sector in the National Development budget is assumed to be 3.3%.

(2) Funds required for the development program of the Sea Transport sector during Repelita V amounts to Rp. 3 trillion, as tabulated in Table 12.2.2.

(3) The source of funds for the above is expected from:

(i) Domestic sources: Rp. 485 Billion (16%)
(ii) Foreign sources : Rp. 2,566 Billion (84%)

(4) Investment Required for Sea Transport for Repelita V (1989/90 - 1993/94) is listed in Table 12.2.2.

Table 12.2.2 Development Program for Repelita V

(Rp. billion)

	Development Program	Source of Funds			Percentage (%)
		Domestic	Foreign	Total	
1.	Sea transportation armada	45	1,649	1,694	56
2.	Port	196	293	489	16
3.	Maritime safety	244	500	745	24
4.	Training/Maritime Sector Training		92	92	3
5.	Research and Human Resources		32	32	1
	Total	485	2,566	3,052	100
	Percentage (%)	16	84	100	

Source: Policy Concept for the 5th Five-year Development Program, May 1987

(5) Programs with first priority are the completion of on-going projects, particularly those financed with foreign aid which have not been expanded by the end of Repelita IV. Government policy in constructing strategy for Repelita V with emphasis on priority is as follows.

(i) Continuation of on-going projects financed by domestic funds as well as foreign assistance to make them fully operational.

(ii) Operation, Maintenance and Rehabilitation in order to optimize the existing facilities.

(iii) Increasing of new capacity, after taking into consideration the above points (i) and (ii), with the priority: -

a) Concretely supporting non-oil and gas export on the condition that the feasibility study had been reviewed and the design/technical specifications had been available.

b) Emphasizing distribution on Eastern Indonesia.

(iv) Department of Communication/Transportation has put stress on the *Safety of Transportation Services.*

Emphasis is also put on programs oriented for promoting services, particularly seaworthiness, salvage and security, for better sea transportation services and programs oriented for cost recovery.

12.3 Development Plan towards the Year 2005

12.3.1 Conditions for Development Framework

(1) Socio-economic Framework

The annual GDP growth rate for the years until 2005 may be expected to fluctuate around 4%, and 4% should be applied for this study as defined in 2.3 "Socio Economic Framework towards 2005".

(2) Maritime Activities

(i) Annual growth rates of international shipping will be 4% both in cargo flow and fleet, and of domestic shipping will be 4.5% and 3.5% in cargo flow and fleet, respectively, towards 2005.

(ii) Annual growth rates of marine fishery will be 3% in production and 2.8% in number of fishery boats towards 2005.

(3) Marine Accidents

(i) Data of KANWIL IV: Basic data for estimation of an occurrence trend of accidents in correlation between the number of accidents and the traffic density.

(ii) Forecast of Accidents in 2005 (1.6 times those in 1986)

a) Collision will rank first with 33% of all accidents in 2005 as follows.

Collision	Stranding	Capsized	Fire	Flooding	Sunk	Engine Propeller Rudder Troubles	Drifting	Human Loss Injury	Unknown	Total
33	8	2	5	7	20	9	2	11	3	100%

b) Surabaya will be in the worst situation in number of accidents in 2005, followed by Belawan.

12.3.2 Summary of Development Plan

(1) Maritime Safety and Search and Rescue

(i) Establishment of Operations Office System in Dit. KPLP of the DGSC and KANWILs

(ii) Establishment of Maritime Safety Air Operation

a) DGSC Air Stations in KANWILs I/II/III/IV/VI/VIII require about Rp. 32.8 billion.

b) Communications facilities at Air Stations amount to Rp. 12 billion approx.

c) Aircraft cost Rp. 170.3 billion

- 2 Airplanes each for Jakarta and Ujung Pandang
- 2 Helicopters each for KANWILs I/II/III/IV/VI/VIII

(iii) Maritime Safety Rescue Ships

Total number required in 2005 is 164 ships while 123 ships exist.

