1991

The implementation of VTS in Bangkok

Sukhin Ratanasathien
World Maritime University

WORLD MARITIME UNIVERSITY
Malmö, Sweden

THE IMPLEMENTATION OF VTS IN BANGKOK

by

Sukhin Ratanasathien

Thailand

A dissertation submitted to the World Maritime University in partial fulfilment of the requirements for the award of the

Degree of Master of Science

in

Maritime Education and Training (Nautical)

Year of Graduation

1991

I certify that all material in this dissertation which is not my own work has been identified and that no material is included for which a degree has been previously conferred upon me.

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

(Signature) S. Ratore

(Date) 25 OCT. 91

Supervised and assessed by:

J.H. Mulders
Professor
World Maritime University

Co-assessed by:

G. Kop
Chairman IALA-VTS Committee
DGSM
Rijswijk
The Netherlands

THE IMPLEMENTATION OF VTS IN BANGKOK

ACKNOWLEDGEMENTS

I am indebted to my assessor and course professor, Professor J.H. Mulders for his invaluable guidance, support and encouragement throughout my dissertation and for his great efforts and work during my two years of study.

I wish to deeply thank my co-assessor, Captain G. Kop, Chairman of the IALA VTS committee, for his indispensable support, advice and encouragement throughout my work.

I am also indebted to the IMO for their generosity in sponsoring me to study at World Maritime University. I am also grateful to the Merchant Marine Training Center under the Thai Harbour Department and especially to the Director General of the Harbour Department, Mr. Amphon Tiyabhorn, and the Director of the Merchant Marine Training Center, Sub.Lt. Sanchai Kulpreecha for nominating me for my studies at World Maritime University.

My profound gratitude also goes to the Very Important Persons of World Maritime University: Chancellor Emeritus C.P.Srivastava, Ambassador B. Zagorin, Rector D.M. Waters, and Vice Rector and Academic Dean Professor G. Zade for their untiring commitment.

I also would like to express my appreciation to Mr. Richard Poisson and Mrs. Cecilia Londahl and all the library staff for their willingness and assistance. My special thanks go to the English Language Section staff and especially to Mr. Nicholas Hilmers for his support in the language correction of this dissertation.

My sincere thanks and gratitude are extended to the following individuals and organizations in Thailand for their material support: the Port Authority of Thailand; the Meteorological Department; the ESCAP Library and the Ports, Shipping and Waterway Division, ESCAP; Professor Suphat Vongvisessomjai, Asian Institute of Technology; Capt. Amporn Bhoyatorn, Pilot Division, Harbour Department; the Technical Division and the Water Transport Inspection Division, Harbour Department; the Office of the Mercantile Marine Promotion Commission; and the Ministry of Transport and Communications.

My thanks are also extended to my colleagues at World Maritime University for their support and warm friendship and to Miss Chompoonuj Thanyakarn for her support and best wishes.

Above all my deepest and most profound gratitude goes to my father and mother, brothers and sister for their patience, support and inspiration.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

A.D.	Anno Domini
ARPA	Automatic Radar Plotting Aids
B.E.	Buddhist Era
C.A.T.	Communications Authority of Thailand
DF	Direction Finder
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
ESCAP	Economic and Social Commission for Asia the Pacific
G.R.T.	Gross Registered Tonnage
H.F.	High Frequency
HHW	Highest High Water
IALA	International Association of Lighthouse Authorities
IAIN	International Association of Institutes of Navigation
IAPH	International Association of Ports and Harbors
IFSMA	International Federation of Ship Masters' Associations
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
IMPA	International Maritime Pilots' Association
INMARSAT	International Maritime Satellite Organization
ITU	International Telecommunication Union
LLW	Lowest Low Water
L.O.A.	Length Over All
MARPOL	Marine Pollution Prevention
M.F.	Medium Frequency
MHHW	Mean Higher High Water
MLLW	Mean Lower Low Water

MSL	Mean Sea Level
M_{95}	Accuracy of position line
NAVTEX	International automated direct-printing service
N.R.T.	Net Registered Tonnage
P.A.T.	Port Authority of Thailand
PRF	Pulse Recurrence Frequency
RCC	Rescue Co-ordination center
RP	Reporting Point
Rx	Radio Reception
R_{95}	Accuracy of Position fix
SAR	Search And Rescue
SMNV	Standard Marine Navigational Vocabulary
SOLAS	Safety Of Life At Sea
S.S.B.	Single Side Band
Tx	Radio Transmission
VHF	Very High Frequency
VTC	Vessel Traffic Control Center
VTS	Vessel Traffic Service
W_{comb}	Weight of position line(combined)

PREFACE

This dissertation focuses on the improvement of safety and efficiency of shipping in the Bangkok port area. Bangkok is the main port of Thailand, and for many years it has had maritime traffic problems. Among these problems, port congestion and marine accidents are of the highest significance due to the increasing amount of cargoes, the rising number and size of ships, and the problem of barge trains. In 1990 the Port Authority of Thailand(P.A.T.) set aside 836 Million Baht(about 32 Million US$) for various development projects. Part of the budget was allocated for the improvement of the access channel and the procurement of a new hopper dredger. However, the restricted width and depth of the channel are not the only causes of accidents. A lack of navigational information and the absence of traffic monitoring and management are the other factors.

Chapters One and Two analyze the navigation and the marine accidents in the Bangkok port in terms of the geographical situation and the existing port facilities. The problems of navigation and the existing port facilities are identified. Then an overview of recent accidents is given. In 1990, 39 accidents occurred in the Chao Phraya River Channel and the Bangkok Bar Channel. At the end of Chapter Two, the introduction of a Bangkok VTS is proposed to improve the safety and efficiency of shipping in the Bangkok port area.

In Chapter Three the VTS functions are discussed. The internal and external functions as well as the monitoring, control, and remedial functions are described here.

In Chapters Four and Five the establishment and the implementation of a possible Bangkok VTS are proposed. The VTS personnel and equipment as well as the procedures and regulations for the operation of this VTS are discussed.

Chapter Six specifies the technical requirements for the Bangkok VTS for the two main systems: the communications system and the identification and tracking system. The criteria of capacity, coverage area, limitations and accuracy are defined.

Chapter Seven deals with the proposed training of VTS operators. The efficiency of a VTS and hence the safety of navigation depend largely upon the VTS operators. The standards for recruitment, training courses, licensing, and refreshing and updating courses are described in this chapter.

Chapter Eight concludes this proposal for the Bangkok VTS and indicates the advantages of such a system for the Bangkok port area.

Finally, Appendix 1(the organization chart of Ministry of Transport and Communications), Appendix 2(the IMO Resolution A.648(16)) and Appendix 3(the Appendix of NAV 36/INF.8) are given.

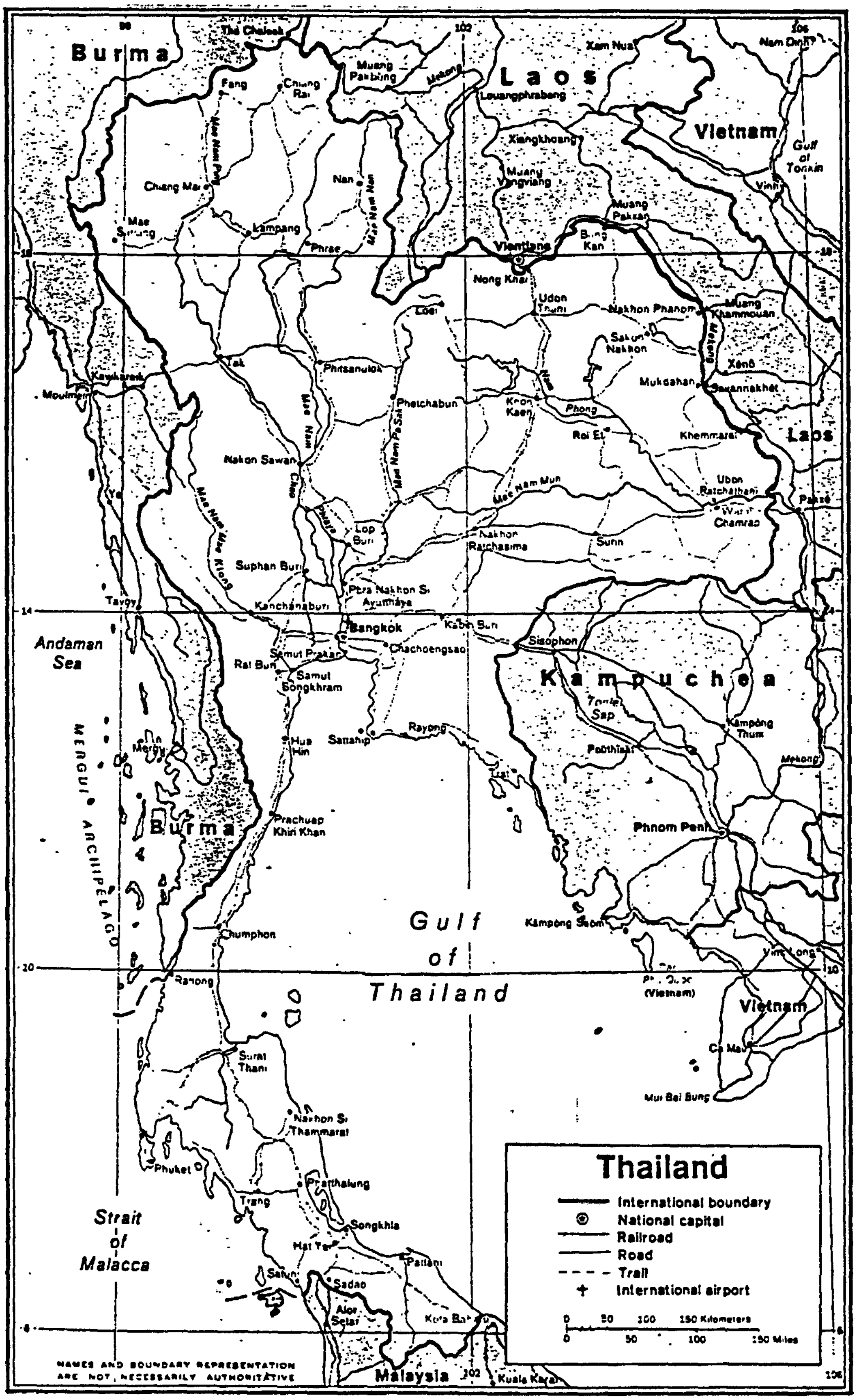
CHAPTER 1

INTRODUCTION

1.1 Background

Thailand is located in South East Asia and covers an area of 514,000 sq.km(see Figure 1-1). It has a population of 56 million(1990). Thai is the national language and sometimes Chinese or English are spoken in business. Bangkok Metropolis is the capital city and the center of business and industry. The economy is traditionally based on agricultural products such as rice, sugar, maize, tapioca, rubber, cotton, beans, fruit, fishery products and livestock. Recently the country has turned to industrial production in areas such as textiles, consumer products, furniture, electrical appliances and plastics. The main exports are rice, tapioca, rubber, precious stones, integrated circuits, canned food, textiles, sugar and tin, the total value of which was 291,000 M.Baht(US$ 1 = 26 Baht) in 1987. The main imports are fuels and lubricants, machinery, chemicals, electrical machinery and appliances, foods and beverages, vehicles and spare parts, and finally fertilizers and pesticides, whose total value was 337,000 M.Baht in 1987. The economic growth is concentrated on industrial growth and one of the main areas is the Eastern Seaboard(Rayong Province). The requirements for infrastructure in telecommunications, transport, water supply and electricity generating have increased rapidly attributing to surge in the industrial investment.

Figure 1-1 Map of Thailand



1.2 Present situation of the maritime environment and shipping in Bangkok and its approaches

1.2.1 Bangkok Metropolis

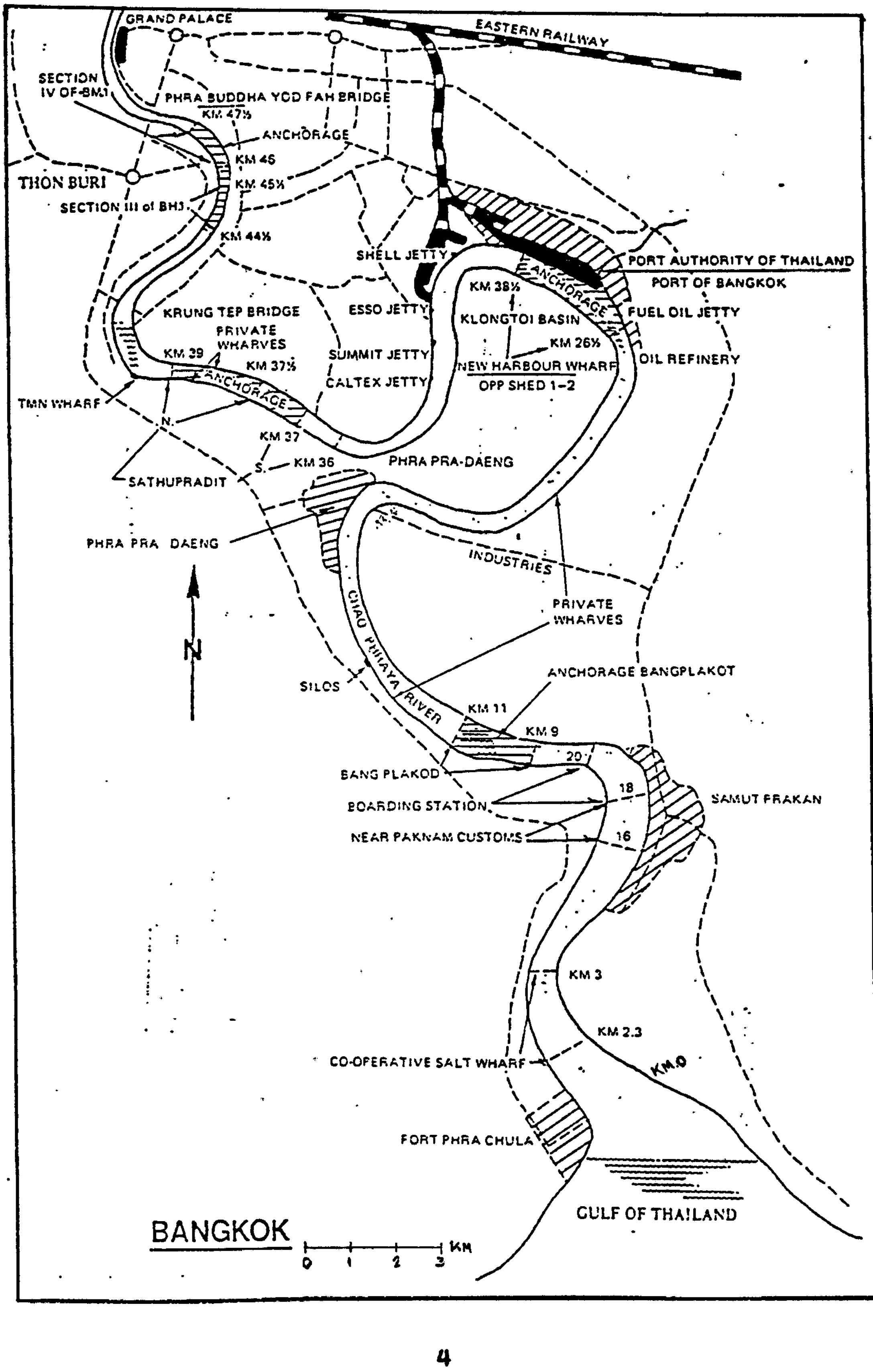
Bangkok has a population of 7 million and is confronted with the problem of a very high population density, not only due to the increasing birth rate in Bangkok itself but also to the migration of people from other provinces to the capital. Bangkok is both a living area and a working place including offices and factories. Samut Prakarn(see Figure 1-2) is the neighbourhood of Bangkok where several hundreds of large factories are situated surrounding the port. Bangkok port, which is the major commercial port of Thailand, has more than one hundred wharves along the bank of the Chao Phraya River from the river's mouth to km.+40 upstream. A ship entering the river mouth has to pass the Samut Prakan province, which has a population of more than 400,000 people in an area along 5 miles of both sides of the river. Many private wharves and several industries are situated on the river banks. Along the border of Samut Prakan province to the Bangkok area the population density becomes very high: 2 million people in the 5 mile radius from the river up to km.+40.

1.2.2 Port of Bangkok

History

"In the offshore area, near the river mouth, a bar has been created by siltation(see Figure 1-3). A large amount of siltation has been transported from the Northern and Central parts of Thailand by river discharge into the sea. This bar is called the Bangkok Bar; it is considered a very useful resource of the country as it has been the origin of many types of marine life. However, in view of sea transportation it is considered to be an obstacle for navigation of many types of ships, especially for the larger ships"(P.A.T: 1987).

Figure 1-2 Chao Phraya River



To solve the problems of the limitations of the port accessibility and the lack of berths to accommodate larger ships, the construction of the new port was begun in 1938 and the Bangkok Bar Channel was dredged. In 1942, during the Second World War, this project was ceased. In 1951, the Port Authority of Thailand(P.A.T.) was established and resumed constructing the port and dredging the channel. In 1954, the port was completed and able to accommodate nine vessels of 172.8 meters in length and 8.25 meters in draught. The Bar Channel was completed in 1956.

Present situation

The Port of Bangkok(see Figure 1-2) is a river port and ships coming to Bangkok have to proceed to the Bangkok Bar Channel(see Figure 1-3) which is 18 kilometers long at the estuary of the Chao Phraya River. The Port Authority of Thailand is situated on the left bank of the Chao Phraya, at a distance of 28 kilometers from the river's mouth. Up till now the Port of Bangkok has been enlarged to handle the increasing amount of cargoes. Many new wharves and midstream dolphins have been built by the P.A.T. and many other private companies. However, the Bangkok Bar Channel has not been improved to allow deeper draught vessels to enter the port since 1956. From the mouth of the river km.0 up to km.+40, there are quays extending into the river and midstream dolphins. They provide berths for ocean-going vessels of certain sizes. These quays and dolphins can serve 104 ocean-going vessels at a time. Amongst these, 67 quays are privately owned, while the others are state-owned.

Entry restrictions for ships coming to Bangkok port are shown in Table 1-1. However, under special circumstances the entry of oversized ships can be permitted by the Harbour Department.

Figure 1-3 Bangkok Bar Channel

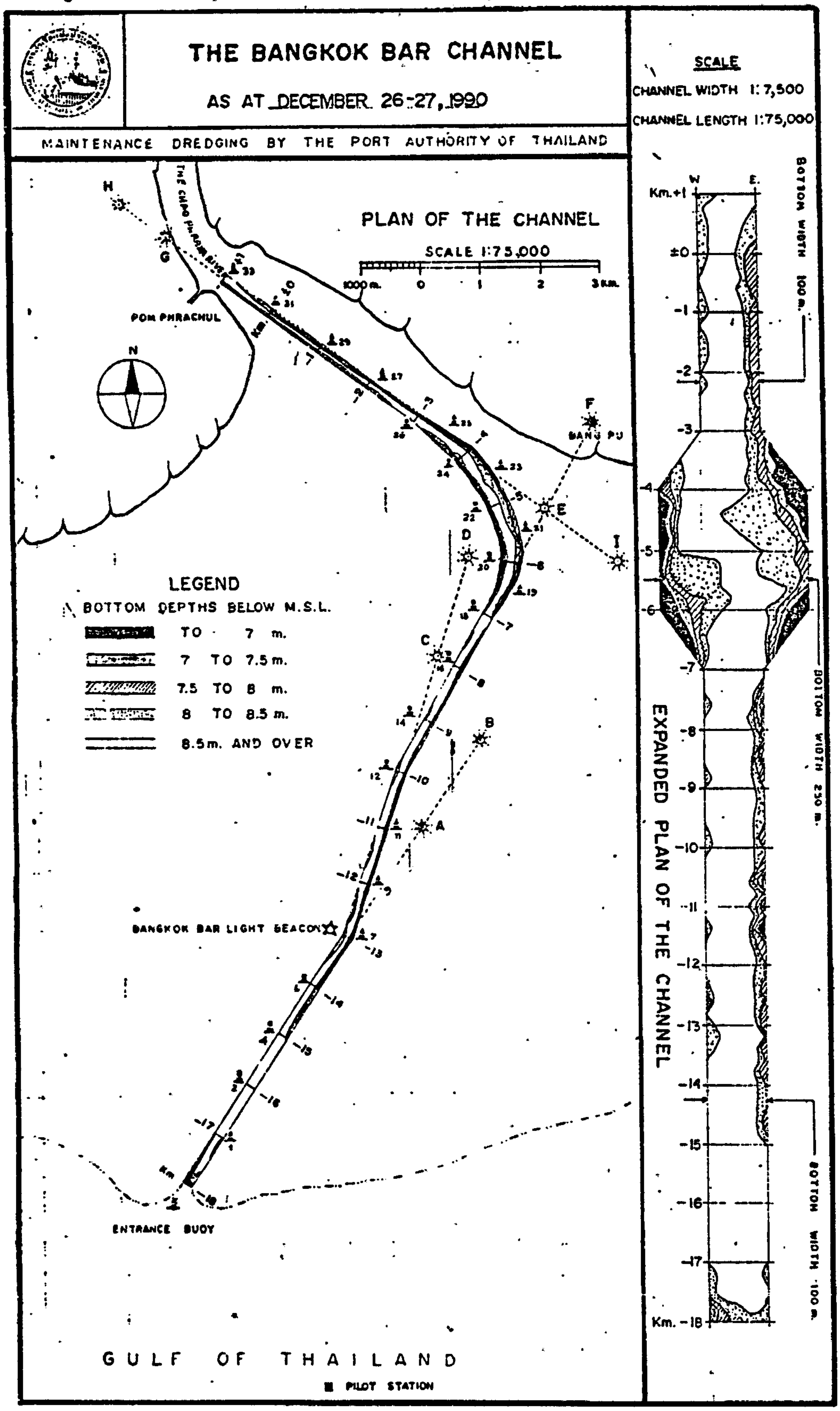


Table 1-1 The maximum size of vessel called at the Bangkok port
(Source: Harbour Department)

	Maximum size	Oversized
L.O.A	172.0 meters	180.0 meters
Width	25.0 meters	30.0 meters
Draught	8.2 meters	8.5 meters

Shipping and Cargoes

Ocean-going vessels calling at Bangkok port are of various types such as breakbulk ships, bulk carriers, container ships, refrigerated ships, oil-product tankers, chemical tankers, passenger ships, fishing vessels and ocean tugs. In the last few years, the number of ships and the amount of cargo handled at Bangkok port have increased dramatically as shown in Table 1-2.