49 ships to be overhauled and/or replaced with will be needed towards 2005.

a)	Class I-A	6 ships with heliport	Rp. 185.0 billion
b)	Class I-B	5 ships	Rp. 115.7 billion
c)	Class II	12 ships	Rp. 92.5 billion
d)	Class III	22 ships	Rp. 72.1 billion
e)	Class IV	4 ships	Rp. 6.4 billion

(iv) Exclusive Use of Moorage-piers for Maritime Safety Rescue Ships

a)	For Class I-A	3 places	Rp. 0.3 billion
b)	For Class I-B	5 places	Rp. 0.2 billion

(v) Special Rescue System Requires Rp. 19.6 billion

a) Special Rescue Stations in KANWILs II, III, IV, VI & VIII
b) Communications facilities for the stations
c) Special Rescue Equipment and Materials

(2) Prevention of Marine Disaster

(i) Forecast of Tanker Accidents in 2005: 23 ships

(ii) Hypothetical Scale of an Accident: Outflow of oil is 1,696 m^3 with fire area of 166 m^2

(iii) Necessary Unit Facilities and Materials:

a) Fire fighting ship 1 unit

a.	Foam concentrate	:	2 k lit.
b.	Chemical dispersant	:	70 k lit.
c.	Dry chemical powder	:	2 tons
d.	Fire-fighting devices:		30 sets
e.	Safety devices for dangerous chemicals	:	3 sets
f.	Gas indicator	:	2 sets
g.	Oil boom	:	1,800 m
h.	Oil skimmer	:	100 k lit./hr x 1 set 30 k lit./hr x 1 set
i.	Handy oil recovery devices:		10 sets

b) Personnel on land 3 persons

(iv) On-shore Bases: 9 bases (Jakarta/Surabaya/Belawan/Tg.Uban/Balikpapan/Palembang/Cilacap/Ujung Pandang/Bitung)

(v) Necessary Facilities and Their Costs

a) Equipment and Materials for Anti-Pollution/
Fire-fighting -------- Rp. 19.2 billion

b) Maritime Safety Rescue Ships for Maritime Disaster Prevention

(3) Maritime Safety and SAR Communications and Information System

a) Introduction of Maritime SAR Telecommunication amounts to Rp. 65.3 billion approx.

a. Two LUTs in Jakarta and Ambon
b. VHF DSC for Gateway ports
c. MF DSC/NBDP for 12 Areas
d. HF DSC/NBDP in Jakarta
e. EPIRB

(ii) SAR Information Networks Amount to Rp. 101.2 billion

a) Trunk Line Networks among the DGSC/KANWILs
b) Area Information Networks in connection with the other units concerned
c) Aeronautical Communication and Office

(iii) Command/Control Communications System amounts to Rp. 14.7 billion.

a) MES
b) MIS
c) Area Communication Terminals

(iv) Other Relevant Facilities Cost Rp. 21 billion

(v) Establishment of NAVTEX Costs Rp. 6.1 billion

(4) Harbour Traffic Control System

(i) Selection of Ports towards 2005

Surabaya (Tanjung Perak), Belawan and Jakarta (Tanjung Priok) ranked high in the priority after selection of ports was made by comparison and analysis of the respective port conditions with two kinds of index figures:

a) 16, 5, 4 and 2 for Surabaya, Belawan, Palembang and Jakarta, respectively. (Table 8.2.1)

b) 9.87, 4.22, 0.29 and 0.60 for Surabaya, Belawan, Palembang and Jakarta, respectively. (Table 8.2.2)

(ii) Three Ports to be arranged in the Long Term Plan

A Control Center, Radar Station and Signal Station are planned for three ports in priority according to the respective needs clarified in this Study. The investment costs are Rp. 37 billion, Rp. 19.5 billion and Rp. 10.2 billion for Surabaya, Belawan and Jakarta, respectively.

(5) Education and Training System

(i) Establishment of a Maritime Safety Training Center (MSTC)

The MSTC will train the maritime safety and SAR personnel, who carry out tasks as administrators engaging at the front line, with the fundamental knowledge and skills required for maritime safety experts.

(ii) Summary of MSTC

- Trainee : 50 persons per year
- Period : 6 months, 1 year or 4 years according to courses
- Main courses: A ... For main personnel in DGSC
  B ... For Experts
- Running Cost: Rp. 450 to Rp. 520 million per year for 200 trainees
- Investment : Rp. 45.7 billion for Building/Facilities/Equipment

(iii) SAR Special Overseas Training

The cost is estimated to be Rp. 1.3 billion approx.

(6) Organizational System

(i) BASARNAS plays a role in coordinating SAR.

(ii) Some additional functions in the present organization framework on the Sub-Directorate, Division and Section levels at the DGSC and the KANWILs are to be prepared for the DGSC as a result of the discussions between the DGSC and the JICA Study Team.

(iii) Establishment of operations offices in DGSC and KANWILs requires approximately Rp. 14 billion in total.

12.3.3 Development Policies and Strategies

(1) Policies

The Long-term Plan is aimed at gradually enhancing and improving, through realistic and step-by-step approaches, the overall performance of the maritime safety system.

The policies for this aim are:

(i) Establishment of the Maritime Safety System in Accordance with Development Stages of the National Economy.

The role of the maritime safety system is to support the sea transportation that promotes smooth cargo flow and migration in addition to sustaining maritime industries. The maritime safety system should be implemented hand-in-hand with, and cannot be separated from, the national economic development.

(ii) Establishment of a Maritime Safety System that Enables Autonomous Development

The orientation of the development should be towards establishing an autonomous system in which qualified and well-trained professional members of maritime safety can, by themselves, review, adjust, and improve the whole system periodically. As a result, the system will continually be improved.

(iii) Establishment of a "Compact and Efficient" System

Although the maritime safety system will be compact in scale, facilities and personnel are to be fully utilized and coordinated with each other through a well-mannered operative management system, which generates efficiency throughout the system.

(2) Strategies

The general strategies to achieve the required performance of Maritime Safety by the year 2005 would evolve in the following three stages.

Stage 1. Solution of Urgent Problems (Repelita V)

- To establish a minimal management system of maritime safety including structures and equipment urgently required, and
- To start training, research and development functions, which take a long time to accomplish.

Stage 2. Preparation for Expansion (Repelita VI)

- To apply improvement measures to pilot plans,
- To enhance and improve the maritime safety system through step-by-step approaches, and
- To expand improvement applications to wider areas.

Stage 3. Stabilization of Expansion (Repelita VII)

- To deploy trained professionals who have finished their training started in Stage 1 (one),
- To employ an assessment system so that the overall maritime safety measures can be reviewed periodically by utilizing research and development results,
- To adjust and apply improvement measures of maritime safety based on the assessment, and
- Eventually, to establish an autonomous improvement system, which consists of the above-mentioned assessment, adjustment, and application procedures, by trained maritime safety professionals themselves.

Table 12.3.1 Development Strategies

	Organization	Facility	Training	Research
Stage 1 (Repelita V)	- Establishment of minimal management system	- Efficient utilization of present facility	- Re-training of present personnel - Start of new training programs	- Start of new research
Stage 2 (Repelita VI)	- Establishment of foundation of the whole management system	- Implementation and efficient utilization of new facilities	- Continuation and expansion of training	- Expansion of research areas
Stage 3 (Repelita VII)	- Enhancement and expansion of organizational structures - Review and adjustment	- Improvement of facilities - Review and adjustment	- Assignment of trained professionals - Further training efforts	- Application of research results - Further research

12.3.4 Available Funds for Development Expenditure

(1) Real GDP for the ensuing years towards the year 2005 is computed with the annual growth rate of 4% used as a base as aforementioned. In this calculation, the following are obtained as the GDP figures for the years, 1989 and 1993, the commencing and final years of Repelita V, respectively; 1994, the starting year of Repelita VI; and 2005, the year towards which this Study is made.

(Unit: Rp. billion)

Year	GDP	Remarks
1986	96,489.3	Nominal
1987	110,171.5	Nominal in assumption
1989	119,161.5	Real in assumption
1993	139,402.1	Real in assumption
1994	144,978.2	Real in assumption
2005	223,187.2	Real in assumption

(2) Sea Transport in National Development Budget(s)

(i) Share of Development Expenditure in GDP:

The annual average share of GDP for the six years 1981 - 1986 is 12.0%. (actual: 11.5%)

(ii) Share of Communication & Tourism Sector in the Development Expenditures:

The annual average share of this sector's budget for the seven years 1981 - 1987 is 14%. (actual: 13.6%)

(iii) Share of Sea Transport Sector in Communication & Tourism for 1981 - 1987:

With the same figures as used above, the annual average share of this sector in the budget for the same period can be calculated to be 18%. (actual: 17.4%)

(iv) Amount of Development Budget(s) for Sea Transport Sector:

The amounts are shown below.

Table 12.3.2 Development Budget for Sea Transport Sector towards 2005

	GDP (Rp. billion)	Share of Development Expenditure (%)	Share of Communication Sector (%)	Share of Sea Transport (%)	Amount of Sea Transport (Rp. billion)
1986	96,489.3	8.6	12.8	13.8	146.3
1987	110,171.5	-	16.6	12.5	161.0
1989	119,161.5	12.0	14.0	18.0	360.3
1993	139,402.1	12.0	14.0	18.0	421.6
1994	144,978.2	12.0	14.0	18.0	438.4
2005	223,187.2	12.0	14.0	18.0	674.9

Source: Statistik Indonesia 1984, 1985, 1986, 1987

The figures listed above are computed with both a 4% annual growth rate of GDP (Gross Domestic Product) and the data which were obtained from the newest edition of Statistik Indonesia 1987.