In addition, a large number of coastal tankers of an average 2,500 G.R.T. carry oil from Sri Racha port (oil refinery terminal) to several storage tank farms in Bangkok every day. The oil transported by these tankers is the main supply of oil for Bangkok and other provinces nearby. Table 1-3 shows the number of calls of the coastal tankers at the Bangkok port.

Also many other local waterway users such as naval ships, coasters, tugs and barges, ferries, pleasure yachts, small fishing vessels, etc. contribute much to the shipping traffic intensity, especially the towed barges, called barge trains, which comprise one or two tugs towing one to four barges carrying cargoes between Bangkok and Ko Si Chang near Sri Racha oil refinery terminal.

Table 1-2 NUMBER OF OCEAN-GOING VESSELS AND CARGOES AT THE BANGKOK PORT
(SOURCE: P.A.T.)

MONTH	1986			1987			1988		
	CALL	N.R.T.	CARGOES	CALL	N.R.T.	CARGOES	CALL	N.R.T.	CARGOES
JAN	262	939,600	589,478	264	1,017,482	692,521	306	1,147,603	1,012,994
FEB	272	986,466	565,964	258	1,062,906	740,928	313	1,117,203	1,080,808
MAR	273	980,345	472,551	292	1,239,738	926,434	324	1,242,083	1,238,180
APR	264	1,026,182	584,220	270	1,016,946	873,201	343	1,300,845	1,187,967
MAY	288	1,152,141	509,748	295	1,169,587	909,592	329	1,253,395	1,171,726
JUN	300	1,221,753	507,030	283	1,081,158	944,383	330	1,248,238	1,325,070
JUL	285	1,088,864	684,806	298	1,322,322	1,040,240	322	1,254,238	1,221,806
AUG	266	1,067,183	627,800	274	1,154,912	945,691	331	1,277,158	1,325,712
SEP	294	1,133,077	821,407	301	1,251,577	1,096,006	330	1,352,117	1,149,518
OCT	280	1,102,745	802,864	277	1,028,277	842,175	353	1,367,346	1,147,336
NOV	277	1,108,099	783,265	314	1,178,152	896,883	314	1,233,049	1,117,974
DEC	281	1,051,318	711,906	319	1,262,439	847,871	360	1,375,200	1,372,067
TOTAL	3,350	12,857,769	7,621,039	3,445	13,745,456	10,755,925	3,955	15,168,475	14,351,158

MONTH	1989			1990		
	CALL	N.R.T.	CARGOES	CALL	N.R.T.	CARGOES
JAN	485	1,764,957	1,271,583	531	1,922,544	1,221,491
FEB	459	1,738,008	1,304,567	499	1,807,363	1,217,955
MAR	513	1,849,122	1,517,842	621	2,307,249	1,533,886
APR	553	2,063,617	1,554,059	537	1,975,341	1,585,377
MAY	569	2,219,657	1,523,050	588	2,190,105	1,656,583
JUN	536	1,946,958	1,379,718	581	2,153,094	1,704,012
JUL	494	1,878,106	1,511,176	564	2,153,196	1,677,297
AUG	522	1,931,283	1,389,623	538	2,110,808	1,732,951
SEP	565	2,056,679	1,496,810	-	-	-
OCT	537	1,892,478	1,471,945	-	-	-
NOV	509	1,800,605	1,355,400	-	-	-
DEC	591	2,107,503	1,618,341	-	-	-
TOTAL	6,332	23,247,973	17,394,114	4,459	16,619,700	12,329,552

* CALL - NUMBER OF CALLS OF VESSELS
N.R.T. - NET REGISTERED TONNAGE
CARGOES - WEIGHT IN TONS

Table 1-3 Number of calls of coastal tankers at the Bangkok port (from Jan-Sep 1990) (SOURCE: P.A.T.)

Month	No. of calls
Jan	531
Feb	531
Mar	578
Apr	557
May	604
Jun	606
Jul	605
Aug	610
Sep	542

A new port, called Leam Chabang deep sea port, has been built to handle cargoes, that will overflow from the Bangkok port in the coming years. However, the Bangkok port will maintain its important role because most of the industries and consumers are in Bangkok and its environs and the delivery of cargoes in Bangkok is therefore often more economical.

The Port Authority of Thailand has predicted the amounts of cargoes to be handled in the three commercial ports. Table 1-4 shows the expected amount of import and export cargoes increased from 16,237 M.tonnes in 1991 to 23,040 M.tonnes in 1996.

Table 1-4 Prediction of cargoes
(import and export, unit: million tonnes)
(SOURCE: P.A.T.)

Port	1991	1992	1993	1994	1995	1996
Bangkok	15.482	15.632	15.990	16.230	16.440	16.590
Sattahip	0.325	0.270	-	-	-	-
Leam Chabang	0.430	3.045	3.910	4.750	5.585	6.450

Dangerous cargoes

Dangerous cargoes which come to be discharged in Bangkok are in packaged form or in bulk within classes 1 to 9 excepting class 7. They are imported in large quantities. Table 1-5 shows the amount of dangerous cargoes in packaged form classified into 9 classes according to the IMDG code. Table 1-6 shows for one year the number of ships of 2,500 G.R.T. average size which carry dangerous goods in bulk and the classification by the main product names.

Table 1-5 DANGEROUS GOODS IN PACKAGE FORM AT THE BANGKOK PORT, 1990 (WEIGHT IN TONS) (SOURCE: P.A.T.)

CLASSES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1 EXPLOSIVE	469	257	312	96	152	428	318	-	-	1	-	-
2 GASES	199	158	302	95	234	439	388	150	382	92	185	38
3 INFL.LIQUID	1,783	2,011	2,060	2,376	2,029	2,061	2,405	2,012	1,870	2,133	2,167	1,713
4 INFL.SOLID	627	1,178	1,489	1,211	1,257	1,115	2,878	1,065	817	1,239	1,446	1,515
5 OXD.AGENT	748	548	576	496	518	676	672	240	357	219	726	278
6 POISONOUS	1,093	1,316	1,007	914	1,678	1,427	1,697	865	1,208	962	993	945
7 RADIOACTIVE	-	-	-	-	-	-	-	-	-	-	-	-
8 CORROSIVE	3,150	2,456	2,491	2,226	3,678	2,998	3,474	1,726	2,948	1,834	2,610	1,757
9 MISC.	2,409	3,001	216	754	992	672	576	290	1,252	799	837	975
TOTAL	10,478	10,925	8,453	8,168	10,538	9,816	12,408	6,348	8,834	7,279	8,964	7,221

Table 1-6 DANGEROUS GOODS IN BULK
NUMBER OF VESSEL CALLS
AT THE BANGKOK PORT, 1990
(SOURCE: HARBOUR DEPARTMENT)

PRODUCTS	NO. OF CALLS
1 OIL	160
2 LUB. OIL	6
3 BASE OIL	6
4 GAS OIL	24
5 FUEL OIL	2
6 CHEMICAL	195
7 AMMONIA	23
8 CAUSTIC SODA	3
9 MONO ETHLYNE GLYCOL	2
10 TOLUENE	3
11 GLYENE	1
12 SOLVENT NATURAL	1
13 BITUMEN	7
14 VINYL CHLORIDE MONOMER	19
15 LPG	69
16 VARIOUS	8
TOTAL	529

Port Authority and organization

Under the authority of the Ministry of Transport and Communications, there are two organizations responsible for water transport in Thailand(see the Ministry of Transport and Communication organization chart in Appendix 1).

1. The Port Authority of Thailand is responsible for:
   - the preparation of berths for ships to load and discharge cargoes.
   - communication services between ships and port
   - the tug service for ships berthing and assistance in case of grounding, collision and fire.
   - the Bangkok Bar channel and Chao Phraya River maintenance, including dredging and navigation aids
   - security in the port area

2. The Harbour Department is responsible for:
   - safety of navigation in rivers and at sea in territorial waters
   - providing pilot services to ocean-going vessels
   - management of the traffic system in the river and channel
   - control of ship movements in the port by the Harbour Master
   - supervision of ship navigation in Thai waters to comply with the Navigation in Thai Waters Act B.E.2456(A.D.1913) and the Collision Avoidance Rules B.E.2522(A.D.1979).

Port development

The Bangkok port

With respect to port development, the Thai government follows a policy of expanding the capacity of the port, solving traffic congestion, and improving safety of navigation in the channel and river. Many projects have been proposed by the Port Authority of Thailand to the government and some are being implemented, for instance:

1. extending the port area to 70,000 square meters
2. providing better cargo handling facilities e.g. forklift trucks, gantry cranes
3. enlarging the Bangkok Bar Channel from 100 meters bottom width and 8.5 meters depth to 150 meters bottom width and 9.8 meters depth
4. dredging a new second navigation channel with 5 meters depth at the Bangkok Bar for small vessels and barge trains
5. conducting a feasibility study of a communication system and a vessel traffic service, both have not been realized yet.

Leam Chabang deep sea port

The P.A.T. has constructed a new deep sea port on the Eastern seaboard to accommodate larger vessels with 14 meters draught and 240 meters length. It starts operating in 1991, in the first stage to receive the overflow from the port congestion in Bangkok. This port will have navigation aids, a communications network and a vessel traffic service.

1.2.3 Climate, tides and currents

Climate

The climate in Thailand is influenced by the monsoon wind and divided into 3 seasons as follows:

1. Rainy season from Mid-May to Mid-October due to Southwest monsoon.
2. Winter season from Mid-October to Mid-February due to Northeast monsoon.
3. Summer season from Mid-February to Mid-May.

In the rainy season, the Southwest monsoon brings hot moist air masses across the country. Consequently, moderate to heavy rains occur frequently. Moreover, typhoons and depressions are present often in the South China Sea. In the winter season, the Northeast monsoon blows between North, Northeast and East and generates waves along the East coast of the southern peninsula of Thailand. The Northeast monsoon receives moisture from the Gulf of Thailand and produces rain for the East Coast of that peninsula. The summer season is the transitional period with variable winds mainly from the East, Southeast and South.

The extreme temperatures range between 19 and 27 degrees Celsius in December to January, and between 32 and 35 degrees Celsius in April(Vongvisessomjai: 1990)

High temperatures, high humidity and monsoon winds characterize the climate of the country with frequent natural phenomena, i.e. rain, fog, haze, thunderstorms, as shown by statistics in Tables 1-7, 1-8, 1-9 and in Figures 1-4 and 1-5.

Table 1-7 CLIMATOLOGICAL DATA FOR THE PERIOD 1951-1980

STATION : BANGKOK METROPOLIS
(SOURCE: METEOROLOGICAL DEPARTMENT)

MEAN VALUE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
HAZE(DAYS)	22.8	22.0	23.0	17.5	11.9	11.5	12.1	11.3	11.1	12.3	13.8	10.9	180.2
FOG(DAYS)	5.3	3.1	2.4	1.2	1.3	0.1	0.4	0.1	0.0	0.3	0.8	1.4	16.4
THUNDERSTORM(DAYS)	0.6	1.3	3.2	8.1	15.5	10.7	10.0	11.0	15.8	14.0	3.1	0.7	94.0
SQUALLS(DAYS)	0.0	0.0	0.2	0.1	0.2	0.3	0.3	0.1	0.1	0.0	0.0	0.0	1.3

Table 1-8 MONTHLY MEAN WIND SPEED(KNOTS) AND DIRECTION OF PREVAILING WINDS

STATION : PILOT STATION
PROVINCE : SAMUT PRAKAN
(SOURCE: METEOROLOGICAL DEPARTMENT)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1986 SPEED	9.7	8.7	12.7	10.1	9.8	9.2	8.5	7.8	6.6	5.4	8.5	9.7
DIRECTION	NE	S	S	S	S	S	SW	SW	S	NE	NE	N
1987 SPEED	9.8	9.9	10.0	9.6	8.7	10.6	8.4	8.8	7.5	5.5	8.0	10.3
DIRECTION	NE	S	S	S	S	S	S	S	S	NE	N	N
1988 SPEED	7.3	7.0	11.1	8.7	8.9	9.3	9.6	8.1	6.1	7.6	11.7	10.3
DIRECTION	NE	S	S	S	S	SW	SW	S	S	NW	NE	NE
1989 SPEED	7.4	8.6	11.3	9.6	9.2	9.4	8.7	8.4	6.9	6.2	9.6	9.6
DIRECTION	SW	S	S	S	S	SSW	SSW	SSW	S	NE	NE	NNE
AVERAGE SPEED	8.6	8.6	11.3	9.6	9.2	9.4	8.7	8.4	6.9	6.2	9.6	9.6
APPROX.DIRECTION	NE	S	S	S	S	SSW	SSW	SSW	S	NE	NE	NNE

Table 1-9 AVERAGE MONTHLY RAINFALL(MM)(AMT.), RAIN-DAYS(R-DAYS) AND DAILY MAXIMUM(MAX.)

STATION : PILOT STATION
PROVINCE : SAMUT PRAKAN
(SOURCE: METEOROLOGICAL DEPARTMENT)

YEAR		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1986	AMT.	0.0	52.7	0.0	19.6	258.2	34.0	83.5	81.6	305.5	280.1	68.1	5.3	1178.6
	R-DAYS	0	1	0	4	8	11	13	14	16	21	3	1	92
	MAX.	0.0	52.7	0.0	13.6	122.0	10.4	22.3	19.5	63.3	53.3	46.0	5.3	122.0
1987	AMT.	0.0	36.3	47.3	8.6	32.3	59.6	4.9	71.7	226.5	193.9	210.4	0.0	891.5
	R-DAYS	0	2	3	4	6	9	3	10	17	18	15	0	87
	MAX.	0.0	33.9	30.4	5.6	15.6	18.0	3.3	29.6	56.2	46.0	59.2	0.0	59.2
1988	AMT.	0.0	31.2	51.9	121.0	280.8	86.3	104.0	170.7	460.9	132.7	6.5	0.0	1446.0
	R-DAYS	0	4	2	6	20	10	17	15	19	14	1	0	108
	MAX.	0.0	16.8	41.9	72.6	60.6	56.7	25.3	38.7	148.5	43.1	6.5	0.0	148.5
1989	AMT.	72.1	103.7	24.1	0.5	65.7	74.2	70.0	118.3	210.1	171.6	1.7	0.0	912.0
	R-DAYS	5	4	3	1	9	9	13	11	15	14	3	0	87
	MAX.	24.6	69.7	10.5	0.5	20.2	36.2	32.2	63.8	49.5	52.0	1.0	0.0	69.7
1990	AMT.	4.2	0.4	33.5	23.0	255.7	24.3	40.7	55.7	176.5	308.2	1.2	0.0	923.4
	R-DAYS	1	1	4	2	16	7	11	10	17	16	2	0	87
	MAX.	4.2	0.4	23.0	19.5	81.2	8.7	10.8	17.6	34.8	65.6	0.8	0.0	65.6
AVERAGE AMT.		15.3	44.9	31.4	34.5	178.5	55.7	60.6	99.6	275.9	217.3	55.6	1.1	1070.4
AVERAGE R-DAYS		1.2	2.4	2.4	3.4	11.8	9.2	11.4	12.0	16.8	16.6	4.8	0.2	92.2
EXTREME MAX.		24.6	69.7	41.9	72.6	122.0	56.7	32.2	63.8	148.5	65.6	59.2	5.3	148.5

Figure 1-4 Climatological data for the period 1951-1980

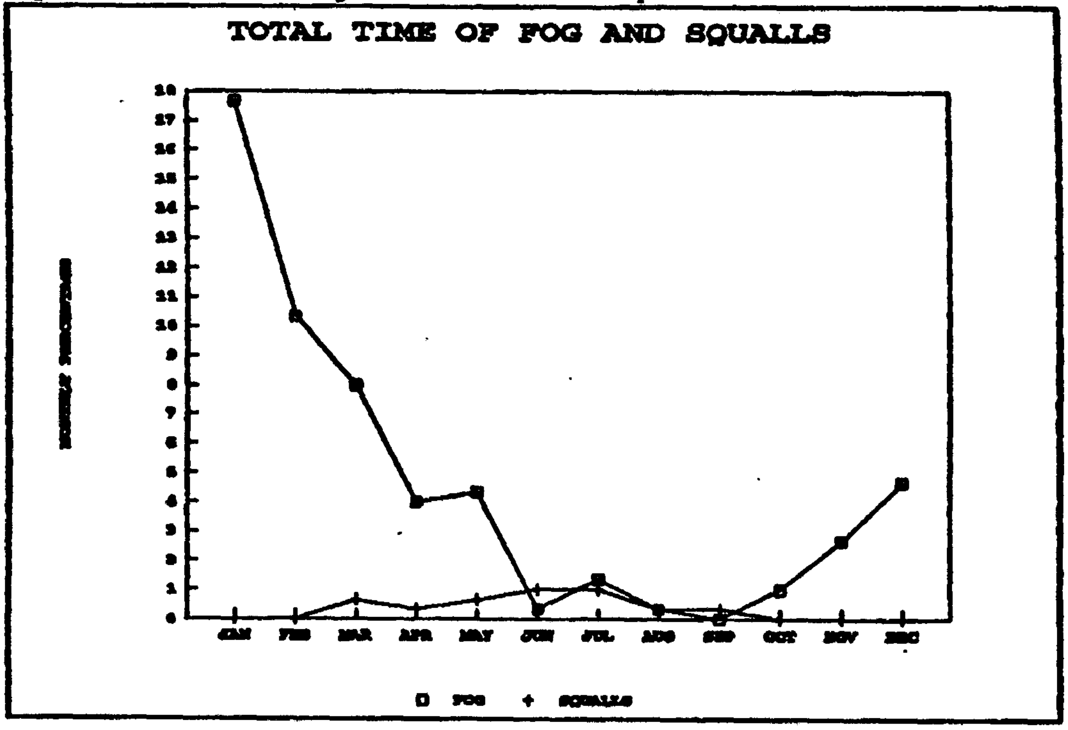
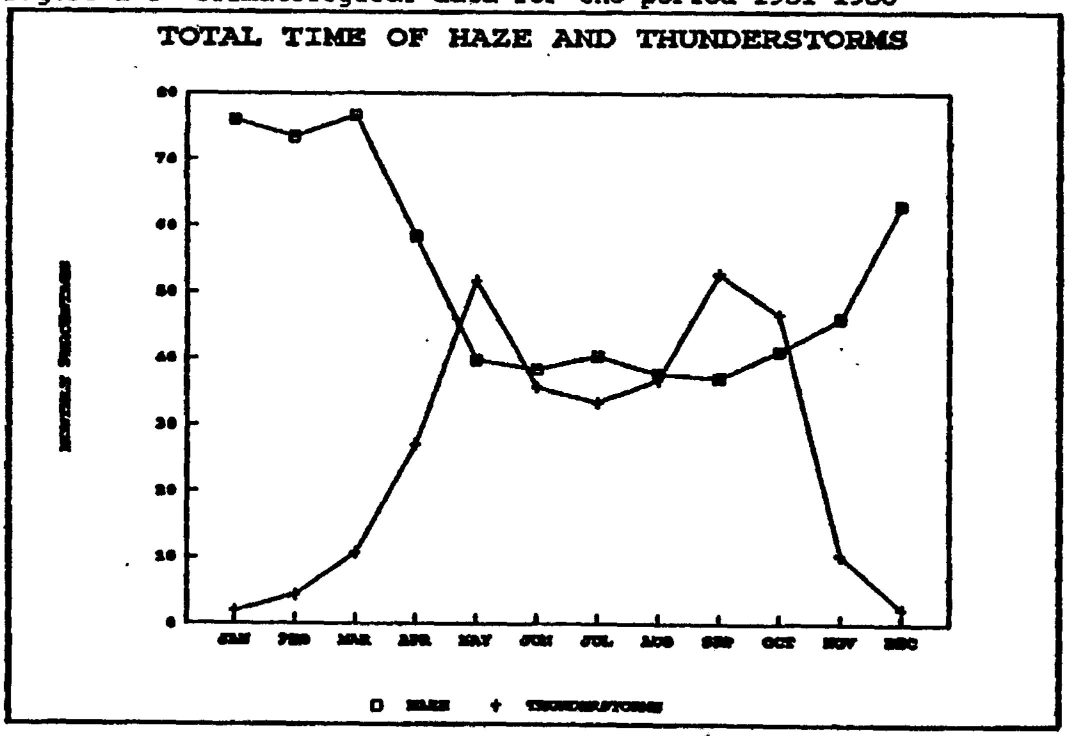


Figure 1-5 Climatological data for the period 1951-1980



Tide

The Bangkok tide varies from diurnal to semi-diurnal. Generally speaking, two high waters and two low waters occur each day as shown in Figures 1-6 and 1-7. The largest range occurs in June and December and the lowest in March and September. The mean range varies between 1.9 and 2.6 meters with a half year period. The monsoon wind causes the MSL to fluctuate between +0.2 m. in May to -0.3 m. in February. The average tidal value is shown in Table 1-10 (NEDECO: 1965).