(v) Total Amount of Development Budget(s) for Sea Transport

(Rp. billion)

a) 1989 - 1993 Repelita V ---------- Rp. 1,954.7

b) 1994 - 2005 12 years ---------- Rp. 6,680.0

Total 17 years ---------- Rp. 8,634.7

(3) Available Amount of Development Plan(s) towards 2005

(i) Share of the estimated development budget for Sea Transport (Communication).

The contents of the respective items of Repelita V on Table 12.3.3/2 are studied to pick out only the items related to this Study so as to reach the figures and their shares (%) in the framework of this investment.

Table 12.3.3 Source of Funds for Items in this Study

(Rp. billion)

Development Program	Source of Fund			Percentage (%)
	Domestic	Foreign	Total	
Maritime safety				
- Seaworthiness and harbour control	12	4.5	16.5	4.5
- Navigation	20	103	123	36
- Security, law and order, implementation of marine law and SAR aids	51	59	110	31
- Maritime services/underwater works	7	-	7	2
- Sea contamination control	-	2	2	0.5
Education & Training/Maritime Sector Training	-	92	92	26
Total	90	260.5	350.5	100
Percentage (%)	26	74	100	

Source: Selection from Rolling Plan

The above total, Rp. 350.5 billion occupies 11.48% of the original total amount, Rp. 3,052 billion (Ref: Table 12.2.2), required in Repelita V for the Sea Communication sector.

The share (11.5%) is not always fixed for all the future calculations of investment amounts required for this Study but is regarded as a key figure in presuming the future size of development budgets and/or investment amounts for development.

(ii) Available Amount for Development Plans towards 2005

Based on the above-mentioned presumption, the amount is Rp. 993 billion approx. (Rp. 8,634.7 billion x 0.115 = Rp. 992.99 billion).

12.4 Colligation

12.4.1 The Accumulated Amount and the Budget/Fund

(1) Comparison: Both the amount and the comparison between the two read as follows:

(i)	Amount accumulated	:	Rp. 1,061,800 million (Refer to Table 13.3.2)
(ii)	Budget/funds	:	Rp. 993,000 million
(iii)	Balance	:	Rp. 68,800 million

(2) Factors Subjects to Change: The available amount of Rp. 993 billion is based on the presumption that 11.5% of the total development budget is duly appropriated to this Study. This figure is affected by the following factors:

(i) Growth rate of GDP
(ii) Obtained amount of foreign funds and exchange rate
(iii) National policy towards allocation of funds
(iv) Attitude on maritime safety within the sea transport sector
(v) As for Repelita V, the necessary budget for on-going projects concerning maritime safety influences the schedule for application of this Study.

(3) Budget on Implementation Level: The calculation of development budget in this Study is based on the annual budgets, which means that it is close to the realized budget, while the achievment rate of Repelita IV is assumed to reach only 42 - 52% (see 12.2.1). Therefore, for example, the amount estimated for the short term plan in the whole sea transport sector, that is, Rp. 2 trillion which has been figured is much more realistic than the Rp. 3 trillion of Repelita V mentioned in the Rolling Plan for Repelita IV and the Policy Concept for Repelita V, May 1987.

(4) Priority in Relation with on-going Projects: The development budget figured includes on-going and committed projects, and requires adjustment with that of these projects already planned for implementation. It is, therefore, assumed that these projects will be accomplished with first priority and then the projects in the Study will be carried out.

12.4.2 Conclusion

This development plan is established from a long-term view-point in consideration of the current situations on maritime safety and based on recognizing the "Nusantara Outlook" and the importance of life and property at sea. Since the share of budgets/funds for maritime safety has been observed to be small when compared with those for other fields in the sea transport sector, an arrangement of the maritime safety systems/organizations is regarded as insufficiency. Thus, this fact brings about loss of valuable life and property at sea.

In this development plan, emphasis is placed on training the personnel and replenishing maritime safety rescue ships for the rescue of maritime distress. Therefore, particularly this replenishment has pushed up an amount of the accumulated investment funds proposed from the respective sectors in this Study. By this, a balance for the amount of Rp. 69 billion comes out between the budgetary amount for Rp. 993 billion which has been calculated from the data of the development budgets/funds in the past to date and the accumulated amount, Rp. 1,062 billion.

As this Study has been carried out from such a very essential point of view as setting the highest value on a human life, it is recommended that the necessary budgets/funds shall be raised by effort, since the amount from the data in the past would be fundamental, though, but should not be adhered only to, and shall be deemed as an advance investment and then all the projects planned in this Study would better be implemented towards 2005.

13 Selection of Priority Projects

13. 1 Criteria for Scheduling Project

13. 2 Economic Effect

Section 13 Selection of Priority Projects

13.1 Projects

13.1.1 Projects Formulation Procedure

The Master Plan comprises the following three types of projects:

a. Facilities
b. Organizational system, and
c. Manpower development (education and training)

Projects can be classified into two types; one concerns facility construction (hardware) and the other relates to facility usage and administrative method (Software), and both have a complementary relationship with each other. If either of these is absent, effective functions could not be expected. Combination of hardware and software aspects should be fully considered when projects are packaged. Fig. 13.1.1 shows the project formulation procedure.

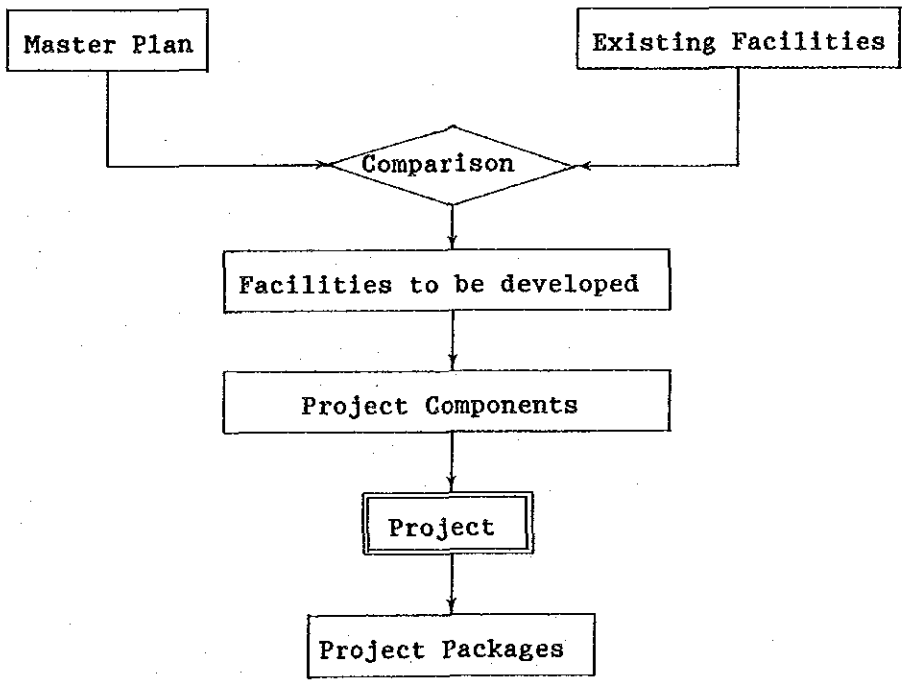

Fig. 13.1.1 Project Formulation Procedure

Facilities investment plan necessary for a Master Plan as shown in the foregoing Section will be implemented by the year 2005. Facilities are segmented in a way not to disturb their functional efficiency in each sector of the Long-term Plan. However, the segmented facilities must be consolidated in a way to fulfill their efficiency.

Several project components are combined, as necessary, to formulate a project. The consolidation of these project component is made:

(i) when the investment scale is too small to handle as one project,
(ii) when an individual project does not fully function, but it has an effect when integrated with other project components.

The project thus formulated is an investment unit for preparing the investment plan.

13.1.2 Formulation of Major Projects

Maritime safety activities are broadly divided into assurance of maritime safety and securing of public order. Such activities are sub-divided into marine accidents-preventing activities, data collection on marine accidents and rescue activities for marine accidents and disaster. This study focuses on search and rescue activities.

A conceptual flow of maritime safety activities mainly focussing SAR activities is shown in Fig. 13.1.2. Rescue system for the occurred accidents is divided according to places --- ports or outside of ports, high or low accident frequency areas. Rescue system classified by place is further divided into information collection and SAR activities. The purpose of the short-term plan is to establish the always ready system in the sea area of high frequency, and to secure minimumly required number of fleet.

For this purpose, personnel should be trained. Personnel abilities should be cultivated on a medium- and long-term basis, rather than a short-term basis. Phasing of rescue system project is necessary according to places. Rescue system include the following facilities:

- Maritime safety rescue ships and mooring piers
- Air crafts
- Special rescue
- Equipment and materials for disaster prevention
- Operation office
- Communications facilities
- Communications within organizations (MES)

As can be seen from Fig. 13.1.2, above these facilities are complicatedly linked together in the flow from the occurrence of marine accidents to SAR activities, it is difficult to individually divide these facilities. Especially, communications related to information collection, operations office and MES, and ships are consisted of total SAR operation system. If one is missing from them, they do not function effectively. Therefore, it is impossible to individually separate these facilities in terms of generating effect.