Table 1-10 The average tidal values(1940-1970)

Tide	MSL datum (meters)
HHW	+ 2.28
MHHW	+ 1.18
MSL	+ 0.00
MLLW	- 1.26
LLW	- 2.42

Figure 1-6 Tide variation

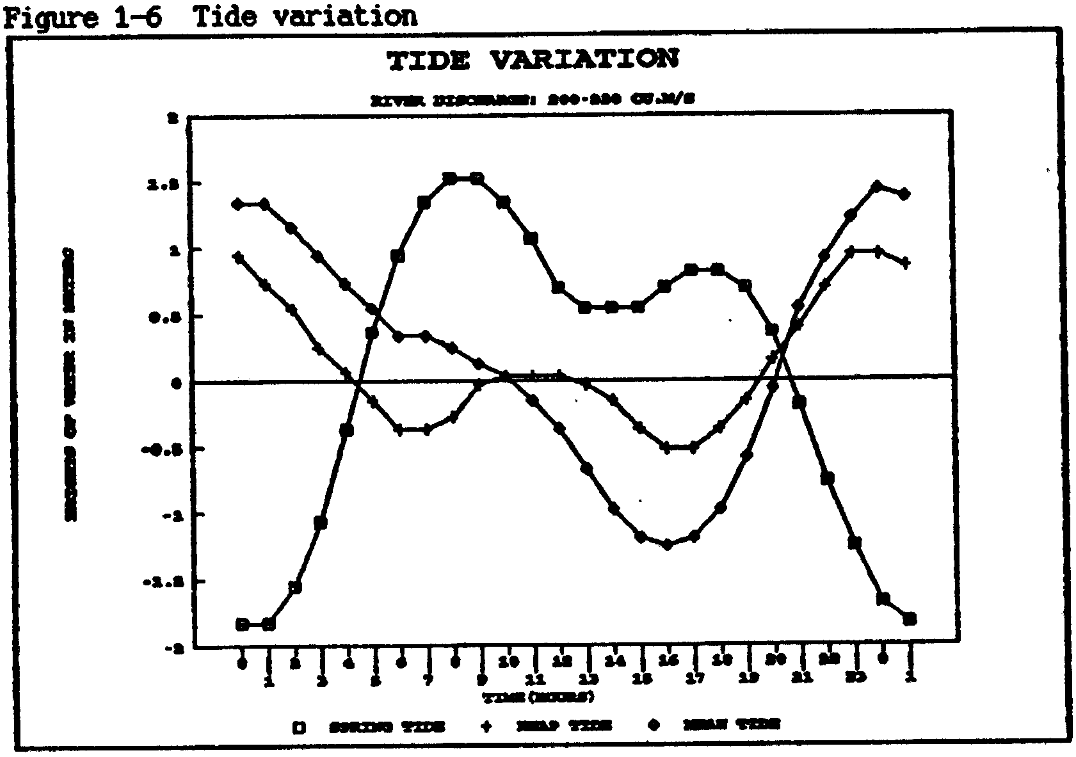
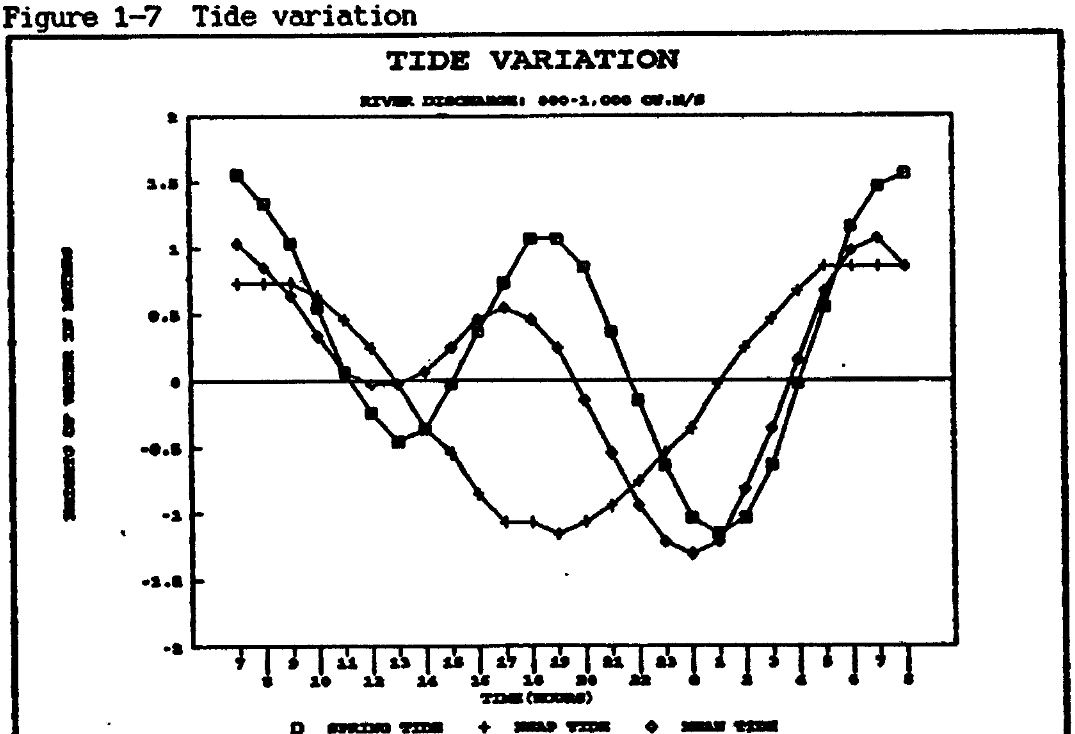


Figure 1-7 Tide variation



Currents

The current at the Bangkok Bar Channel is formed by the interaction of the discharge of the Chao Phraya River and the tide. The pattern is complicated as commonly seen in an estuary. In the upper part (km.-0 to km.-3) and the middle part of the existing channel, the current is generally along the direction of the channel axis. However, in the bend(km.-3 to km.-7) and the southern part

Figure 1-8 The current vectors at river discharge 200 cu.m/s (half ebb)

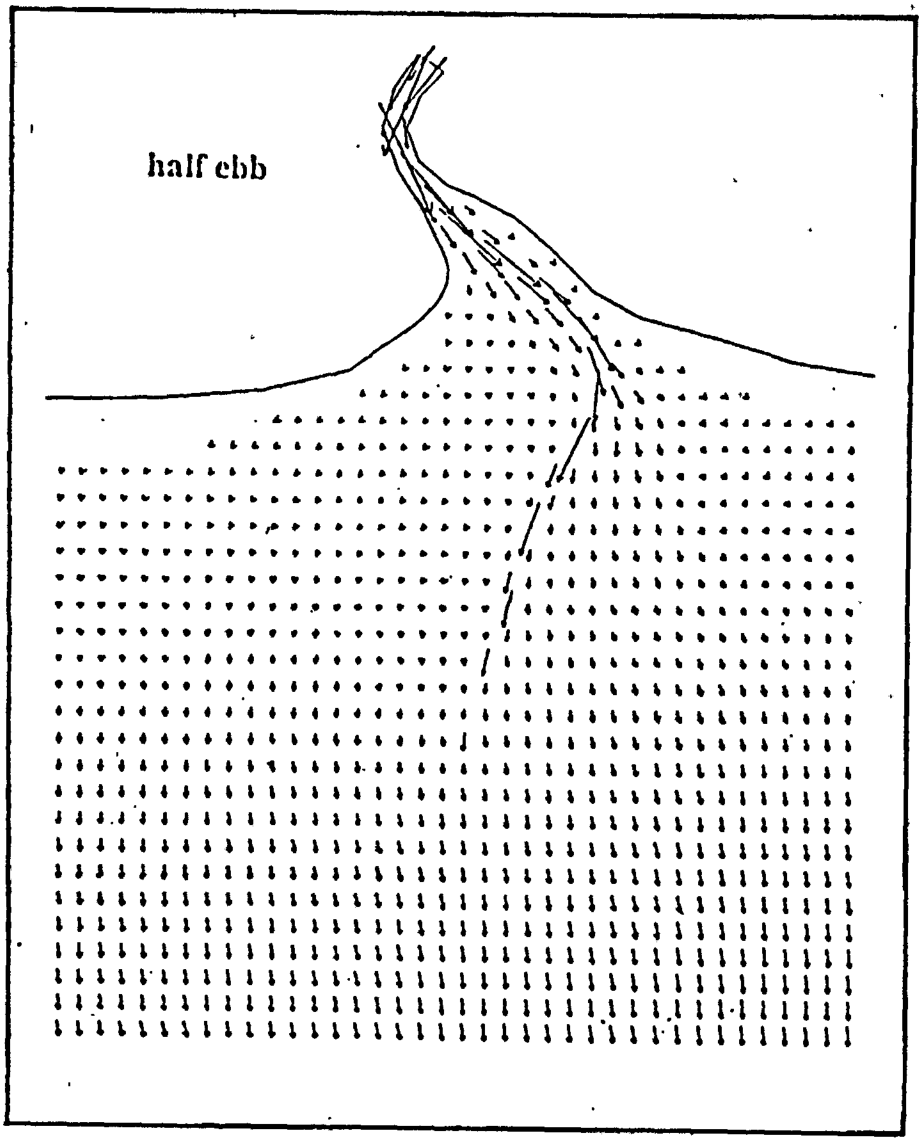
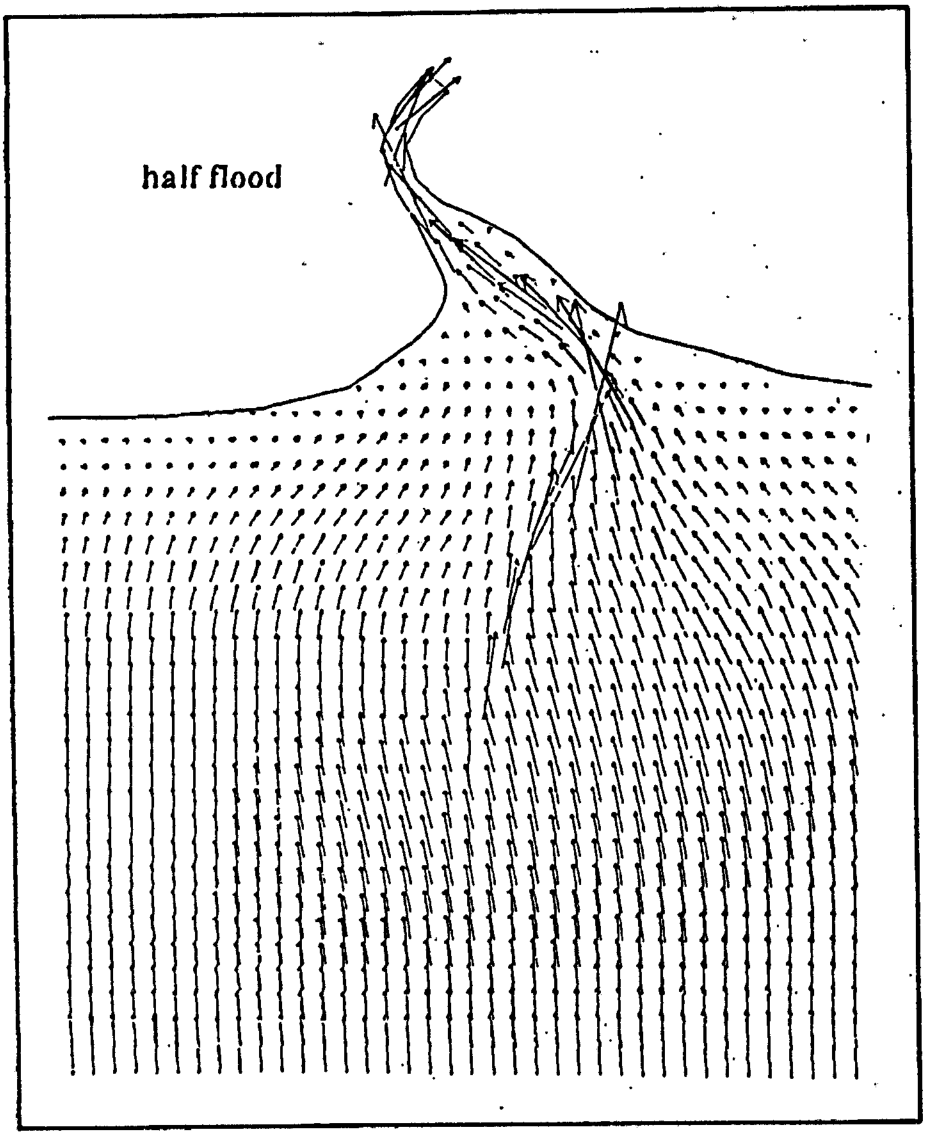


Figure 1-9 The current vectors at river discharge 200 cu.m/s (half flood)



(km -13 to km -18) in some cases the current crosses the channel with a maximum velocity of 2.5 to 3.0 knots(see Figures 1-8 and 1-9).

Waves

The height of the waves is generally moderate in all areas and even the most exposed gulf areas have almost no waves over 2.5 meters(see Table 1-11). The waves in the upper Gulf of Thailand are the smallest due to the small fetch length and weaker SW winds.

Table 1-11 Probability of occurrence of significant wave height

Wave height	5 m.	4 m.	3 m.	2 m.	1 m.
Probability	0.5%	3.0%	10.0%	22.5%	45.0%

1.2.4 Sea exploitation

In the northern Gulf of Thailand, the most sensitive area is at the estuary of the Chao Phraya River and its vicinity. The river discharges water with mud and several micro-organisms into the sea. The rich sea in this area and the mangrove forest along the coast support many types of marine life. Further down to the south of the estuary, there are several beaches and coral reefs. As a result, the northern Gulf of Thailand is an important area for marine exploitation. The main industries there are fishing and related industries(see Table 1-12), aquaculture farming, salt producing, tourism and hotels.

Table 1-12 FISHING INDUSTRY IN COASTAL AREAS NEAR BANGKOK
(RECORDED: JAN - DEC 1989)
(SOURCE: HARBOUR DEPARTMENT)

COASTAL AREAS	TOTAL TERMINALS	TOTAL VESSELS	PRODUCT (tons)	FISHERMEN
SAMUT PRAKARN	3	500	167,000	6,800
SAMUT SAKORN	12	2,110	511,555	38,050
SAMUT SONGKRAM	6	400	111,000	2,610
PETCH BURI	7	683	23,311	4,136
CHOLBURI	4	100	1,500	1,600
BANGPAKONG	3	500	977	7,080
	35	4,293	815,343	60,276

Summary

In the past few years, shipping in Bangkok has increased rapidly in terms of the number of ships and the amount of cargoes. The size of ships, however, has not very much increased because of the channel constraints. The Port Authority of Thailand plans to develop the port area and facilities, waterway and other infrastructure to contribute to the country's economic growth. The safety of people and the environment have been seriously degraded by the transport of dangerous cargoes and by pollution in the air and water from many sources including shipping. The weather is characterized by a rather high percentage of fog, haze and rather strong winds. The tide alternates between diurnal and semidiurnal patterns. The river discharge, tide and sea currents influence the tidal current pattern at the river's mouth.

CHAPTER 2

ASSESSMENT OF THE NECESSITY OF THE BANGKOK VTS

2.1 General information

2.1.1 Channel and traffic system

The channel and traffic system in Bangkok port consists of the following components: the Bangkok Bar Channel, the Chao Phraya River, the navigation aids and the traffic pattern.

1. The Bangkok Bar Channel

The Bangkok Bar Channel(see Figure 1-3) is 18 kilometers long and has a bottom width of 100 meters except at the large bend between km.-4 and km.-7 which has a bottom width of 250 meters. The channel is not one straight line but consists of three straight sections which have bends at km.-4 to -7, km.-10 and km.-13. The current pattern is variable according to tides, winds, discharges of river water and ocean currents.

2. The Chao Phraya River

The Chao Phraya River route to Bangkok port begins at the river mouth(km.0) and extends to km.+56(see Figure 1-2). The river channel depth is at least 8.5 meters and its width ranges from 170 to 350 meters. The river trajectory has 5 bends at km.+7, +9, +17 to +19, +29 to +31 and +34 to +35. The largest turning angle is 120 degrees. The navigation aids consist of three buoys to indicate the port side edge of the narrowing channel at Samut Prakan province. In the river some areas are specified for particular purposes as follows:

a) Bang Plakod Anchorage at km.+10 to km.+11 for discharging explosives.
b) Bang Hua Sua dolphins and Klong Toey dolphins at km.+13 to km.+15 and km.+27 to +28 for berthing general cargo ships.
c) Naval ship moorings at km.+22 to km.+24
d) Sathu Pradit mooring area at km.+36 to km.+37 for general cargo ships.
e) Three anchorage prohibited areas at km.+24 to +25, km.+30 to +31 and km.+40 to km.+41.

3. The navigation aids

The existing navigation aids in Bangkok port consists of;

a) Five transit lines, with a total number of nine lights at the Bangkok Bar Channel. The center of the channel in each section is indicated by a pair of leading marks(see Table 2-1 and Figure 1-3).

Table 2-1 The Bangkok Bar channel transit lines(leading lights)

The leading marks	Distance	Bearing	Nominal Range of lights
A and B	-18 to -13	034	4 M.
C and D	-13 to -10	018	4 M.
E and F	-10 to - 7	030	9 M.
G and H	- 4 to + 1	306	4 M.
E and I	+ 1 to - 4	126	9 M.

b) The buoyage system of the channel, which is a unilateral system except at the large bend where buoys indicate both sides of the channel. The buoys have daymarks and lights but not radar reflectors. The nominal range of the lights of the buoys is 3 miles.

c) A pilot station light and the Bangkok Bar tide station light.

4. The Traffic pattern

The Chao Phraya River is the main road for water transport, and compared to other means of transportation it is the most efficient one.

The traffic problem in the river is not less than in the channel, even though it is wider and deeper, because the number of movements of vessels is larger. Vessels use the river without much discipline. For example, crossing ahead in close quarter situations or overtaking at a bend are common practice and this regularly creates dangerous situations.

At the Bangkok Bar Channel, the traffic will be dense at a peak period during the high water period for about 4 hours. Inbound and outbound traffic pass each other at the same time and the proceeding time in the Bar channel is at least one hour. Passing ships in convoy, winds and currents, shallow water, barge trains, bends and poor visibility and some of the difficulties that the Bangkok pilots and ship masters are increasingly faced with.

2.1.2 Navigational hazards, constraints and casualty record

1. Navigational hazards

The navigational hazards in the Bangkok Bar Channel and the river can be divided into three groups: reduced visibility; wind, wave and currents; and the depths in the channel.

a) Reduced visibility

As mentioned before, the climate in Thailand is influenced by monsoon winds. Moderate to heavy rain occurs in the rainy season and fog and haze usually occur during dawn and sunset. In such a long and narrow channel, if visibility is reduced by either rain or fog, the vessel can easily ground with a strong cross-channel current. The existing navigation aids do not have 100% visibility especially when the leading lights are totally obscured.

b) Winds, waves and currents

Just before a thunderstorm, the wind sometimes increases suddenly up to 30 knots. The pathwidth of the ship will increase with the drift angle.