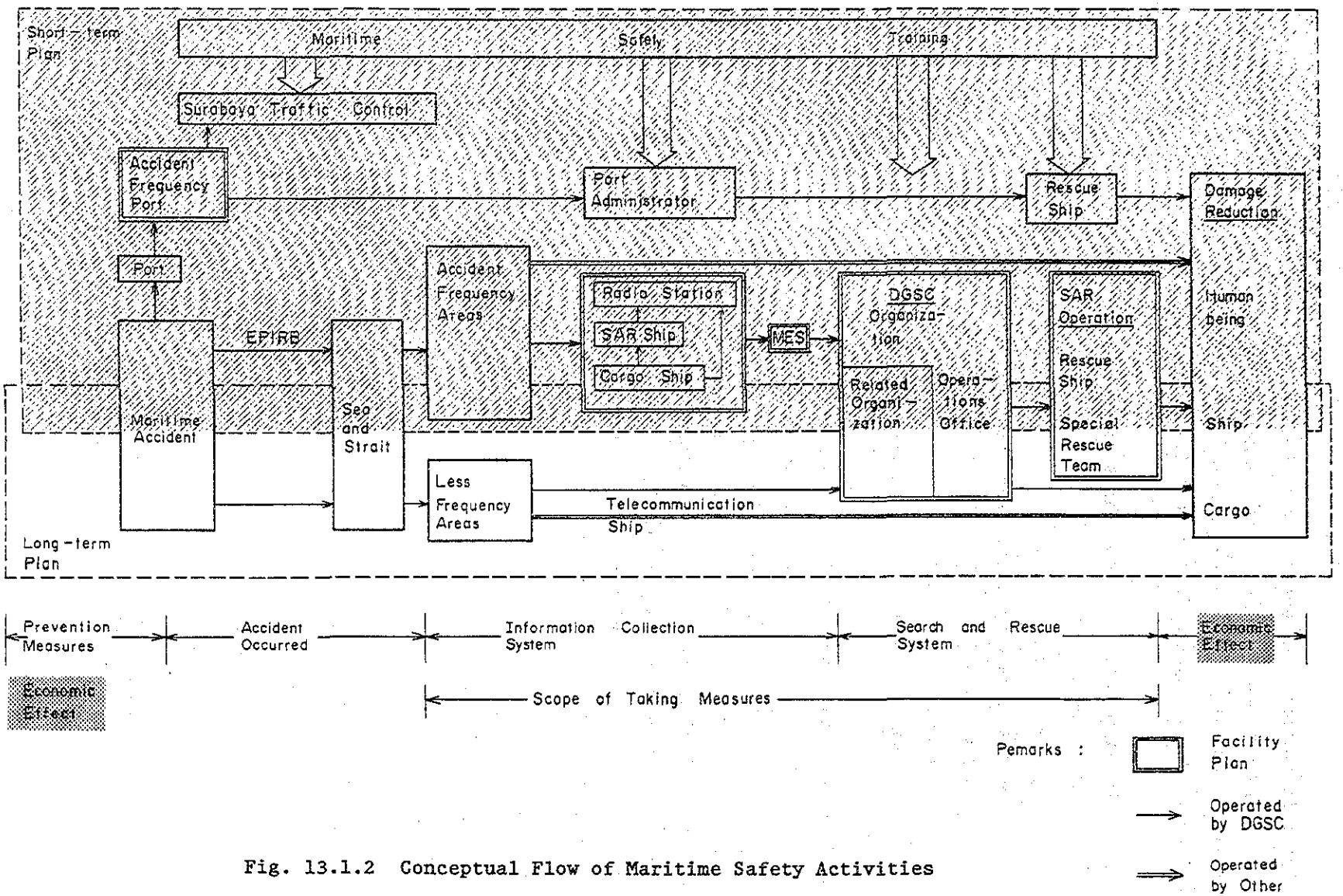

Fig. 13.1.2 Conceptual Flow of Maritime Safety Activities

13.2 Scheduling Projects

A schedule is formulated in this plan based on the following conditions.

-Coordination with related/planned projects:
Projects that have a mutual relationship in terms of functional aspects or are necessary to coordinate with already planned project(s)

- Needs: Frequency and damage scales involved in marine accidents

13.2.1 Coordination with Related/Planned Projects

Where a project has complementary and/or supporting relationship(s) to other project(s), any good effects could be anticipated only by implementation of these project(s) as a group. Thus, they should be consolidated in a group which is called a project package.