The current can be divided by the direction into two groups. First, there is a current along the channel which influences the ground speed. The other is the current across the channel with speeds of 1.0 - 2.5 knots. The pathwidth of the ship in this situation increases and two ships passing each other require accurate manoeuvering in that case.

c) The depths in the channel

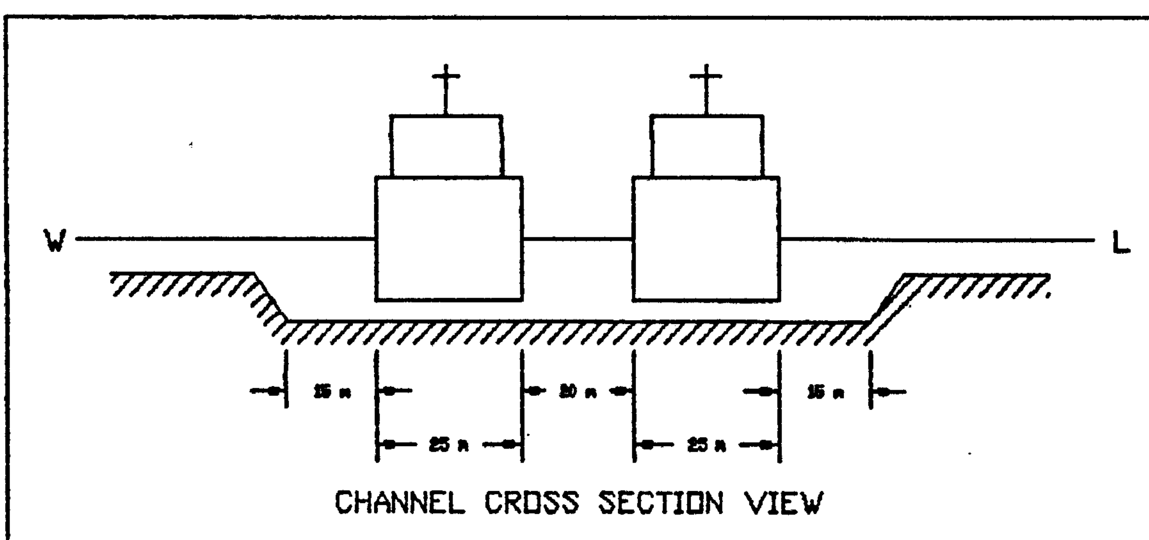
The channel actually is shallower than its minimum requirement in some areas especially at the sides of the channel. So the chance of collision or stranding, especially when two ships are passing, is very high. Moreover, some ships pass the Bar with a small Under Keel Clearance and have difficulties in manoeuvering.

2. Navigational constraints

The difficulties in navigating in the channel and river are of various kinds.

a) Navigation in Bangkok Bar Channel has a very low safety margin when one ship is overtaking or passing another as shown in Figure 2-1.

Figure 2-1 Two ships passing at the Bangkok Bar Channel with low safety margin



b) There are several bends in the river, in the channel and at the Bangkok Bar. The sharp bends that have a potential for navigational danger are shown in Table 2-2.

Table 2-2 The characteristics of the sharp bends in the Chao Phraya River.

Bends	km.	Course change (degrees)	width (m)	Radius (m)
Naval Academy	+ 8	094	260	1,200
Phra Pra Daeng	+17	094	220	720
Chong Non Si	+30	094	170	860

When the ship is turning, it will have a certain pathwidth due to the drift angle and we can calculate the pathwidth by the following formula(see Figure 2-2):

$$S \cong B + L \sin(\psi)$$

Figure 2-2 The pathwidth of a ship
(Hooff: 1989, pp XI-11)

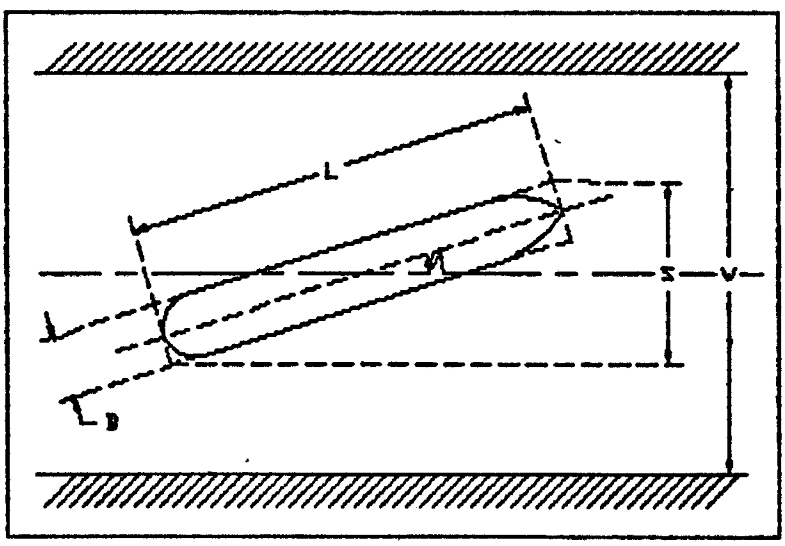


Figure 2-3 Two ships passing at the Phra Pra Daeng bend

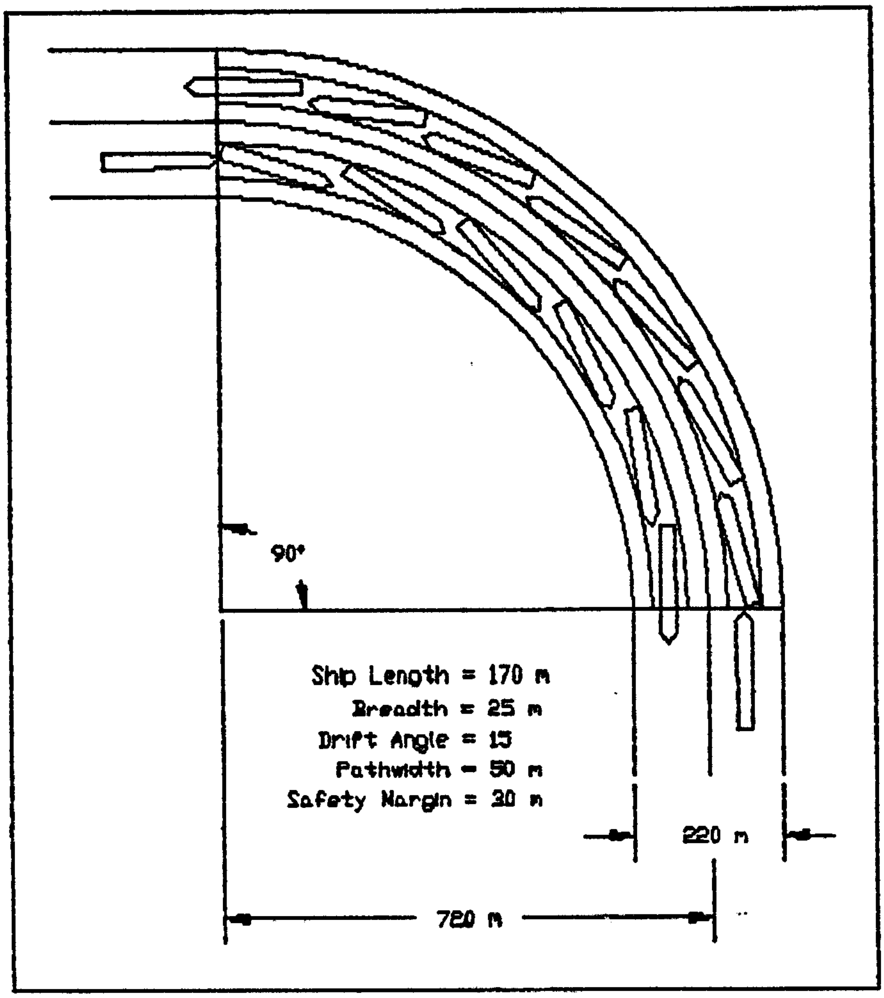


Figure 2-3 shows two ships with a length of 170 m. and a breadth of 25 m. passing at Phra Pra Daeng bend with a drift angle of 15 degrees. The pathwidth of each ship is 50 m. and the navigational margin on each side is 30 m., which is too dangerous.

c) The tide causes many vessels to rush out to the Bangkok Bar as quickly as possible, as otherwise they have to wait for the next tide. A vessel proceeding to the

Bar with very low margins of underkeel clearance will have difficulty in manoeuvering properly in the channel. In addition, there are speed limitations caused by the squat effect.

d) The extra large vessels, which have permission from the Harbour Department to enter the port, require very high precautions due to their draught and width. When passing other ships not only is the width more limited, but also the suction forces are greater than normal.

e) Barge trains, the tugs usually have low power engines and when engaged in towing 2-3 lighters their speed is only 2-3 knots. So when it is in the river passing a bend or when there is a cross current in the channel, the pathwidth of the barge train can be large(see Figure 2-4).

Figure 2-4 The pathwidth of barge train

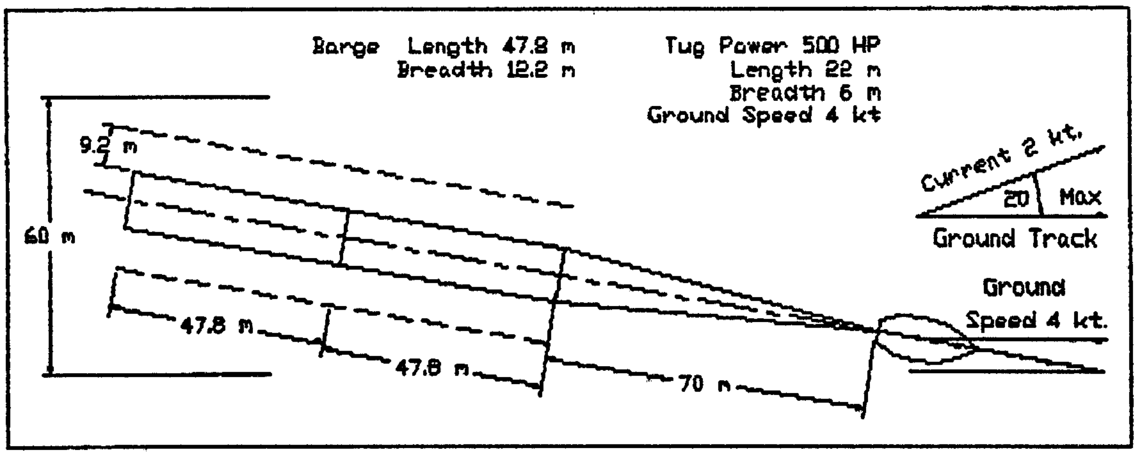


Figure 2-4 shows that a tug towing two barges in the Bangkok Bar Channel with a current across the channel at a 20-degree angle. As a result, the barge train has to steer at an angle of 9.7 degrees as compensation for the current's effect. The pathwidth of the barge train with a safety factor of 0.75 of the breadth of the barge on both sides, has increased from 31.2 meters to 60 meters while the ground track is in the same direction of the channel.

3. Casualty record

According to the casualty records, about 30 to 40 accidents happen in the river and the Bar Channel each year. Table 2-3 shows the records for the period 1980-1990 and Table 2-4 gives the records for 1990. The accidents are of different kinds and occur under different conditions(see Table 2-4). Recently two serious accidents have happened: one was in the channel, the other in the port. In the first case, two ships collided at the entrance of the channel. Due to a very strong wind, the outbound ship drifted into the other vessel which was turning to enter the channel. One ship sank immediately near the channel. It was salvaged after 14 days and found to be a constructive total loss. In the second case, an inbound ship came near the P.A.T container port and ran into thick fog. The visibility suddenly dropped to 100 meters. The ship hit the quay and

Table 2-3 Accident record for 1980-1990
(Source: Harbour Department)

Kind of accident	80	81	82	83	84	85	86	87	88	89	90
Collision between											
ship and ship	2	3	8	6	2	11	7	6	8	4	6
ship and barge	8	8	5	7	3	5	6	14	11	5	4
Hit a wharf or moored ship/barge	9	10	11	18	10	6	5	3	NA	NA	21
Grounding	11	12	8	12	26	9	11	2	NA	NA	8
Total	30	33	32	43	41	31	29	25	19	9	39

Table 2-4 Summary of accident record in 1990
(source: Harbour Department)

Kind of accident	No.of cases
River Channel	
Hit a wharf or ship/barge moored	21
Collision/Touch with barge	2
Total	23
Bangkok Bar Channel	
Grounding	8
Collision/Touch with barge	2
Collision/Touch with other ship	6
Total	16
Total accidents	39

Cause of accident in the river and channel	No.of cases
Poor manoeuvrability of barge	2
Strong current	2
Poor visibility	2
Course change or passing and mis-steering	12
Wrong engine order	5
Others(engine breakdown,carelessness)	16

Time of accident	No.of cases
Day	23
Night	10
Dawn/Dusk	6

the protruding bow knocked the shore gantry crane down. Fortunately in these two cases, the channel was not blocked and there were no dangerous goods on board the ships and no lives were lost.

From the records, we can identify the following major causes of accidents:

1. main engine, auxiliary engine or steering engine failures
2. poor manoeuvrability of barge trains
3. natural phenomena, i.e. wind, current, fog, rain
4. the insufficient depth and width of the channel for oversize ships.
5. mis-steering and wrong engine manoeuvering due to poor communication

2.1.3 The existing communications system

The maritime communications network under the control of the Communications Division of the Port Authority of Thailand provides telecommunications services for ships calling at the Bangkok port, and is also responsible for maritime safety and ship distress calling. The navigational information, e.g. navigation warnings, weather forecasts and Bangkok port traffic is broadcast at particular times. Telex and facsimile services are also available from other ports and shipping agents. Other types of services such as satellite communications and a national communications network are supported by the radio station of the Communication Authority of Thailand. The communication system consists of three aspects: the frequencies, the network and the procedures.

1. Frequencies

The Communications Division of the Port Authority of Thailand works on the following frequencies:

a) H.F. - power 1,000 watts, range 1,200 Miles
- port calling frequency (Rx) 8,364 KHz.
- port working frequency (Tx) 8,466 KHz.
- listening time (local time) at 0700, 1000, 1300, 1600 and 2000 Hrs.(about 30 minutes in each case)
- S.S.B. power 60 watts, range 50 Miles for internal working frequencies: 4.1450, 4.4208, 7.9430 and 8.2825 MHz.

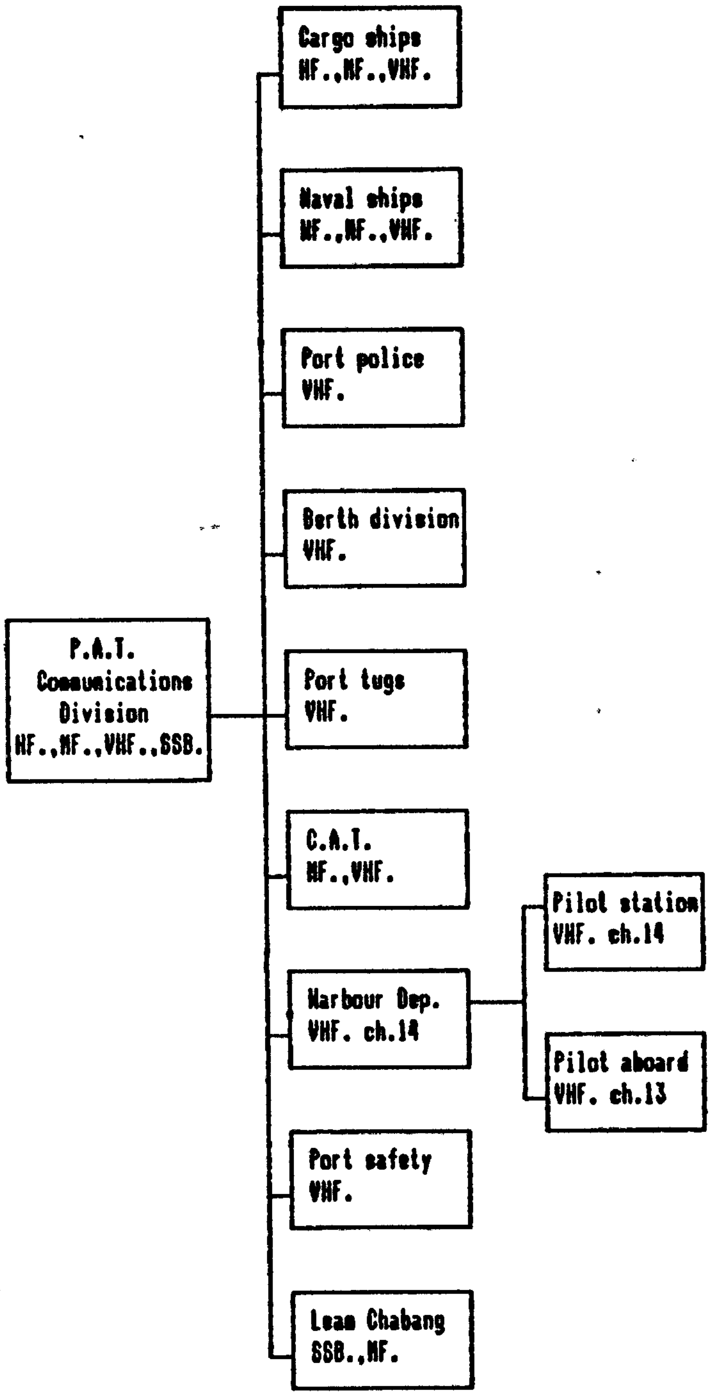
b) M.F. - power 1,000 watts, range 300-500 Miles.
- port calling frequency (Rx) 500 KHz.
- port working frequency (Tx) 443 KHz.
- listening time (local time) 0600 - 2400 Hrs.
- traffic lists broadcast daily at 1145 Hrs. and the beginning of every hour from 0600 - 2400 Hrs.(local time)
- listening 24 hours for maritime distress signal on 500 KHz.

c) V.H.F.- power 60 watts, range 60 Miles.
- channel 16, 156.800 MHz. listening 24 Hrs. for port calling and maritime distress signal
- working frequencies:
channel 6(156.000 MHz.)
channel 13(156.650 MHz.)
channel 14(156.700 MHz.)
channel 25(161.125 MHz.)

2. Network

The communications network has the main communications center in Bangkok at the Port Authority of Thailand and is linked with internal and external departments and agencies(see Figure 2-5).

Figure 2-5 The existing communications network



(C.A.T. stands for Communication Authority of Thailand)

3. Communication procedures

Ships bound for Bangkok port or staying in the port have to follow the communications procedure for reporting to the P.A.T. and the harbour master.

a) report the ship's name and particulars, ETA, draught and cargo, 24 hours before arrival

b) confirm ETA one hour before arriving at the Bangkok Bar

c) inform when anchored at the Bangkok Pilot station
(at the entrance of the Bangkok Bar Channel)

d) inform when proceeding into the channel and prepare to get the immigration clearance while passing Samut Prakarn province

e) notify the tug and the berth officer of approaching the harbour, one hour in advance

f) inform when anchoring or berthing is completed

g) for departure, ships have to inform the ETD 24 hours in advance for port clearance and tug assistance

h) report the departure of the ship and the passing out of the channel

2.2 The necessity of a VTS in Bangkok

According to any definition of VTS, the aim is the safety and efficiency of navigation. The implementation of VTS in Bangkok is aimed at the safety and efficiency of navigation in the Bangkok Bar Channel and Chao Phraya River. People who live in the vicinity will benefit as well as crews and passengers who use this route. The port and shipping business, the marine environment and the economy of the country will profit as well.

The main causes of the accidents in Table 2-4 are ranked in descending order: mechanical failures and human errors(16 cases); course change or passing or mis-steering(12 cases); wrong engine order(5 cases); poor manoeuvrability of barges(2 cases); poor visibility(2 cases); and strong currents(2 cases). The VTS will not be able to do anything about mechanical failures but will help to avoid human error and misjudgment. For the other causes of accidents, the VTS will play a role in reducing collisions through traffic management(space allocation).

To optimize the use of the waterways, the VTS will manage the traffic flow efficiently to reduce the waiting time for ships due to tides, bearing in mind the safety of navigation.

The VTS in Bangkok is necessary for the following reasons:

1. The Thai people, crews and passengers should be protected from the dangers of maritime accidents through the functioning of the VTS. Nowadays increasing ships size and increasing amounts and toxicity of dangerous goods may cause catastrophes.

2. The natural resources should be conserved and the environmental pollution by shipping activities should be prevented. Similarly, the consequences of marine accidents will damage natural resources and environment which has many effects on sea exploitation activities(see 1.2.4).

3. The utilization of the waterway should be improved in term of traffic movement and navigation.

4. Economic losses should be reduced through the prevention of maritime accidents and the improvement of traffic flow.

5. port surveillance and security measures should be upgraded to control illegal activities in shipping.

6. A communications network, an information exchange and a shipping data bank in Bangkok port should be developed.

7. The IMO conventions such as 1974 SOLAS, 1973/1978 MARPOL and 1979 SAR conventions should be implemented.

2.3 Proposal for the Bangkok VTS

To meet the objective of the development of Bangkok port, the following measures to enhance the VTS in Bangkok are proposed:

1. the establishment of a VTS organization

2. the area of coverage in the Chao Phraya River, the VTS boundary begins from Bangkok Bridge km.+42 downstream to the Bangkok Bar channel and ends at the outer end of the Bangkok Bar channel and it also includes the Bangkok port boundary at the Bangkok Bar bounded by the following lines:

- West boundary delimited by a line drawn from the coast along the longitude 100° 32'E
- East boundary delimited by a line drawn from the coast along the longitude 100° 39'E
- South boundary established by a line along the latitude 13° 22'N intersecting the West and East boundaries

3. the participation of ships in the VTS is compulsory for all passenger ships irrespective of size and all cargo ships of 300 tons gross tonnage and upward and all

towing vessels with a length of tow of 100 meters and upward.

4. the ships that participate in the VTS shall be equipped with VHF radiotelephones at certain channels

5. a new traffic system shall be installed (as mentioned in Chapter 5)

2.4 Need for other improvements

The implementation of VTS alone cannot fully guarantee the safety of navigation. Some other important traffic components require upgrading as well— for instance, the improvement of the infrastructure of the port, as mentioned in Chapter 5, and the improvement of small boat behaviour through education about an enforcement of the rules and regulations.

CHAPTER 3

VTS FUNCTIONS

3.1 VTS definitions and functions

IMO gives as a VTS definition: "A Vessel Traffic Service or a VTS is any service implemented by a competent authority, designed to improve safety and efficiency of vessel traffic and protect of the environment. The service should be dedicated to the flow of such traffic and have the capability to interact with it and respond to traffic situations developing in the VTS area"(IMO Res.578(14): 1985, revised by IMO NAV 37/11: 1991).

A vessel traffic service also is described as "an integrated system encompassing the technologies, equipment and people employed to coordinate vessel movements in or approaching a port or waterway"(Lynch: 1983, pp 24).

Another interesting description is "A vessel traffic system consists of an integrated plan, regulations, people, equipment and facilities for the collection, analysis and dissemination of information to assist and direct as needed, the manoeuvering of vessels in waters subject to congested vessel traffic"(Lynch: 1983, pp 24).

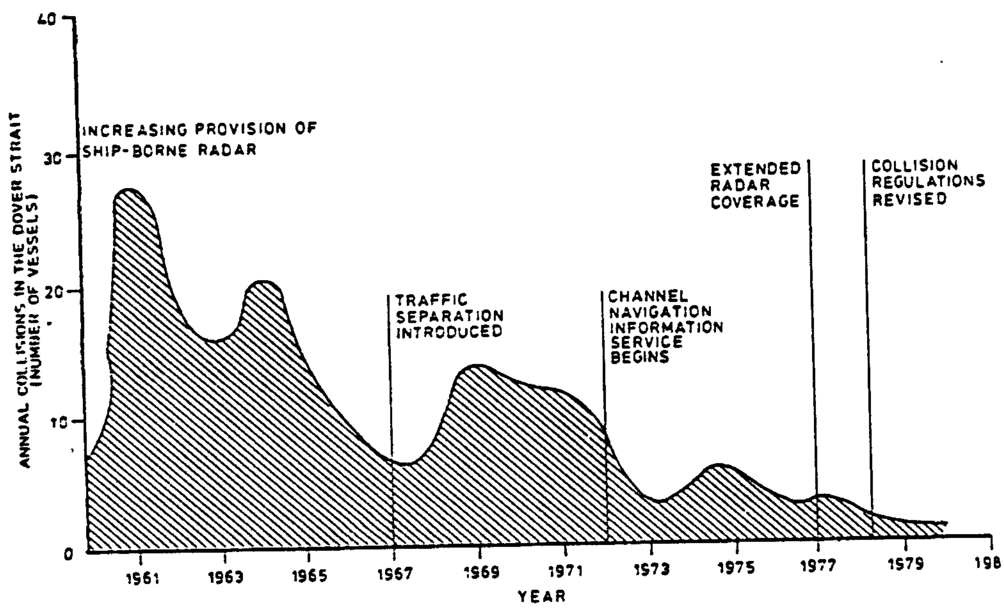
According to the definitions, a VTS is established for collecting data and processing information to use for navigation and it will provide that information to vessels to coordinate vessel traffic for efficiency reasons and to assist in navigation for safety reasons.

The VTS functions are designed, in line with the above definitions, for supporting vessel traffic with services. For instance, compared with existing systems it can provide ships with information that is more detailed, more accurate and more frequent. It will perform as a traffic coordinator in order to expedite vessel movements and allocate space. Also it will support shipboard navigation by shore-based equipment in guiding the vessels, warning them of any navigational danger caused by other ships or by nature.

There are some interesting statistics concerning the number of ship collisions annually in the Dover Strait. They have been reduced to a satisfactory level by the effectiveness of the traffic separation schemes and the Vessel Traffic Service as shown in Figure 3-1.

Figure 3-1 Collisions in the Dover Strait(1960 to 1979)

(COST 301: 1988, pp 115)



COLLISIONS IN THE DOVER STRAIT (1960 TO 1979)

The VTS functions can be categorized into two main areas, namely internal functions and external functions.

3.2 The internal functions of the VTS

3.2.1. Data collection/acquisition

VTS data may come from various sources for example, the Harbour Department, the Port Authority of Thailand, the Meteorological Department, the Hydrographic Department, ships and shipping companies and the VTS monitoring stations. Data must be updated from time to time depending upon the rate at which it changes. The data collected should be relevant and sufficient in quantity and accuracy. VTS data generally may be divided into 4 groups as follows:

1. Navigational data
   - state of navigation aids and waterway including structures and obstructions
   - areas of high traffic density
   - state of berths and anchorages
   - water depths
   - emergency situations and pollution

2. Environmental data
   - meteorological data regarding fog, rain, thunderstorms and visibility, wind speed and direction, sea conditions, etc.
   - hydrological data regarding the tide and current in the river and the Bangkok Bar Channel

3. Ship data
   - ship's callsign, nationality, ship's dimension, draught, speed limits, ETA, ETD, origin and destination, dangerous goods, ship deficiencies, manoeuvering particulars

4. Traffic data
   - ship's callsign, ship's position, course and speed, intended tracks, waypoints.

3.2.2. Data evaluation

As mentioned before, the data cannot be used directly in certain cases. Collected data has to be evaluated first. This task can be done very well by a computer by taking raw data and processing them by sorting, merge, extracting, collating and extrapolating to obtain the necessary information for

- generating total traffic image, density, flow and composition
- assessing the potential risks in traffic
- analyzing the traffic to allocate speeds and space

3.2.3 Decision making

After the data are evaluated, the VTS will make the traffic plans based on the data, rules and regulations which best suit the situation. The plans that are made by the VTS include sailing plans and contingency plans.

1. Sailing plans

After the data evaluation, the total traffic will be considered and planned by the VTS and the sailing plan which consists of time and space allocations for individual ships may be distributed to the ships. With the consent of a ship's master, the sailing plan will become valid; otherwise if any ship has a good reason to change the sailing plan, it may do so within good time and in a safe manner. They are obliged to inform the VTS, however, and obtain approval.

2. Contingency plans

Contingency plans are plans which are used in cases of emergency such as collision, grounding, fire aboard, disabled ships, poor visibility, etc. Each type of emergency has its own plan which is designed by the VTS. When such a situation occurs, the procedure of the contingency plan will be announced by the VTS and all ships are obliged to comply with this procedure.

3.3 The external functions of the VTS

3.3.1. Data provision/exchange

Data provision refers to the flow of information from the VTS to the ships in the traffic. The useful information provided by the VTS supports the masters of ships in decision making by enabling them to make a full appraisal of the information. The information may be divided into two groups: general information and individual information. According to the type of information, the data would be provided to ships in two ways: the general information by broadcasting and the individual information by ship-shore or ship-ship communication. At this stage the navigation of the ship is left to the decisions of the master and without any influence or interference by the VTS.

3.3.1.1 General information

- Broadcasting of navigational environment information, daily traffic movements, navigation warnings, local notices to mariners, local weather report and hydrological information including visibility, gusts and storms, tides, currents and changes in depth of the Bar Channel; specific navigational conditions: hindrances, barge trains, large ship encounters, dredging works, fishing vessel density and other specific items

- Instantaneous broadcast of urgent notification within the VTS area: rogues, grounding, collisions, fire on board, pollution, relevant details for navigating in port when a vessel is entering or leaving port waters.

- Exchange of ship information with adjacent VTS centers, probably at Leam Chabang Deep Sea Port

- SAR information to RCC

- Providing published information bulletins

3.3.1.2 Individual information

- Individual shipping information service

- Individual general information service

3.3.2. Monitoring function

For monitoring the traffic an identification and tracking system is essential. Progress can be monitored by ships reporting the position through radio communication, but independent monitoring requires radar, VHF DF, closed-circuit TV and/or visual observation from shore or patrol boats.

The VTS has to monitor the traffic in the area coverage to ensure: a good traffic flow, the safety of navigation and ships'compliance with the rules and regulations.

1. Good traffic flow

If every thing goes according the sailing plans, the time and space allocations will be in good order. However, an unexpected situation may arise which may require a change of plan. To detect this, continuous traffic monitoring by the VTS is necessary.

2. Safety of navigation

The VTS has to constantly monitor hazards or dangers in navigation, risks of collision, and traffic deficiencies such as ship delays or obstructions of barge trains. If a hazard is detected, a warning will be given to ships to avoid unwanted consequences.

3. Ships'compliance with the rules and regulations

When a breach of rules or regulations occurs, the VTS will detect this as soon as possible. A warning will be given to ships to prevent any accident that might occur due to non-compliance with safety rules and regulations.

3.3.3. Control function

The control function of the VTS comprises activities, where ships are given directives to follow certain procedures, and also the enforcement of rules and regulations.

1. Control of traffic

If the VTS monitoring determines that an unsafe navigation situation will arise, then it has to intervene in the traffic. It may do so by exercising its authority to give directives to the traffic in accordance with the situation and circumstances. The control of traffic may be conducted in the form of directives regarding the movements or navigation of ships in the VTS coverage area.

- The directives for movements are given to the traffic that is entering, leaving or moving within the VTS area.

- The directives for navigation apply to the traffic flow, for example by controlling ship speed in order to have safe distances between ships in the same traffic path or to have ships encountering at appropriate points. At the request of a ship, the VTS may assist the ship in navigating in the VTS by advising it of its position or directing it through the channel. However, the master has the final authority in controlling the ship.

2. Enforcement of rules and regulations

When the VTS discovers a breach of rules and regulations, a warning will be given. If the ship does not comply with the rules and regulations after the warning, the VTS may decide to intervene as necessary and ships may be penalized.

3.3.4 Remedial function

The remedial function is the extra function that is incorporated in the tasks of the VTS in order to utilize the VTS equipment and its facilities for purposes other than traffic control. The special tasks refer to the following operations:

- Radio watchkeeping for safety and distress signals
- Search and rescue operations
- Medical assistance
- Pollution prevention
- Salvage operation
- Other special operations

CHAPTER 4

ORGANIZATION AND STRUCTURE OF THE BANGKOK VTS

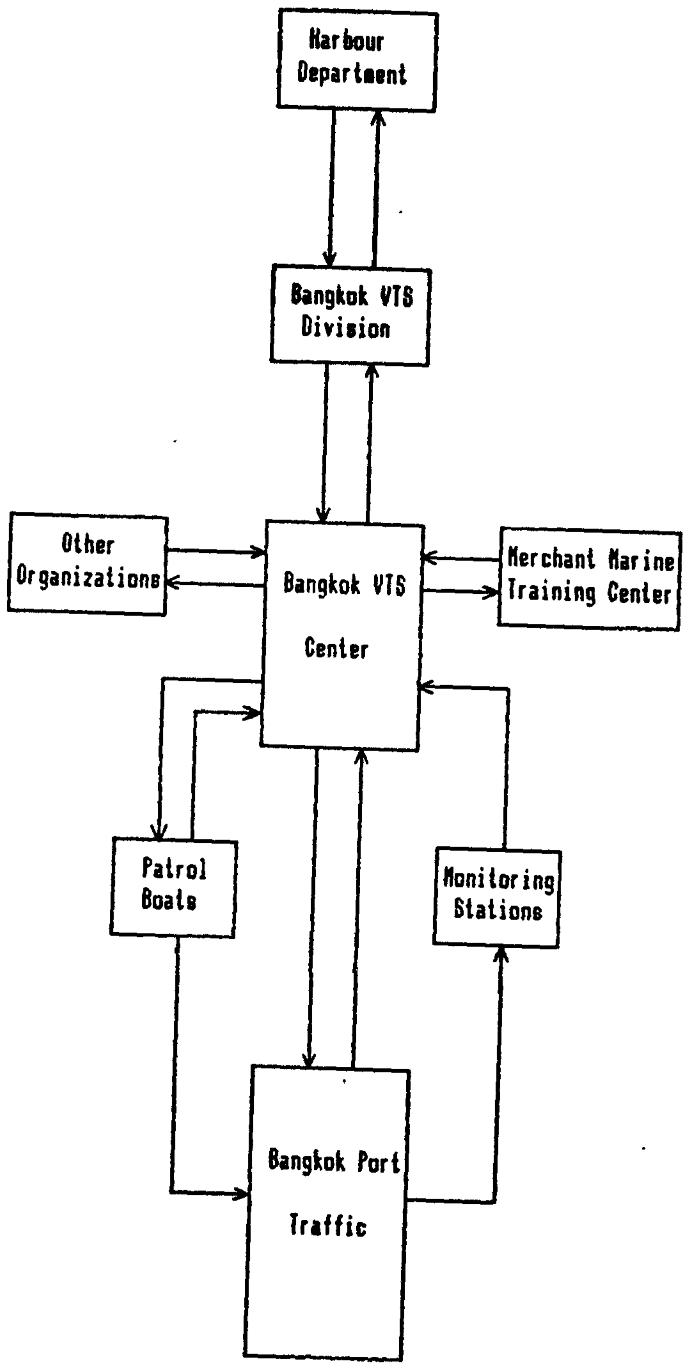
4.1 Vessel Traffic Service Organization

To be established under the authority of the Harbour Department, the Bangkok Vessel Traffic Service organization is the organization that would supervise, manage and control the vessel traffic in Bangkok port. As a matter of fact, the VTS would take over these specific functions from the Water Transport Inspection Division of the Harbour Department which is currently responsible for the water traffic for the whole country. The Bangkok VTS organization would be headed by the Bangkok Vessel Traffic Service Division or Bangkok VTS Division. It would supervise, manage and control the vessel traffic in Bangkok port with the VTS operators and special equipment and facilities. The VTS organization would consist of 5 subdivisions:

1. Bangkok VTS Division
2. Bangkok VTS Center (Bangkok VTC)
3. Monitoring stations
4. Patrol boats
5. Bangkok port traffic

The VTS organization chart shows the structure and organization of the proposed Bangkok VTS (see Figure 4-1).

Figure 4-1 Proposed Bangkok VTS Organization



4.1.1 Bangkok VTS Division

The Bangkok VTS Division will be the authority which is responsible for the supervision, management and control of the traffic in Bangkok Port(see Figure 4-1). It will have several units under its authority: the Bangkok VTS center and supporting units such as monitoring stations and patrol boats.

The Bangkok VTS Division will be responsible for:

1. VTS implementation and policies, recruitment of VTS personnel
2. drafting rules and regulations concerning vessel traffic services and remedial services
3. setting up communications procedures and operation procedures
4. promulgating VTS rules and regulations
5. provision of VTS equipment, facilities and their maintenance
7. administration and management of the VTS organization
8. training of VTS personnel
9. cooperation with the other divisions, agencies and organizations

4.1.2 The Bangkok VTS Center

The Bangkok VTS Center will be the control center(see Figure 4-1) that will be operated 24 hours a day.

The main functions of the VTS center are to be:

1. data collection/acquisition
2. data evaluation
3. data provision/exchange

4. port clearance
5. making sailing plans for the traffic
6. monitoring the safety of navigation, navigational hazards and dangers, the traffic flow
7. traffic organization
8. enforcement of rules and regulations
9. remedial activities

The function of the VTS center will be supported by its equipment installed in the control center: communications network and identification and tracking network. The communications network is consisted of radio telex, satellite communication equipment and VHF for ship-shore communication; and telephone, telex, telefax and data communication for shore-shore communication. The identification and tracking network is composed of VHF direction finders, automatic tracking radars, radar data processing computer, database computer and control console(see details in Chapter 6).

4.1.3 Monitoring stations

The monitoring stations will be unmanned and equipped with radars and VHF direction finders.

4.1.4 Patrol boats

The patrol boats manned with crews will patrol the river at particular times to regulate and monitor the traffic in the river. Sometimes they will be on standby for assisting the VTS center when it is required to go on the scene to inspect a ship or investigate an accident and report to the VTS center.

4.1.5 Merchant Marine Training Center

The Merchant Marine Training center, another organization under the Harbour Department, is the appropriate institute for training VTS personnel. It has various equipment and facilities for training ship officers such as a radar simulator and communications equipment. It will be able to provide short courses for training VTS operators who are recruited as well as courses to refresh and update VTS personnel who will have been working for a period of time(see Chapter 7 for further details).

4.1.6 Other organizations

These organizations are the external organizations with which it will be necessary to cooperate. The VTS center will require information or cooperation or both from organizations such as the Pilot Division, the Water Transport Inspection Division, the Port Authority of Thailand, the Meteorological Department, the Customs Department, the Immigration Division, the other VTS organization, shipping companies, agencies, etc.

4.2 Infrastructure changes relevant to the VTS

The infrastructure of the VTS will be part of the infrastructure of the port. The existing infrastructure needs improvement and what does not exist will have to be established. The following improvements will be required:

1. The Bangkok Bar Channel needs to be dredged to a standard depth through the channel.
2. The Bar Channel buoys should be laid on both sides of the channel.

3. As for the installation of other navigation aids, channel buoys should be equipped with radar reflectors and a radar beacon should be established at the Bangkok Bar Channel.

4. Establishment of one-way traffic schemes on a time-slot basis(for details see Chapter 5).

5. A communications network and an identification and tracking networks for the VTS will be required(see also Chapter 5).

6. The anchorage areas at Bangkok Pilot Station and in the river for general cargo ships and dangerous cargo ships, should be upgraded in order to accommodate a greater number of ships with satisfactory safety precautions and measures.

7. A remedial network will be required to establish communications and cooperation between the VTS and other entities such as a Search and Rescue center, a hospital in cooperation for medical assistance, and tugs in cases of towing assistance or accident.

CHAPTER 5

IMPLEMENTATION AND OPERATION OF THE BANGKOK VTS

5.1 New traffic pattern, rules and regulations

Because of the complexity of traffic and the presence of undisciplined waterway users, it is necessary to set up a new traffic pattern in a structural way. So that masters and pilots will be able to clearly understand and assess the prevailing circumstances. If a problem arises or something goes wrong, it will be detected in an early stage and they will have more time to make decisions and take actions in order to avoid collision or grounding or other disasters. With the new traffic pattern and new rules and regulations, the safety and efficiency of navigation will be improved as well as the protection of the environment.

5.1.1 The new traffic pattern

The new traffic pattern to be proposed in the Bangkok VTS takes into consideration the limitations and dangers in the river and Bangkok Bar Channel and the dangerous cargo transportation to be controlled. The new traffic pattern for the implementation of the VTS is proposed as follows:

a) The barge trains should have a limitation on length; the tugs should have a minimum horsepower. They should navigate close to the bank of the river and should avoid navigating in the middle of the river or channel as much as possible.

b) The speed of ships should be limited when navigating in the river and in the channel. In particular, when two ships are passing a low speed for both ships should be required. Another crucial point is the overtaking situation, where it is allowed. Not only does the speed limit have to be taken into account but also the difference between speed of the two ships should be large enough to make the overtaking time as short as possible.

c) The ferry boats crossing the river at the Phra Pra Daeng bend(km.+18) should give way to the seagoing vessels passing in this area.

d) For ships or barge trains carrying dangerous goods, the following special precautions should be imposed:

- They have to navigate without encountering other seagoing vessels or barge trains in the Bar Channel and to keep a good distance from the ships ahead and astern. Special attention should be paid when she is proceeding in the river until berthed.
- They have to anchor when the visibility is restricted.

e) One-way traffic on a time-slot basis for seagoing vessels and barge trains at the bends in the river and the Bar channel should be established as follows:

In the river:

1. between km+29.0 and km+30.0
2. between km+24.5 and km+25.5
3. between km+17.0 and km+19.0
4. between km+ 7.5 and km+ 8.5

In the Bangkok Bar Channel:

1. from km.0 and km-18.0

The one-way traffic schemes are shown in Figure 5-1. It is not allowed to have ships encountering in these schemes. The passage plan should be carefully considered and planned so that no ships are passing or overtaking in this area. If the plan cannot be followed, the ship sailing against the current should give way to the ship sailing with the current.

f) Ship reporting schemes should be established to identify the seagoing vessels and the barge trains. All ships should report their name and callsign, position and other information(specified in 5.3) to the Bangkok Vessel Traffic Center(Bangkok VTC)

1. before entering the Bangkok Bar Channel
2. before leaving the berth or heaving up the anchor at the anchorage
3. when passing so-called reporting points(RP) as follows:
   RP 1. Bangkok Bar entrance km.-18
   RP 2. Pom Phra Chulachomklao km.0
   RP 3. Naval Academy km.+8
   RP 4. Phra Pra Daeng bend km.+18
   RP 5. ESSO oil storage km.+30
   RP 6. Krung Thep Bridge at km.+40
   (see Figure 5-1)
4. when berthed or anchored.

g) The overall traffic should be planned, controlled and monitored by the Bangkok Vessel Traffic Center(Bangkok VTC).