A group of projects, which have a mutual strong relationship in functional efficiency, is consolidated to comprise a project package. This purpose is to facilitate preparation of scheduling for implementation and evaluation of the project.

In other words, it is difficult to simultaneously handle numerous projects and to locate (assign) them on a time axis (timing for implementing the project) by the year 2005, with consideration given to priority and fund allocation for each year, because many projects are included in the Long-term plan. Methodologically, there are small-scale and improper projects when they are evaluated individually. Therefore, the projects that are the nucleus of the Long-term Plan are selected.

At the same time, selected projects are packaged into several groups, for the preparation of project list, which are made, considering core and related project to be implemented at the same time.

13.2.2 Needs (Analysis of Marine Accidents)

DGSC Log Book data indicate that the number of marine accidents throughout the waters of Indonesia amounts to 1781 for the five years from 1982 to 1986, and an analysis is made for damages of 988 which has so far been recorded.

Table 13.2.1 shows the number of accidents by category, ship size and kind of damages. Damages are divided into five categories; 1, ship, 2, human beings, 3, cargo, 4, port facilities, and 5, others. These numbers of accidents by category are overlapped with those of other categories. The number of to human beings involved is 668 (134 persons/year), cargo tonnage damaged amounts to approximately 45,000 (9000 ton/year).

As shown in Table 13.2.1, the total number of human accidents is 0.68, 45 ton per accident. The number of humans per human accident and cargo per cargo accident are four persons and 102 tons respectively.

Occurrence places of accidents are divided into port, strait and sea. The damage record by category and place is shown in Table 13.2.2.

According to these records, accidents in ports account for 21%, while damages to persons involved in accidents in ports are 4%; 15 persons, the percentage of cargo volume is 17%; 6423 tons. Accidents in straits account for 21%, the percentage of total persons involved in accidents in straits is 25%. Damage percentage in straits is 31% (in tons). Damage percentage to humans at sea is 71%. Damage percentage (in cargo tonnage) at sea is 52%.
As for accident category, sinking and collision damages in ports are 34% and 24%, respectively, which are the highest percentages. Sinking damages in straits and at sea account for more than the majority.

Table 13.2.1 Summary of Damage Record (1982-86)

Accident Category	No. of Accidents	Ship Size (m^3)	No. of Human	Total Ton	Human Accident	Ton/ Accident
Sunk	492	2,210	194	26,329	0.39	54
Flooding	52	688	37	2,214	0.71	43
Stranding	57	841	50	2,846	0.88	50
Trouble	17	381	16	468	0.94	28
Capsized	32	722	142	1,213	4.44	38
Collision	128	3,822	64	1,071	0.50	8
Drifting	20	1,647	11	5,030	0.55	251
Fire	54	1,294	41	2,135	0.76	40
Human Loss	99	3,631	85	1,036	0.86	10
Others	37	2,619	28	2,555	0.76	69
Grand Total	988	1,776	668	44,898	0.68	45

Source: DGSC Log Book

Table 13.2.2 Summary of Damage Record by Category and Place (1982-86)

	Total Port			Total Strait			Total Sea			Grand Total		
	No.	Human	Ton	No.	Human	Ton	No.	Human	Ton	No.	Human	Ton
Sunk	55	1	5,337	193	25	3,729	247	118	13,448	395	144	22,515
Flooding	7	0	285	7	4	860	28	33	703	42	37	1,849
Stranding	11	0	288	4	0	135	24	1	1,296	39	1	1,719
Trouble	0	0	0	4	1	68	9	5	320	13	6	388
Capsized	4	0	46	6	12	92	11	70	215	21	82	353
Collisien	39	2	100	14	0	643	49	9	155	102	11	898
Drifting	1	0	0	5	3	4,681	9	7	324	15	10	5,005
Fire	20	6	359	8	9	677	16	21	494	44	36	1,530
Human	24	6	4	14	48	2	36	12	606	74	66	612
Others	3	0	3	8	1	450	15	17	1,831	26	18	2,284
	0	0	0	0	0	0	0	0	0	0	0	0
Total	164	15	6,423	163	103	11,337	444	293	19,390	771	411	37,151

Source: DGSC Log Book

13.3 Results of Scheduling

Projects that are to be implemented for 17 years from 1989 to 2005 are summarized in Table 13.3.1. Investment schedule for the Long-term Plan is presented in Table 13.3.2.

According to coordination with related and planned projects, projects concerning SAR forces is given to priority in the Fifth Five-year Development Plan. Accident analysis reveals that a minimum scale to cover sea area where marine accidents occur high frequently is given top priority. However, personnel abilities supporting this rescue system should have already been trained and effective use of this system should be set forth as a premise.