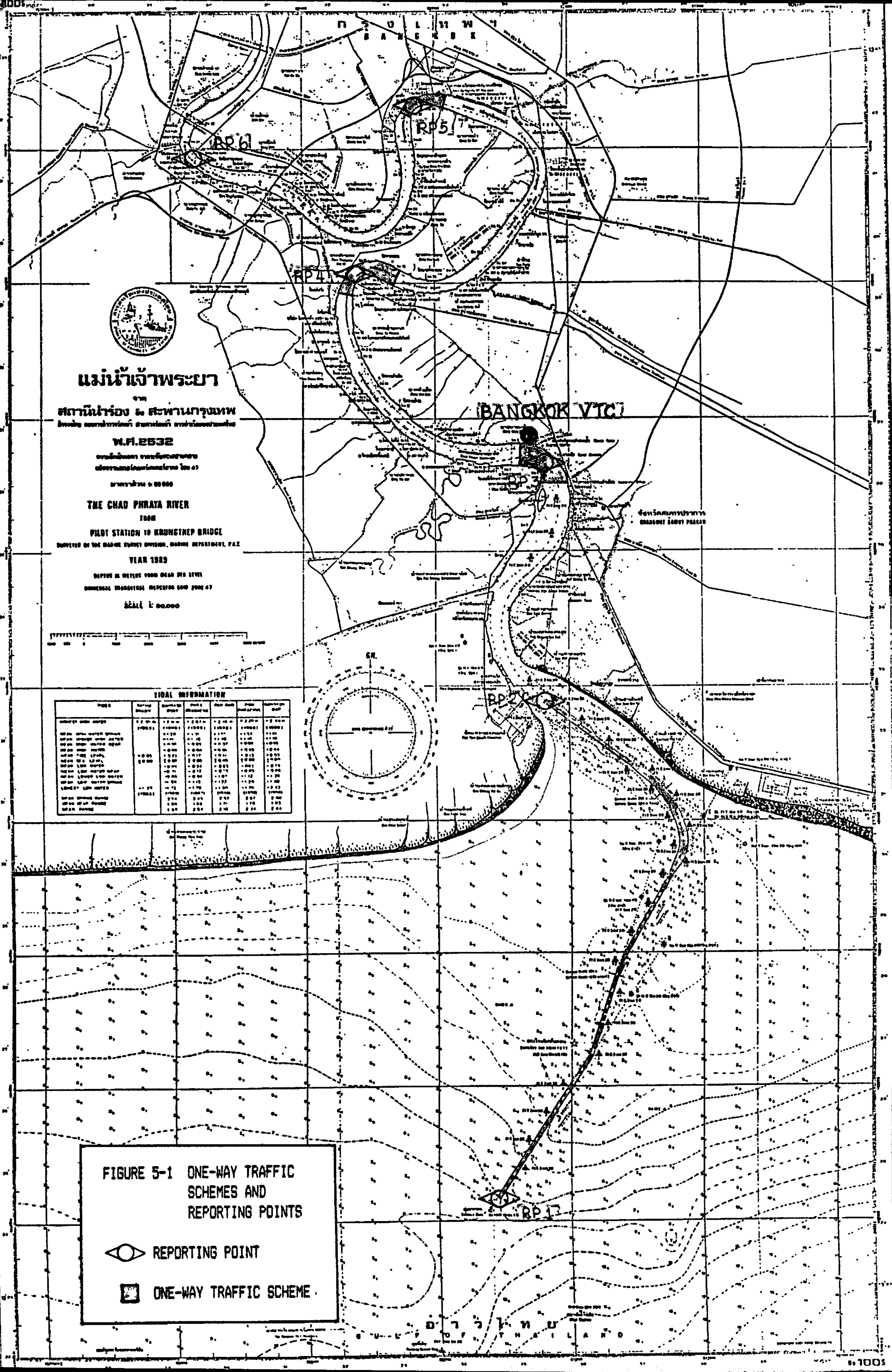


FIGURE 5-1 ONE-WAY TRAFFIC SCHEMES AND REPORTING POINTS

5.1.2 Rules and Regulations

5.1.2.1 Introduction

Rules and regulations for navigation and environmental control in the river and the Bar Channel will provide the basic principles of operation for all waterway users in order to navigate in that specific area in the same manner, especially for collision avoidance.

The rules and regulations nowadays in force in Thailand are contained in two acts: the Navigation in Thai Waters Act B.E.2456(A.D.1913) and the Regulations for Preventing Collisions of Ships Acts B.E.2522(A.D.1979).

1. The terms, definitions and regulations of the Navigation in Thai Waters Act B.E.2456 Part 1 Section 1-6 with respect to navigation in the Chao Phraya River and the Bangkok port, are rather out of date for the present situation.

2. The Regulations for Preventing Collisions of ships Acts B.E.2522 in compliance with the International Regulations for Preventing Collisions at Sea, 1972, gives the Harbour Department the authority to adopt the regulations for preventing collisions of ships navigating in channels and rivers.These were adopted in B.E.2524. However, no consideration was given to the navigation in ports and harbours such as Bangkok port and Sattahip Deep Sea port. When there is a lack of appropriate rules and regulations a conflict of navigation always occurs and a solution to the conflict has to be agreed or it will end up causing an accident.

Another problem is the impediment of traffic by the barge trains and fishing vessels. Special rules and regulations for the navigation of such vessels in the Bar

Channel and the Chao Phraya River should be imposed to increase navigational discipline.

5.1.2.2 New rules and regulations

The rules and regulations which will be required in the VTS are:

1. A revisions are necessary in the revised Navigation in Thai Waters Act B.E.2456 Part 1 section 1-6 concerning the navigation channel and traffic lanes in the Bangkok Bar Channel and the Chao Phraya River; the duties of ship masters when entering and leaving the Bangkok port; anchorages, mooring and berthing; size and speed limits; and accident investigation.

2. Adoption of rules for navigation in the Bangkok Bar Channel and the Chao Phraya River to impose one way traffic schemes and limit the speed and direction of traffic flows. The rules for overtaking situations and head-on situations have to be given more emphasis which also applies to the passing distance, traffic density, size and draught of ships, manoeuvrability of ships and the assessment of circumstances such as winds, currents, visibility, ships in vicinity.

3. Rules should be designed to limit the tow length of barge trains and the minimum horsepower. Tugs should be able to perform the VHF communications and keep a continuous listening watch while navigate in the VTS area.

4. Rules for the reporting scheme and communications procedures should be adopted. Participation in the reporting scheme should be compulsory for cargo vessels

above 300 G.R.T.. for vessels carrying dangerous cargoes and for barge trains.

5. Authority should be given to the VTC in order to monitor and control the traffic and the enforcement of the rules should be effected in cooperation with the Bangkok Harbour Master.

5.2 Communications system and tracking system

5.2.1 Communications system

A communications system will be required in the VTS for ship to shore and shore to ship communication on

1. long range
2. medium range
3. short range

in order to broadcast routine messages and to communicate with ships at sea and in the Bangkok port.

Another type of communication is shore to shore via land communication network. It will be useful for acquiring information from various sources and giving it to parties on request.

In the existing system, communications between ship and shore use radio telegraphy for long range and medium range communication. For the Bangkok VTS, the radio telex should be included in service for coastal vessels and the system of communication via satellite should be introduced because nowadays the number of satellite communication users is increasing rapidly with the implementation of INMARSAT A and INMARSAT C(voice communication and data communication). In the very near future when the INMARSAT system is fully implemented, the ship-shore communication by radio telegraphy will no longer exist on board modern vessels and at that time satellite communication will be necessary to make the Bangkok port competitive.

For short range communication, at the moment the VHF communication is the most efficient system. The short range communication for the VTS should have VHF communication with sufficient channels for various users in consideration of the channel load.

The shore to shore communication for the VTS should use the landline network and be fully equipped with various facilities such as telephone lines, telex, telefax and data communication.

5.2.2 Identification and tracking system

Before the entry or movement of a ship in the VTS area, the identity of that ship must be determined by the VTS through the identification system.

The tracking system will be used for tracking ships participating in the VTS. It will give the position, course and speed history and will also be a useful tool for predicting the ship's position. However, torrential rains within VTS area(especially at the Bangkok Bar) may cause tracking failures, in such a case the special provision should be used such as keeping the distance between ships larger than normal and reducing the ships'speed.

1. Identification system

Identification will be made when a ship reports to the VTS and verified when the ship passes the control points as proposed in 5.1.1. The communication and operation procedures and information contents will be discussed further in 5.3. Ships which participate in the VTS have to report to the VTS center before entering the VTS and when passing the reporting points by VHF communications. The VTS center, by using the VHF and the VHF Direction Finders(located at the Bangkok Bar area), will be able to identify and track ships within the VTS area.

2. The automatic tracking system

The automatic tracking system of the VTS is similar to the Automatic Radar Plotting Aids or so-called ARPA that will be used on board ships. However, the automatic tracking system for shore-based radars will be a larger system with respect to the number of radars, combination of pictures from different radars, number of targets to be tracked and the display of information. For the Bangkok VTS, the automatic tracking system should be able to detect and track at least 50 targets in the river and 100 targets at sea including channel buoys. The automatic tracking system will consist of three components:

a) Automatic tracking radars

The detection and tracking of ships will have to be done at different remote radar sites to cover the whole area of the VTS. Each radar site will have one radar and will be unmanned. The radar antenna must be high enough to ensure coverage.

b) Radar data links

Due to the installation of radars at different sites in the extensive area to be monitored, the radar data will have to be transmitted to the VTC to be processed and displayed there. Microwave link will probably be the most efficient means of doing this.

c) Radar data processing computer

The radar data processing computer at the VTS center will have to process the information sent from the remote radar sites before displaying at the central control console. The computer will have to provide sufficient memory and high speed data processing capability for target extraction and calculations and it should be real-time.

5.3 Procedures for communication and operations

The communication procedure should define the way to convey the information with precision, clarity and unambiguity.

5.3.1 Communication Procedures

Communication will occur between masters, pilots and the VTC in planning and conducting navigation. The problem in communication for navigation is, as Van Hooff explains, the language problem: " The function of the pilot on board is that of an adviser to the master. Even if the pilot is permitted to conduct the navigation entirely by himself, the master remains responsible. This entails that the master should be able to judge the actions of his pilot at all times, and if necessary to intervene. The master should therefore be able to understand the messages from the shore radar to the pilot. Since normally these messages are in the language of the country of the port, a foreign captain may not be able to understand their content. When there is little or no more time to ask the pilot for translations, the master will be in very awkward position"(HOOFF: 1982, pp XI-77). To improve the efficiency and effectiveness of voice communication and overcome of the language problem, a uniform communication procedure is a solution.

1. General procedures

In VTS operations, voice radio communication(VHF) will play the most important role in providing information, organizing the traffic and performing the control function. The communication procedure should be set up to define the users in compliance with the international standards of maritime communication.

a) The procedure should specify the English language as the recommended language used for communications in the Bangkok VTS. The English language is internationally recognized as the traditional maritime language. However, non-English speakers have to overcome the difficulties of the language such as pronunciation and vocabulary.

b) The physical objects, areas and points in the Bangkok VTS should be named so that they can be easily identified and recognized, and for the ship reporting system the Alpha-Bravo system should be specified(Resolution A.648(16), 1989). The Alfa-Bravo system should be used in voice communication to transmit messages with marking words. The Alfa-Bravo system is classified as communication level 1 or "Slot and Filler" for the most frequent messages.(Mulders: 1990, pp 17).

c) The use of Standard Marine Navigational Vocabulary is recommended as a language link. The Standard Marine Navigational Vocabulary(SMNV) was adopted by the IMO Assembly in 1977 as Resolution A.380(10) to enhance the safety of navigation and conduct of ships and to standardize the language used in communication for navigation at sea, in port-approaches, in waterways and harbours. The SMNV is classified as communication level 2 or "Rigid Format" for common messages(Mulders: 1990, pp 17).

d) The use of SEASPEAK, referring to the SEASPEAK reference manual published by Pergamon Press, is also recommended. It contains procedures for initiating, maintaining and terminating conversations and the recommended language and structure of the message. SEASPEAK followed SMNV(1977), which was adopted by IMO; the ITU standard radio communication procedures(ITU stands for the International Telecommunication Union). Through the use of SEASPEAK in voice communication, the transmission of information will be clear, efficient and accurate. Seaspeak is classified as communication level 3 or "Generative" for the least common messages(Mulders: 1990, pp 17).

e) General procedures should be established concerning, for example: the priority sequences of communications, the controlling station, interruptions of communication, radio reception, and loss of contact and they should comply with the ITU standard radio communication procedures.

f) The communication procedures should be harmonized with other types of communication such as NAVTEX and meteorological broadcasts.

2. Exchange procedures

The exchange procedures will be used to organize the information flow between two radio stations- for example, ship to ship or VTC to ship.The procedure is as follows:

a) Make initial call
b) Respond to call
c) Agree on working channel
d) Apply switch-over rules
e) Transmit message

f) Respond to message transmission

g) End transmission

h) End procedure

3. Broadcast procedures

The broadcast procedure which to be used for radio message transmission by the Bangkok VTS to several ships simultaneously is proposed as follows:

a) Make initial call

b) Apply switch-over rules

c) Broadcast message

d) End procedure

5.3.2 Operation procedures

1. Reporting Schemes

The operation procedures may be divided into 6 categories according to the type of operation.

1. ship report 24 hours before arrival
2. movement report
3. pre-entry and pre-departure report
4. entry and departure report
5. final report inbound and outbound
6. emergency and other reports

Table 5-1 The format for reporting categories(Alfa-Bravo System)

Data	Categories					
	1	2	3	4	5	6
1.Name and Callsign A	*	*	*	*	*	*
2.Time (local) B	-	*	*	*	*	*
3.Position C	-	*	*	*	*	*
4.Course E	-	*	-	*	-	-
5.Speed (knots) F	-	*	-	*	-	-
6.Last Port G	*	-	-	-	-	-
7.ETA (local) I	*	-	-	-	-	-
8.Pilot J	*	-	*	*	-	-
9.Draught (meters) O	*	-	*	-	-	-
10.Dangerous Goods P	*	-	*	-	-	*
11.Agent T	*	-	-	-	-	-
12.Type of Ship U	*	-	*	-	-	*
13.Dimension (meters)U	*	-	*	-	-	-
14.Tug X	-	-	*	*	-	-
15.Other X	*	-	*	-	-	*

2. Navigational assistance procedures

The VTS will provide navigational assistance to support ships in different situations. The types of navigational assistance operation are navigational information, hazard and danger warnings, navigational advice and instructions, and collision avoidance and manoeuvering. The procedure is as follows:

a) Ship callsign
b) Station that is calling
c) Respond to call
d) Type of navigational assistance operation
e) Operation message transmission
f) Respond to transmission
g) End transmission
h) End procedure

The IALA VTS Committee, which included experts from other four international associations, namely IAPH, IAIN, IFSMA and IMPA, had studied the VTS communications and reached the conclusion that "a clear understanding of the contents of such communications could be best acheived by the use of standard messages"(NAV 36/INF.8: 1990). Examples of VTS communications to support the VTS functions were produced and submitted to the IMO (see details in Appendix 3) and these examples give the clear understanding of the contents of the VTS communication and can be applied to the Bangkok VTS as well.

CHAPTER 6

TECHNICAL REQUIREMENTS

6.1 Communications network

The communications network in the VTS will have to provide ship-shore communications and shore-shore communications. The communications network in Bangkok port of several organizations such as the P.A.T., the Bangkok VTS, the pilot station, the Harbour Department and the Communication Authority of Thailand(coastal radio station) should be integrated.

6.1.1 Ship-shore communications

6.1.1.1 Long range and medium range communications

For long range and medium range communications, the range of communication will cover a distance of 200-500 N.Miles and 30-200 N.Miles, respectively. The types of communications systems used at present are HF, MF, VHF and Satellite communication(Satcom).

1. Radio telex

Radio telex is still in use in ocean-going vessels for ship-shore communications. It is used for data communication at a low speed rate(50 Baud) with zero error checking. In comparison with Satcom, radio telex is cheaper for communications services. The radio telex machine consists of transmission and reception facilities with an input keyboard and printing machine. The VTC should be equipped with one radio telex.

2. Satcom

The satellite communications system which operates in worldwide services for maritime users nowadays is INMARSAT. The INMARSAT satellite system, which employs geostationary satellites and operates in the 1.5 and 1.6 GHz frequency bands, provides a capability for two-way communications using radio telex and radio telephone(direct-dial), data communications(via telephone channel), and facsimile. Thailand is covered by the Indian Ocean Region satellite and partly covered by the Pacific Ocean Region satellite and the nearest Coast Earth Stations are in Singapore and Hong Kong. The components required for the VTC are:

1. Inmarsat-A terminal(transportable)
2. Dynamically-driven parabolic antenna, generally housed in a radome

6.1.1.2 Short range communications

For short range communications, the range of communication will cover an area with a radius of 25-30 N.Miles(line-of-sight). The most effective equipment to use for short distances for voice communication will be VHF radiotelephone.

The device that will be needed for the VTC is a VHF installation which can operate in

- a frequency range of 155.5-163.550 MHz and 121.5 MHz
- half-duplex and full-duplex transmission modes.
- 99 channels(maritime mobile band)
- a 30-mile range

Each operator in the VTC should have a VHF set at his disposal.

6.1.2 Shore-shore communications

The shore-shore communication will connect to landline communications network. The equipment to be installed are telephone, telex, telefax and data communication(computer modem).

6.2 Identification and tracking network

In order to monitor and control the traffic, the VTC will have to identify each ship's name and callsign as well as its position. Once the VTC identifies the ship it will be able to keep track of this ship continuously until it has anchored, berthed or left the VTS area. In addition, the tracking network will assist the VTC to monitor the position of the navigational buoys in the channel.

6.2.1 Reporting system

The requirements for the VTS to track the vessel via the reporting system will be:

1. A VHF Radiotelephone which will be used for transmitting and receiving messages regarding identification and position by communication. This equipment can be used for two purposes at the same time: communication and tracking, as already mentioned in the communications network.

2. VHF Direction Finders will allow the VTC to detect the position of a ship which is transmitting a radio signal within the VHF band. In the area of the Bangkok Bar, there are many ships coming in and going out of the channel and also many ships at anchorage. The radio direction finder will be used to determine the position of the ship on the radar screen, which means to confirm that the VTC is

communicating with the correct ship. VHF DFs should be installed at the Pilot Station, at No.2 radar site and at the Racon(see Figure 6-1).

The specifications of the proposed VHF DF are as follows:

i) VHF DF receiver

Frequency range: 155.5-163.55 MHz and 121.5 MHz

Number of VHF channels: 15 preselected channels automatic scanning

Bearing Resolution: 0.3 degree

Accuracy(R_{95}): 1 degree

Data Interface

ii) DF antenna

8-element antenna array

6.2.2 Automatic tracking system

The monitoring functions of the VTS are mainly based on an automatic tracking system. The automatic tracking system consists of four main components.

1. Radar site installations
2. Radar data links
3. Radar data processing computer
4. Radar displays

1. Radar site installations

The VTS radar will have to cover the entire VTS area as indicated in the proposal for the Bangkok VTS in Chapter 2. Several factors will have to be taken into consideration such as several bends in the river which affect the line-of-sight of the radar, the very small size of some targets like buoys or small fishing vessels, and the width of the Bangkok Bar

Channel which restricts the passing distance between the ships when they encounter each other. A narrow channel like Bangkok Bar requires highly accurate radar bearing and ranging to obtain the best position of the target and also an efficient radar data processing and ship information processing system.

To fulfil these requirements, the following VTS radar specifications are proposed:

Transceiver

1. Frequency: between 8825-9225 MHz tunable
2. Wavelength: 3 cm.
3. Peak power: 30-40 kW.
4. Maximum range scale: in the river 5-9 kilometers
   : at the Bar 50 kilometers
5. Pulse duration: 0.03 microsecond for PRF=2,000-3,000
   : 0.05 microsecond for PRF=1,000
6. PRF in the river: 2,000-3,000 pulses/second
   at the Bar : 1,000 pulses/second
7. Video processor: Analog/Digital converter

Antenna

1. Slotted Array type for 8825-9225 MHz
2. Horizontal beamwidth at 3 dB: 0.23 - 0.35 degree
   20 dB: 0.50 - 1.00 degree
3. Vertical beamwidth at 3 dB: 4 - 20 degrees
4. Polarization: Circular(for suppression of rain clutter)
5. Antenna rotation: 20 rpm
6. Antenna gain: 36 dB
7. Side lobe response: -27 dB

Radar sites

The radar sites should be located at the outer curves of the river to obtain the best visibility. The coverage range of the radars should partly overlap especially at the sharp bends. The number of radar sites required is ten at the different locations as follows:

Radar site No.1 at Pilot Station
Radar site No.2 at km. 0 west side
Radar site No.3 at km.+8 east side
Radar site No.4 at km.+13 west side
Radar site No.5 at km.+18 west side
Radar site No.6 at km.+22 east side
Radar site No.7 between km.+25 - km.+26 east side
Radar site No.8 between km.+29 - km.+30 east side
Radar site No.9 at km.+34 west side
Radar site No.10 between km.+37 - km.+38 west side
(see Figure 6-1 The location of the radar sites)

Radar antennas at sites should have minimum height to cover the minimum range(without the height of target) as shown in Table 6-1.

Table 6-1 The antenna heights and the detection ranges

Radar sites	Antenna height	Range of detection
No.1 to No.8	5 meters	9,260 meters
No.9	20 meters	18,470 meters
No.10	40 meters	26,120 meters

Radar accuracy

According to the radar specification, the accuracy of the target position is calculated as shown in Table 6-2 according to the following definitions.

For the radar with Bearing accuracy (M_{95}) = 0.20 degree

Range accuracy (M_{95}) = 20 meters

$$R_{95} \text{ of position fix.} = \sqrt{\frac{M_{95}{}^2{}_{(1)} + M_{95}{}^2{}_{(2)}}{\mathrm{Sin}(90^\circ)}}$$

(Mulders: 1989, pp 3.16)

Table 6-2 The accuracy(R95) of the position of target acquired by a VTS radar

Range in use (km.)	M95 of Radar Bearing LOP (m.)	M95 of Radar Ranging LOP (m.)	R95 of Target Position (m.)
1	7	20	21
2	14	20	24
3	21	20	29
4	28	20	34
5	35	20	40
6	42	20	46
7	49	20	53
8	56	20	59
9	63	20	66
10	70	20	73
11	77	20	80
12	84	20	86

In the overlaps covered by two radars the accuracy of the ship position will be improved by combining the two positions obtained by taking the weight as following:

$$W_{comb} = 1/R_{95}^2 + 1/R_{95}^2$$
$$R_{95comb} = 1/\sqrt{W_{comb}}$$

(Mulders: 1989, pp 3.15-3.16)

In the river, the ranges in use to be combined are 2 and 3 km.
So R_{95comb} = 18 meters .