Phase II focuses on the improvement of maritime information system and aircrafts to cover the entire sea areas of Indonesia.

Table 13.3.1 Project List

Projects	Description	Duration
Education and training project	Construction of training center and SAR overseas training	Repelita V (1989-1992)
Maritime safety rescue system		
Phase I	Various facilities centering around a minimum of SAR system to cover high frequency area	Repelita V (1989-1993)
Phase II	Various facilities focusing on air system and communication facilities to cover the entire sea areas of Indonesia	Repelita VI (1994-1998)
Phase III	Reinforcement of facilities to cope with the increasing number and diversifying situation of marine accidents and strengthening of information collection function	Repelita VII & VIII (1999-2005)
Harbour traffic control project	Introduction of harbour traffic system in major ports of Surabaya, Belawan and Jakarta during each Repelitas	1989 - 1900 1995 - 1996 1999 - 2000

Table 13.3.2 Investment Schedule for Master Plan

(Unit:Rp. Million)

	Investment Cost	REPELITA V					REPELITA VI					REPELITA VII					REPELITA VIII	
		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Operations Office	13,918																	
a. Large Console	8,990			4,495	4,495													
b. Medium Console	2,115			1,058	1,057													
c. Small Console	2,813			1,407	1,406													
Maritime Safety Rescue	472,211																	
Ships & Rescue System																		
a. Maritime Safety	471,719																	
Ships																		
:Class I-A	185,040			30,840	30,840	30,840										30,840	30,840	30,840
:Class I-B	115,650	23,130	23,130											23,130	23,130			23,130
:Class II	92,520				7,710	7,710	7,710	7,710	7,710	7,710	7,710	7,710	7,710	7,710	7,710	7,710		
:Class III	72,084						6,553	6,553	6,553	6,553	6,553	6,553	6,553	6,553	6,553		6,553	6,554
:Class IV	6,425						1,606		3,213	1,606								
b. Moorage Piers	492																	
:Class I-A	322			108	107	107												
:Class I-B	170	85	85															
Air Operations	214,803																	
a. Air Stations	32,846																	
:Large Scale	19,900												9,950	9,950				
:Small Scale	12,946						3,237	3,237	3,236	3,236								
b. Communications																		
Facilities	11,623						1,937	1,937	1,937	1,937		3,875						
c. Air Craft	170,334																	
:Fixed Wing	77,849														19,462	19,462	19,462	19,463
:Helicopters	92,485						7,707	7,707	7,707	7,707	7,707	7,707				15,414	15,414	15,415
Dissester Prevention																		
Units	19,197			10,665							8,532							
Special Rescue System	19,625		3,924	3,924			3,926	3,926	3,925									
Maritime SAR Communication	202,181																	
and Information System																		
a. SAR Telecommunication	65,356																	
System																		
:LUT	9,072											4,536	4,536					
:VHF DSC	8,661						4,331	4,330										
:MF DSC/NBDP	24,441								6,110	6,110	6,110	6,111						
:HF DSC/NBDP & INMARSES	10,460												5,230	5,230				
:EPIRB	12,722			3,855	3,855	5,012												
b. SAR Information Network	101,232																	
:Trunk Line Networks	42,199											14,066	14,066	14,067				
:Area Information	30,917									15,459	15,458							
:Aeronautical Communi-																		
cation and Office	28,116						9,372	9,372					9,372					
c. Command Control	14,674																	
Communication System																		
:MES	8,738			2,913	2,912	2,913												
:MIS	1,002						501	501										
:Area Communication	4,934								2,467	2,467								
Terminal																		
d. Associated	20,919						2,510	2,510	2,510		4,393	4,393	4,603					
Installations																		
Harbour Traffic Control	66,695																	
Center																		
a. Surabaya	37,021	18,511	18,510															
b. Belawan	19,512							9,756	9,756									
c. Jakarta	10,162														10,162			
Maritime Information																		
Control System, NAVTEX	6,142											3,071	3,071					
SAR Overseas Training	1,284	1,284																
Maritime Safety	45,700																	
Training Center																		
a. Building	20,600	10,300	10,300															
b. Facility	9,100		4,550	4,550														
c. Materials	16,000		8,000	8,000														
Total Investment	1,061,756	53,310	68,499	71,815	52,382	46,582	49,390	57,539	55,124	52,785	56,463	58,022	65,091	66,640	67,017	73,426	72,269	95,402
		REPELITA V Total = 292,588					REPELITA VI Total = 271,301					REPELITA VII Total = 330,196					REPELITA VIII = 167,671	

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