At the Bar, the ranges in use to be combined are 6 and 12 km.
So R_{95comb} = 41 meters

The radar sites and their coverage areas are shown in Figure 6-1.

2. Radar data links

The radar data links will take the radar data from the radar sites to the VTS center in the form of data bits to be processed and displayed on the radar screen. In order to reduce the amount of information that will have to be sent to the VTS center, only the dynamic part which is in the river and in the Bangkok Bar Channel will be transmitted. However, the amount of data will still be very large, so the link must have the capacity to carry this data with high speed and accuracy. Microwave links will be the most efficient and convenient way. They will transmit data from the radar site direct to the VTS center. The microwave, however, has the limitation that the wave will propagate in a straight line. Therefore the antenna of the transmitter and receiver must be high enough so that the microwave can reach the receiver. The microwave link will consist of two components: the transmitter at the radar site and the receiver at the VTS center, and both sides will require a parabolic antenna at a certain height.

3. Radar data processing computer

1. Digital data processing(radar data quantization)
2. Scan-to-scan correlation
3. Synthetic information presentation
4. Automatic tracking(ARPA) with
   - maximum target tracking 50 targets
   - maximum speed error 0.1 meter/second
   - maximum ground course error 5 degrees
   - tracking filter(Alfa-Beta filter)

4. Radar displays

1. Display raster scan screen diameter: 406 mm.
2. Range: 2.5/5/10/20 km +/- 20%, 100% off-centring
3. Synthetic video and non-interlace
4. Bearing accuracy: 0.15 - 0.20 degree
5. Range accuracy: 12 - 20 meters

6.3 The VTS Control Center

6.3.1 Location

The VTS control center could be located at the Merchant Marine Training Center in Samut Prakan province as shown in Figure 6-1. The Merchant Marine Training Center is proposed as the VTS center because it will have several advantages. First, this location will be appropriate because it is near the river mouth. Most of the cargo ships coming to the Bangkok Port will pass this point, so the VTC will be able to visually observe the ships inbound and outbound. Second, the Merchant Marine Training Center belongs to the Harbour Department, for economic, management and administration reasons it would be good to utilize this location.

6.3.2 Control center

The control center should be near the river bank and as high as possible(on the top of the building), so that the VTS operators can view the traffic as far as possible.

The control center should have a control console for two VTS operators and be equipped with equipment for communications, identification and tracking. The control console should have four radar screens, two for each VTS operator. The coverage area of the radar screens may be divided as follows:

Screen No.1	from km.+40 - km.+15
Screen No.2	from km.+16 - km. 0
Screen No.3	from km. +1 - km.-13
Screen No.4	from km.-12 - km.-18 and anchorage area and inbound traffic (see Figure 6-1)

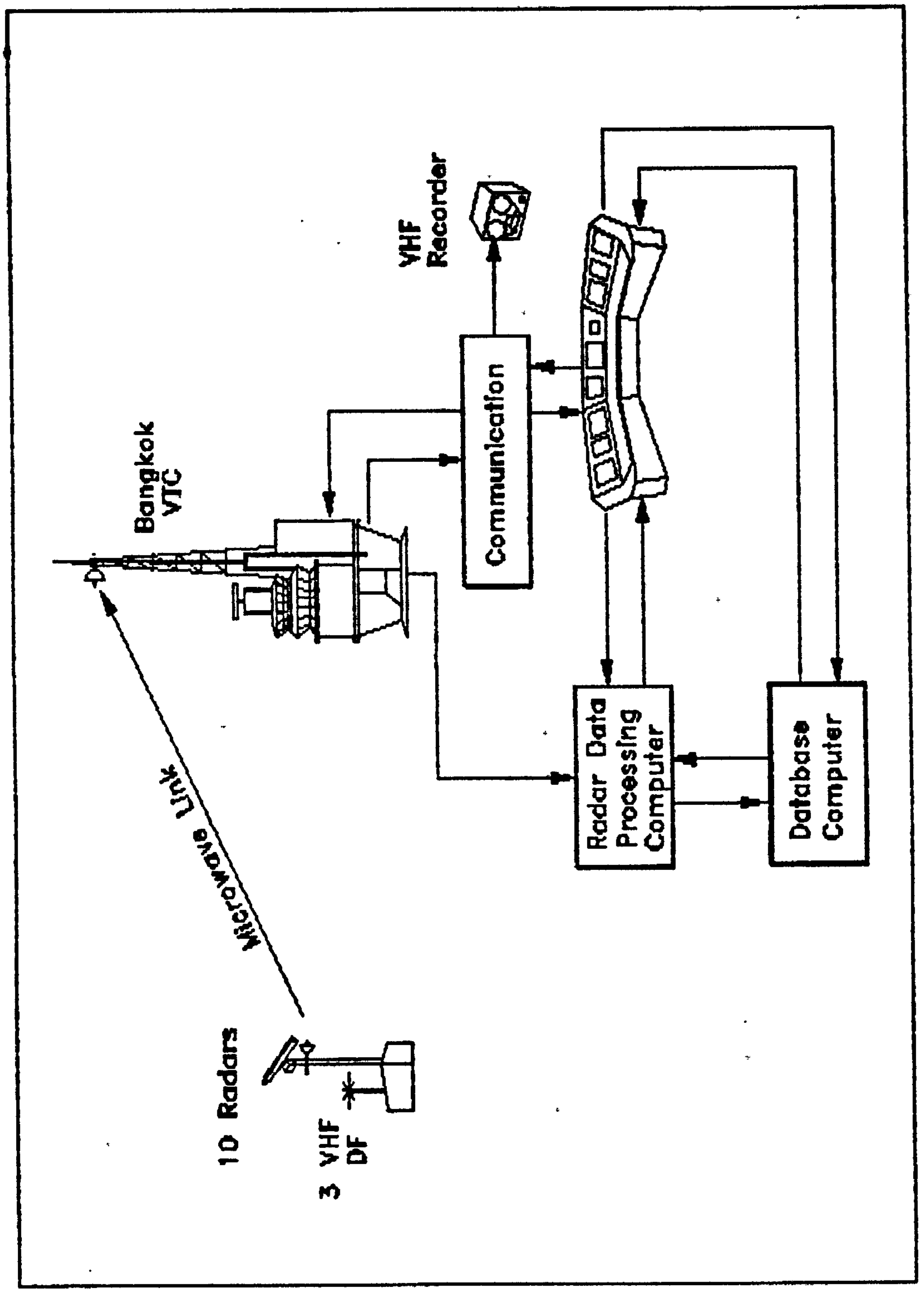
The area coverage by the four radar screens is shown in Figure.6-1

The control center will need a main frame computer as a database computer interface with the radar data processing computer and a control console at the VTS center for handling data such as ship information and port information. It can also be used for buffering radar pictures for 5 minutes.

The control center also will need a VHF recorder(voice logging system) to record voice communications on the VTS operating channels.

The system configuration for the Bangkok VTS is shown in Figure 6-2.

Figure 6-2 System configuration for the Bangkok VTS



6.4 Navigation aids

The navigation aids in the Bangkok port area consist of the buoyage system, the leading lights and a lighthouse. The most crucial aid is the buoyage system which is inadequate. Improvement is proposed as follows:

1. The buoyage system should be changed to a bilateral system having buoys on both sides of the channel. In this case, fourteen buoys should be installed in addition. The buoys on both sides can assist the master maintaining the ship in the middle of the channel in poor visibility when the leading lights cannot be seen. Another advantage of this system is that "the sides of the channel are clearly marked, so that the navigator may judge his manoeuvering space when meeting other vessels"(Hooff: 1982, pp XI-24).

2. The colour of the buoys should be maintained but the paint that is used should be changed to a luminous colour to increase the range of detection and the discrimination of the buoy from the sea surface background, especially during the dusk and dawn and in poor visibility.

3. The Bar Channel buoys should be equipped with octahedral radar reflectors, because this will increase the range of detection and make the buoys stand out better on the radar screen against sea return clutter which hamper the detection of small objects close to the ship(Hooff: 1982).

4. A racon should be installed at the leading light No.F to assist the navigation in the Bar Channel by ships'radars (see Figure 6-1).

6.5 Other resources

1. Two patrol boats should be used for patrolling in the river and in the Bar Channel.

2. Tugs(in cooperation with P.A.T.) will be used to render assistance to ships in the VTS area in case they are required.

CHAPTER 7

VTS OPERATORS

The VTS operators will be qualified persons who monitor and manage the vessel traffic with the available equipment provided in the Bangkok vessel traffic system. The VTS operators will have to fulfil the VTS functions: Internal and External functions, as mentioned in Chapter 3. The IMO has set the standards for VTS personnel. IMO resolution A.578(14), adopted on 20 November, 1985, Guidelines for Vessel Traffic Services, Section 6, Personnel, states that " The VTS authority should ensure that VTS operators have the qualifications and have received specialized training appropriate to their tasks within the VTS and meet the language requirements mentioned in paragraph 3.4, in particular with regard to VTS operators authorized to issue traffic instructions or to give navigational assistance."

The Bangkok VTS Authority will have to specify the prerequisite qualifications such as skills, knowledge and experience of candidates and give subsequent training to the future VTS operators according to analyses of the tasks that they have to perform. The training will partly take place in the classroom and on the radar simulator or shiphandling simulator and is complemented by on-the-job training.

7.1 Qualification and recruitment

The VTS authority should set up the prerequisite qualifications to ensure that candidates of the required level are recruited. A standard entry level will be important for the subsequent training program that will train the candidates to become competent VTS operators. In the screening mechanism, there will be three standard criteria for prerequisite qualification that have to be fulfilled.

These criteria will be:

1. Basic knowledge
2. Personal suitability
3. Nautical experience

1. Basic knowledge

Basic knowledge is required, with emphasis on the following specific subjects:

- basic navigation
- electronic navigation
- navigation aids and chartwork
- passage planning
- meteorology
- radio communication
- communications networks
- rules of the road
- shiphandling and manoeuvering
- dangerous goods
- maritime English
- maritime communication procedures and protocols

2. Personal suitability

"Personal suitability refers to personal traits and characteristics affecting the application of knowledge and skills in the performance of the duties of the position"(Kop: 1990, pp 4). Personal suitability will define how well an individual can carry out specific tasks. In this case, the VTS functions will be tasks that require persons of good problem solving and decision making skills, good communication(social) skills and self-confidence who can carry the workload and time pressure. Personal suitability will include:

- personal aptitude appropriate to the tasks
- cognitive skills such as analysis, synthesis, interpretation and evaluation

- social skills such as communication and negotiation
- ancillary skills such as typing and computer programming
- language capability
- problem-solving capability
- the ability to work under pressure
- good physical and mental health
- discipline and responsibility
- spatial problem assessment capability

(Kop: 1990,pp 11)

3. Nautical experience

VTS operators will have to deal with navigational matters either by giving information or navigational assistance, so professional marine experience, especially in shiphandling and manoeuvering in certain circumstances, is necessary. The VTS operators should have at least 5 years experience on board cargo ships of 500 G.R.T. or above and hold a chief mate or a master certificate(foreign-going).

7.2 Training of VTS operators

The training of VTS operators will be the first step after recruitment. The training program will be arranged by the VTS authority after analysis of the tasks(VTS functions). On completion of the training program, the VTS authority will test candidates to ensure that the trainees'knowledge and skills are satisfactory, after which the VTS operator's license may be awarded.

The training program outline

1. Electronic navigation
   1.1 Shore-based radar and tracking system
      - radar presentation- synthetic coastline, symbols and information
      - identification and tracking targets
      - radar performance- tracking capability and limitation
      - errors, accuracy and reliability
      - interpretation, evaluation and analysis of information for prediction and decision making
   1.2 VHF direction finder incorporated with VHF and radar

2. Meteorology
   - meteorological terms and definitions
   - preparation of weather forecast messages

3. Communication
   - English for communication- grammar, vocabulary, speaking and listening to a variety of accents
   - voice communication procedures
   - standard marine navigational vocabulary
   - Seaspeak
   - Distress, urgency and safety communication
   - information broadcasting

4. Waterway and environmental conditions
   - geography of Bangkok Bar Channel and river channel
   - characteristics of tides and currents
   - navigational hazards and constraints
   - characteristics of barge train and fishing vessel traffic

- berths, mooring buoys and anchorages
- navigational aids in Bangkok port

5. Equipment
   - system configuration
     radar and tracking system
     VHF direction finder
     VHF communication
     telex and facsimile machine
     Satcom
     telephone and intercom
     computer hardware, database and other software
     voice logging system
     radar data recorder
   - start up, operate, adjust, test, maintain the equipment and perform minor repairs

6. Shiphandling and manoeuvering
   - types of vessels and specific characteristics: propulsion, rudder, steering ability, directional stability
   - shiphandling and manoeuvering in narrow channels and shallow water: Chao Phraya River and Bangkok Bar Channel
   - wind and current effects
   - shiphandling in reduced visibility
   - turning, berthing and anchorage
   - role of the VTS with respect to shiphandling and manoeuvering

7. Bangkok VTS
   - VTS objectives and principles
   - organizations and functions
   - operations and cooperation
   - authority, responsibility and liability

8. Regulations and legislation
   - the Navigation in Thai water Act B.E.2456
   - the Collision Avoidance Rules B.E.2522
   - the Law of the Sea
   - the Bangkok VTS rules and regulations
   - the regulations for dangerous goods transport
   - the pollution prevention rules and regulations
   - the rules and regulations for marine accident and casualty investigations

9. Data collection
   - knowing the kinds of data needed, the sources of data, when data should be collected and by what methods on the following subjects:
     - meteorological information
     - tides and currents
     - barge train and ship identification, position and other details prior to entry and departure
     - ships carrying dangerous goods
     - berths and anchorage situations
     - condition of navigation aids
     - tracking of ships and barge trains
     - channel dredging activities
     - accidents and navigational dangers

10. Data provision and exchange
   - knowing what types of message or information to be provided or exchanged.
     1) general information
        - traffic information
        - navigational and meteorological information
        - navigation warnings
        - local notices to mariners
     2) individual information
        - shipping information

- knowing how to construct the message or information
- knowing how to convey the message or information, to whom and when

11. Vessel traffic management
    - sailing plan
    - operational procedures
    - traffic situations and navigational conflicts
    - one way traffic management
    - time and space allocation and separation distance
    - monitoring, routine control and addressing
    - navigational assistance: providing position fixing, course and speed
    - contingency plans for accident, pollution, emergency

12. Remedial activities

- knowledge and skill of the remedial activities of Bangkok VTS supported by the communications network and other facilities:
    - distress, urgency and safety radio watchkeeping
    - SAR
    - medical assistance
    - salvage operations

The training course will partly take place in the classroom and on the radar simulator or shiphandling simulator or other means of simulation such as VTS simulation.

The subjects that will require simulation exercise or practice are:

- data collection
- data provision and exchange
- communication
- traffic monitoring
- traffic management
- remedial actions

- use of other equipment
- traffic planning

The appropriate training period will be approximately 4-6 months, depending on the prerequisite qualifications and the complexity of the designed system. This period is followed by on-the-job training for another six months.

7.3 Training course for refreshing and updating

After working for some time, the VTS operators will need additional training for the following purposes:

1. to refresh their skills and knowledge in the tasks which have less frequency
2. to improve their task performance by analyzing of the traffic situations in the past
3. to update their knowledge about changes in rules and regulations, new equipment, new concepts, new developments and techniques used in a VTS

The training course for refreshing and updating may take a period of 2-5 days every two years.

CHAPTER 8

CONCLUSION

For centuries, the shipping industry has expanded its activities in the transportation of commodities, keeping pace with industrial and commercial growth in other sectors, and it still plays an important role in international commerce. Commercial ports both state and privately owned, are important to a country's economic, political and social interests. Capital investments for ports are large amounts so that port operations have to be efficient.

Bangkok port, the major port of Thailand, has become more and more important for the development of the country such as the industrial development, the international commerce development, the investment intensity and population growth. Bangkok port is vital part of the infrastructure for water transport that supports the commerce and economy of the country. At the same time, it affects sea exploitation activities and the safety of people, and the environment, for which the government is responsible. World shipping has developed by increasing ship size for economic reasons. However, the controllability of ships has not been improved to the same extent. Moreover, the Bangkok port channel has not been improved to suit the larger size of vessel. The increased number and types of waterway users make the traffic in Bangkok port complicated and congested occur frequently. As a result, the environment is more and more exposed to the risks of accidents, e.g. collision, grounding, ramming. Its consequences are loss of lives, damage to ships and cargoes, damage to port structures, waterway blockage, fire and marine pollution.

The Port Authority of Thailand is planning to improve the Bangkok Bar Channel by dredging it in order to increase the capacity of the port in handling the deeper draught vessels. Two proposals are currently under consideration: one to increase the draught to 8.8 meters, the other to increase it to 9.6 meters with an estimated capital investment of 756 and 973 Million Baht, respectively, in 1990. The Harbour Department is planning to dredge a second navigation channel at Bangkok Bar in order to deviate the barge train and fishing vessel traffic to that channel. The capital investment for this project(including hopper dredging vessel and navigation aids) is about 1,095 Million Baht in 1986.

As for the Vessel Traffic Service is a different approach for improving Bangkok port traffic. The Vessel Traffic Service has the task of improving the safety and efficiency of traffic through navigation and communications systems.

The navigation can be improved by adding navigation aids such as a buoyage system and a radar beacon and by adopting new structural traffic patterns and rules and regulations which will reduce the complexity of traffic and improve the discipline of the users. A sailing plan and one-way traffic schemes on a time-slot basis will reduce the risk of collision and grounding. The functions of the VTS are to monitor and control the traffic and give navigational assistance to ships whenever necessary.

The communications system for safety of navigation and information purposes can be improved by establishing an efficient communications network and setting up procedures for utilizing the communications network effectively. Nowadays the communication is becoming vital for navigation because navigational information and messages can be transmitted and received to/from subscribers efficiently and effectively and without errors. The VTS is also for the use of allied activities which are indicated in the remedial function of VTS, such as SAR operation, medical assistance and environmental protection.

Even if the Bangkok Bar Channel will be extended in the future, it will still be useful to have the VTS because of the traffic congestion, traffic complexity. The VTS will cope with such problems effectively by continuously monitoring and controlling the traffic in Bangkok port and rendering navigational assistance when required.

Some European countries have integrated the VTS database computer with the port and shipping information services to make the VTS system more efficient. In the author's opinion, it would be very useful for Bangkok port and the shipping business to have such an information service. Anyhow, if the Bangkok VTS wants to integrate such a port and shipping information service with the VTS system, it needs an extended computer network which will mean more investment.

For the implementation of the Bangkok VTS, the functions, organization and operation of the VTS are proposed as simple as possible. When it is fully established, it should run on a trial basis for one or two years. During this period, ships would participate in the VTS on a voluntary basis until the VTS has gained experience and made the corrections, improvements that may be necessary. When the VTS can be run smoothly, the VTS participation of all ships on a compulsory basis will be applied.

The technical requirements mentioned in Chapter 6 imply the application of new technology using digital techniques which have been developed during the last decade. As for the cost of such equipment compared with the old system, it is rather high due to the new technology. However, the author believes that within a few years the prices will go down. Moreover, for the market for analog systems will decrease in inverse proportion to digital systems which will augment the problem of maintenance due to lack of spare parts and difficult repair services.

The VTS operators will play the most important role in the VTS because they have to solve problems of difficult traffic situations. They also face the difficulty of particular conflicts between master, pilot and VTS operators, about navigational decisions, issues of authority and responsibility and questions of liability. So the VTS operators must be highly qualified and well-trained and updated to ensure good performance.

Finally, regarding the harmonization of the Bangkok VTS and the Leam Chabang VTS, there will have to be common procedures, rules and regulations and joint traffic management policies. This harmonization also should consider other VTS organization in the Southeast Asian region in order to come to identical international standard.

BIBLIOGRAPHY

1. COST 301, Final report, Shore-based marine navigation aid systems, Main report, EEC project, 1988.
2. COST 301, Executive report, EEC project, 1988.
3. COST 301, Annex to Main report Vol.3, EEC project, 1988.
4. A European Concerted Approach to VTS for Safe Navigation, EEC Project COST 301 Seminar, Delft University, 20 January, 1986.
5. Fifth International Symposium on Vessel Traffic Services, Marseilles, 1984.
6. Fourth International Symposium on Vessel Traffic Services Vol.1 and Vol.2, Bremen, 1981.
7. Fujii, Y.,Yamanouchi, H. and Takayuki, M., Survey on Vessel Traffic Management Systems and Brief Introduction to Marine Traffic Studies, 1984.
8. Griffiths, P F C, Vessel Traffic Systems-Present and Future Prospects, Paper 18, Communications and Control, 26-28 October, 1988.
9. Handbook for radio operators, Post Office, Her Majesty's Stationery Office, London, 1975.
10. Hooff, Drijfhout J.H., Aids to Marine Navigation Vol I &II, 1982.
11. Koburger, Charles W. Jr., Vessel Traffic Systems, 1986.
12. Kop, G., Guidelines on Recruitment, Qualifications and Training of VTS Operators, IALA VTS Committee Working Group II, 1991.
13. Lynch, William Daniel, Vessel Traffic Services, Thesis, Naval Postgraduate School, California, USA, 1983.
14. Maritime Communications and Control, The Institutes of Marine Engineers International Conference, London, 26-28 October, 1988.
15. Mokhlesiyan, Hossein, Implementation of Vessel Traffic Services in Iranian waters, MSc.Thesis, World Maritime

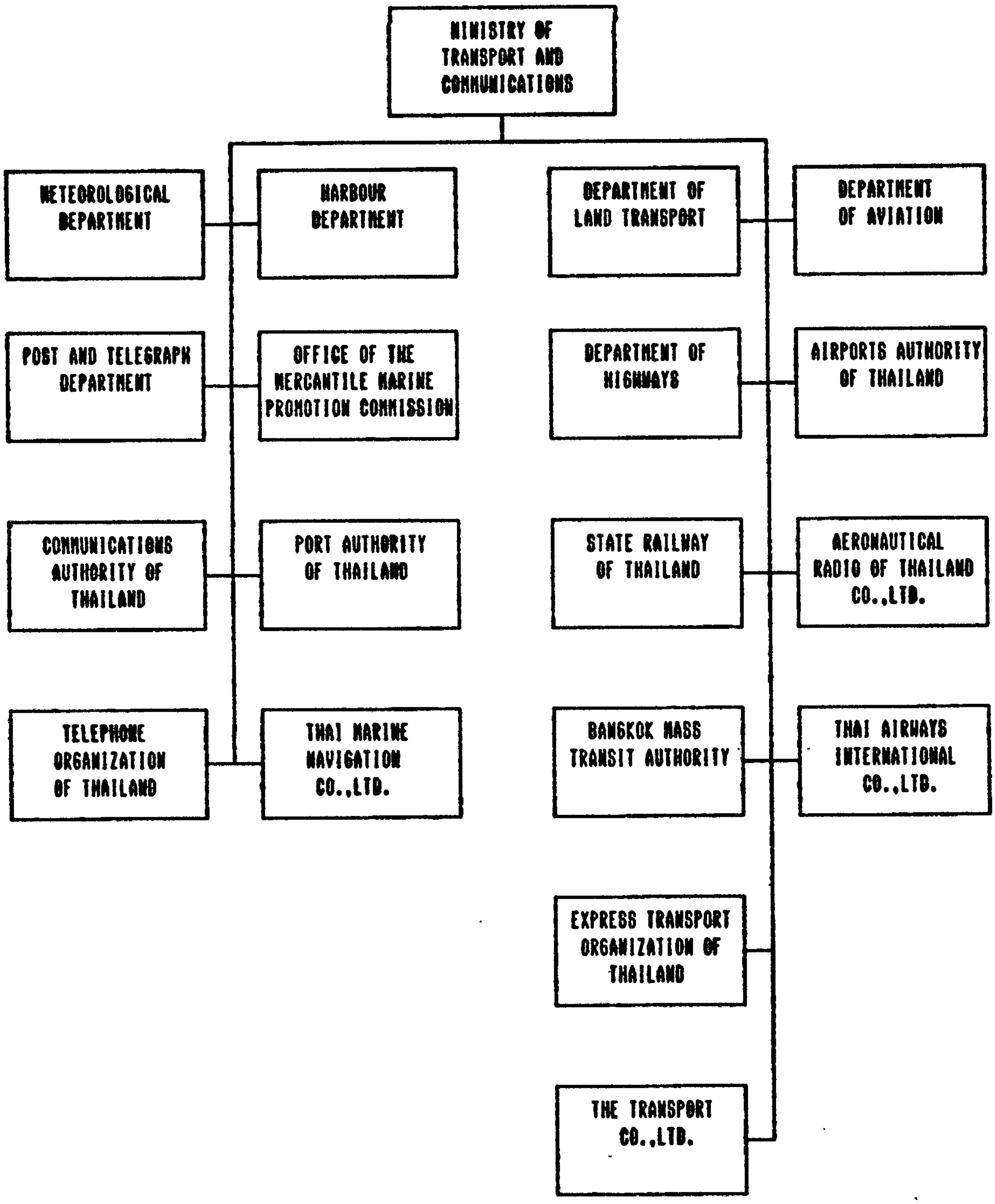
University, Malmo, Sweden, 1990.

16. Mizuki, N., Yamanouchi, H. and Fujii, Y., Result of the Third Survey on Vessel Traffic Services in the World, 1989.
17. Mulders, J.H., Introduction to Maritime Communication, World Maritime University, Malmo, Sweden, 1990.
18. Mulders, J.H., Error Analysis of Position Fixing(Methods and Systems), World Maritime University, Malmo, Sweden, 1990.
19 NAV 36/INF.8 of IMO, VTS functions - Sub-division for communication purposes, IALA VTS Committee, 1990
20. NEDECO, A study of Siltation of the Bangkok Port Channel Vol.II, The Hague, 1965.
21. Port Authority of Thailand '86-'87, Report, 1987.
22. Proceeding of the Fourteenth Conference, Hamburg May 4-10, 1985.
23. Resolution A.380(10) of IMO, Standard Marine Navigational Vocabulary, 1977.
24. Resolution A.578(14) of IMO, Guidelines for Vessel Traffic Services, 1985.
25. Resolution A.648(16) of IMO, General principles for ship reporting systems and ship reporting requirements, including guidelines for reporting incidents involving dangerous goods, harmful substances and/or marine pollutants, October 19, 1989.
26. Sixth International Symposium on Vessel Traffic Services, Gothenburg, May 17-19, 1988.
27. Vongviseesomjai, Supat, Final report of Study of the development of coastal transportation systems, associated inland waterways and river transportation in Thailand, 1990.
28. Weeks, F., Glover, A., Johnson, E., Stevens, P., SEASPEAK Training Manual, 1988.

APPENDICES

APPENDIX 1

ORGANIZATION CHART OF MINISTRY OF TRANSPORT AND COMMUNICATIONS



RESOLUTION A.648(16)

Adopted on 19 October 1989
Agenda item 10

GENERAL PRINCIPLES FOR SHIP REPORTING SYSTEMS AND SHIP REPORTING REQUIREMENTS, INCLUDING GUIDELINES FOR REPORTING INCIDENTS INVOLVING DANGEROUS GOODS, HARMFUL SUBSTANCES AND/OR MARINE POLLUTANTS

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety and the prevention and control of marine pollution from ships,

RECALLING ALSO resolution 3 of the International Conference on Maritime Search and Rescue, 1979, on the need for an internationally agreed format and procedure for ship reporting systems,

CONSIDERING that current national ship reporting systems may use different procedures and reporting formats,

REALIZING that such different procedures and reporting formats could cause confusion to masters of ships moving from one area to another covered by a different ship reporting system,

BELIEVING that such confusion could be alleviated if ship reporting systems and reporting requirements were to comply as far as practicable with a number of general principles and if reports were made in accordance with a standard format and procedures,

RECALLING the Guidelines for Reporting Incidents Involving Dangerous Goods in Packaged Form developed by the Maritime Safety Committee (MSC/Circ.360/Rev.1),

RECALLING ALSO article 8 and Protocol I of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78), as amended, and also the Guidelines for Reporting Incidents Involving Harmful Substances (resolution MEPC.30(25)),

RECOGNIZING that States Parties to the International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (1969) and the Protocol relating to Intervention on the High Seas in Cases of Marine Pollution by Substances other than Oil (1973) may take such measures on the high seas as may be necessary to prevent, mitigate or eliminate grave and imminent danger to their coastline or related interests from pollution or threat of pollution of the sea by oil and substances other than oil following upon a maritime casualty or acts related to such a casualty, which may reasonably be expected to result in major harmful consequences,

RECOGNIZING ALSO the need for coastal States to be informed by the master of an assisting ship, or of a ship undertaking salvage, of particulars of the incident and of action taken, RECOGNIZING FURTHER that an incident involving damage, failure or breakdown of the ship, its machinery or equipment could give rise to a significant threat of pollution to coastlines or related interests,

HAVING CONSIDERED the recommendation made by the Maritime Safety Committee at its fifty-seventh session and by the Marine Environment Protection Committee at its twenty-sixth session,

1. ADOPTS the General Principles for Ship Reporting Systems and Ship Reporting Requirements, including Guidelines for Reporting Incidents Involving Dangerous Goods, Harmful Substances and/or Marine Pollutants set out in the Annex to the present resolution;

2. URGES Member Governments to ensure that ship reporting systems and reporting requirements comply as closely as possible with the general principles specified in the Annex to the present resolution;

3. URGES Member Governments to bring the reporting format and procedures to the notice of shipowners and seafarers as well as of the designated authorities concerned;

4. RECOMMENDS Member Governments and States Parties to MARPOL 73/78 to implement the Guidelines, in accordance with paragraph (2) of article V of Protocol I thereof;

5. REVOKES resolution A.598(15), resolution MEPC.30(25) and MSC/Circ.360/Rev.1.

ANNEX

GENERAL PRINCIPLES FOR SHIP REPORTING SYSTEMS AND SHIP REPORTING REQUIREMENTS, INCLUDING GUIDELINES FOR REPORTING INCIDENTS INVOLVING DANGEROUS GOODS, HARMFUL SUBSTANCES AND/OR MARINE POLLUTANTS

1 GENERAL PRINCIPLES

1.1 Ship reporting systems and reporting requirements are used to provide, gather or exchange information through radio reports. The information is used to provide data for many purposes including search and rescue, vessel traffic services, weather forecasting and prevention of marine pollution. Ship reporting systems and reporting requirements should, as far as practicable, comply with the following principles:

.1 reports should contain only information essential to achieve the objectives of the system;

.2 reports should be simple and use the standard international ship reporting format and procedures; where language difficulties may exist, the languages used should include English, using where possible the Standard Marine Navigational Vocabulary, or alternatively the International Code of Signals. The standard reporting format and procedures to be used are given in the appendix to this Annex;

.3 the number of reports should be kept to a minimum;

.4 no charge should be made for communication of reports;

.5 safety or pollution related reports should be made without delay; however, the time and place of making non-urgent reports should be sufficiently flexible to avoid interference with essential navigational duties;

.6 information obtained from the system should be made available to other systems when required for distress, safety and pollution purposes;

.7 basic information (ship's particulars, on-board facilities and equipment, etc.) should be reported once, be retained in the system and be updated by the ship when changes occur in the basic information reported;

.8 the purpose of the system should be clearly defined;

.9 Governments establishing a ship reporting system should notify mariners of full details of the requirements to be met and procedures to be followed. Details of types of ships and areas of applicability, of times and geographical positions for submitting reports, of shore establishments responsible for operation of the system and of the services provided should be clearly specified. Chartlets depicting boundaries of the system and providing other necessary information should be made available to mariners;

.10 the establishment and operation of a ship reporting system should take into account:

.10.1 international as well as national responsibilities and requirements;

.10.2 the cost to ship operators and responsible authorities;

.10.3 navigational hazards;

.10.4 existing and proposed aids to safety; and

.10.5 the need for early and continuing consultation with interested parties including a sufficient period to allow for trial, familiarization and assessment to ensure satisfactory operation and to allow necessary changes to be made to the system;

.11 Governments should ensure that shore establishments responsible for operation of the system are manned by properly trained persons;

.12 Governments should consider the interrelationship between ship reporting systems and other systems;

.13 ship reporting systems should preferably use a single operating radio frequency; where additional frequencies are necessary, the number of frequencies should be restricted to the minimum required for the effective operation of the system;

.14 information provided by the system to ships should be restricted to that necessary for the proper operation of the system and for safety;

.15 ship reporting systems and requirements should provide for special reports from ships concerning defects or deficiencies with respect to their hull, machinery, equipment or manning, or concerning other limitations which could adversely affect navigation and for special reports concerning incidents of actual or probable marine pollution;

.16 Governments should issue instructions to their shore establishments responsible for the operation of ship reporting systems to ensure that any reports involving pollution, actual or probable, are relayed without delay to the officer or agency nominated to receive and process such reports, and to ensure that such an officer or agency relays these reports without delay to the flag State of the ship involved and to any other State which may be affected;

.17 States which are affected or likely to be affected by pollution incidents and may require information relevant to the incident should take into account the circumstances in which the master is placed, and should endeavour to limit their requests for additional information; and

.18 the appendix to this Annex does not apply to danger messages referred to under regulation V/2 of the 1974 SOLAS Convention, as amended. The present practice of transmitting such messages should remain unchanged.

2 GUIDELINES FOR REPORTING INCIDENTS INVOLVING DANGEROUS GOODS

2.1 The intent of these Guidelines and those contained in the appendix is to enable coastal States and other interested parties to be informed without delay when any incident occurs involving the loss, or likely loss, overboard of packaged dangerous goods into the sea.

2.2 Reports should be transmitted to the nearest coastal State. When the ship is within or near an area for which a ship reporting system has been established, reports should be transmitted to the designated shore station of that system.

3 GUIDELINES FOR REPORTING INCIDENTS INVOLVING HARMFUL SUBSTANCES AND/OR MARINE POLLUTANTS

3.1 The intent of these Guidelines and those contained in the appendix is to enable coastal States and other interested parties to be informed without delay of any incident giving rise to pollution, or threat of pollution, of the marine environment, as well as of assistance and salvage measures, so that appropriate action may be taken.

3.2 In accordance with article V(1) of Protocol I of MARPOL 73/78, a report shall be made to the nearest coastal State.

3.3 Whenever a ship is engaged in or requested to engage in an operation to render assistance to or undertake salvage of a ship involved in an incident referred to in subparagraph 1(a) or (b) of article II of Protocol I of MARPOL 73/78, as amended, the master of the former ship should report, without delay, the particulars of the action undertaken or planned. The coastal States should also be kept informed of developments.

3.4 The probability of a discharge resulting from damage to the ship or its equipment is a reason for making a report.

APPENDIX

1 PROCEDURES

Reports should be sent as follows:

Sailing plan (SP) – Before or as near as possible to the time of departure from a port within a system or when entering the area covered by a system.

Position report (PR) – When necessary to ensure effective operation of the system.

Deviation report (DR)	–	When the ship's position varies significantly from the position that would have been predicted from previous reports, when changing the reported route, or as decided by the master.
Final report (FR)	–	On arrival at destination and when leaving the area covered by a system.
Dangerous goods report (DG)	–	When an incident takes place involving the loss or likely loss overboard of packaged dangerous goods, including those in freight containers, portable tanks, road and rail vehicles and shipborne barges, into the sea.
Harmful substances report (HS)	–	When an incident takes place involving the discharge or probable discharge of oil (Annex I of MARPOL 73/78) or noxious liquid substances in bulk (Annex II of MARPOL 73/78).
Marine pollutants report (MP)	–	In the case of loss or likely loss overboard of harmful substances in packaged form including those in freight containers, portable tanks, road and rail vehicles and shipborne barges, identified in the International Maritime Dangerous Goods Code as marine pollutants (Annex III of MARPOL 73/78).
Any other report	–	Any other report should be made in accordance with the system procedures as notified in accordance with paragraph 9 of the General Principles.

2 STANDARD REPORTING FORMAT AND PROCEDURES

2.1 Sections of the ship reporting format which are inappropriate should be omitted from the report.

2.2 Where language difficulties may exist, the languages used should include English, using where possible the Standard Marine Navigational Vocabulary. Alternatively, the International Code of Signals may be used to send detailed information. When the International Code is used, the appropriate indicator should be inserted in the text, after the alphabetical index.

2.3 For route information, latitude and longitude should be given for each turn point, expressed as in C below, together with type of intended track between these points, for example "RL" (rhumb line), "GC" (great circle) or "coastal", or, in the case of coastal sailing, the estimated date and time of passing significant points expressed by a 6-digit group as in B below.

Telegraphy	Telephone (alternative)	Function	Information required
Name of system (e.g. AMVER/ AUSREP/MAREP/ ECAREG/JASREP	Name of system (e.g. AMVER/ AUSREP/MAREP/ ECAREG/JASREP)	System identifier	Ship reporting system or nearest appropriate coast radio station
	State in full	Type of report	Type of report:
SP			Sailing plan
PR			Position report
DR			Deviation report
FR			Final report
DG			Dangerous goods report
HS			Harmful substances report
MP			Marine pollutants report
Give in full			Any other report
A	Ship (alpha)	Ship	Name, call sign or ship station identity, and flag
B	Time (bravo)	Date and time of event	A 6-digit group giving day of month (first two digits), hours and minutes (last four digits). If other than UTC state time zone used
C	Position (charlie)	Position	A 4-digit group giving latitude in degrees and minutes suffixed with N (north) or S (south) and a 5-digit group giving longitude in degrees and minutes suffixed with E (east) or W (west); or
D	Position (delta)	Position	True bearing (first 3 digits) and distance (state distance) in nautical miles from a clearly identified landmark (state landmark)
E	Course (echo)	True course	A 3-digit group

Telegraphy	Telephone (alternative)	Function	Information required
F	Speed (foxtrot)	Speed in knots and tenths of knots	A 3-digit group
G	Departed (golf)	Port of departure	Name of last port of call
H	Entry (hotel)	Date, time and point of entry into system	Entry time expressed as in (B) and entry position expressed as in (C) or (D)
I	Destination and ETA (india)	Destination and expected time of arrival	Name of port and date time group expressed as in (B)
J	Pilot (juliet)	Pilot	State whether a deep-sea or local pilot is on board
K	Exit (kilo)	Date, time and point of exit from system	Exit time expressed as in (B) and exit position expressed as in (C) or (D)
L	Route (lima)	Route information	Intended track
M	Radiocommuni-cations (mike)	Radiocommuni-cations	State in full names of stations/frequencies guarded
N	Next report (november)	Time of next report	Date time group expressed as in (B)
O	Draught (oscar)	Maximum present static draught in metres	4-digit group giving metres and centimetres
P	Cargo (papa)	Cargo on board	Cargo and brief details of any dangerous cargoes as well as harmful substances and gases that could endanger persons or the environment (See detailed reporting requirements)
Q	Defect, damage, deficiency, limitations (quebec)	Defects/damage/ deficiencies/ other limitations	Brief details of defects, damage, deficiencies or other limitations (See detailed reporting requirements)

Telegraphy	Telephone (alternative)	Function	Information required
R	Pollution/ dangerous goods lost overboard (romeo)	Description of pollution or dangerous goods lost overboard	Brief details of type of pollution (oil, chemicals, (etc.) or dangerous goods lost overboard; position expressed as in (C) or (D) (See detailed reporting requirements)
S	Weather (sierra)	Weather conditions	Brief details of weather and sea conditions prevailing
T	Agent (tango)	Ship's representative and/or owner	Details of name and particulars of ship's representative or owner or both for provision of information (See detailed reporting requirements)
U	Size and type (uniform)	Ship size and type	Details of length, breadth, tonnage, and type, etc., as required
V	Medic (victor)	Medical personnel	Doctor, physician's assistant, nurse, personnel without medical training
W	Persons (whiskey)	Total number of persons on board	State number
X	Remarks (x-ray)	Miscellaneous	Any other information – including, as appropriate, brief details of incident and of other ships involved either in incident, assistance or salvage (See detailed reporting requirements)

3 GUIDELINES FOR DETAILED REPORTING REQUIREMENTS

3.1 Dangerous goods reports (DG)

3.1.1 Primary reports should contain items, A, B, C (or D), M, Q, R, S, T, U, X of the standard reporting format; details for R should be as follows:

R 1 Correct technical name or names of goods.
  2 UN number or numbers.
  3 IMO hazard class or classes.
  4 Names of manufacturers of goods when known, or consignee or consignor.
  5 Types of packages including identification marks. Specify whether portable tank or tank vehicle, or whether vehicle or freight container or other cargo transport unit containing packages. Include official registration marks and numbers assigned to the unit.
  6 An estimate of the quantity and likely condition of the goods.
  7 Whether lost goods floated or sank.
  8 Whether loss is continuing.
  9 Cause of loss.

3.1.2 If the condition of the ship is such that there is danger of further loss of packaged dangerous goods into the sea, items P and Q of the standard reporting format should be reported; details for P should be as follows:

P 1 Correct technical name or names of goods.
  2 UN number or numbers.
  3 IMO hazard class or classes.
  4 Names of manufacturers of goods when known, or consignee or consignor.
  5 Types of packages including identification marks. Specify whether portable tank or tank vehicle, or whether vehicle or freight container or other cargo transport unit containing packages. Include official registration marks and numbers assigned to the unit.
  6 An estimate of the quantity and likely condition of the goods.

3.1.3 Particulars not immediately available should be inserted in a supplementary message or messages.

3.2 Harmful substances reports (HS)

3.2.1 In the case of actual discharge primary HS reports should contain items A, B, C (or D), E, F, L, M, N, Q, R, S, T, U, X of the standard reporting format. In the case of probable discharge (see 3.4), item P should also be included. Details for P, Q, R, T and X should be as follows:

P 1 Type of oil or the correct technical name of the noxious liquid substances on board.
  2 UN number or numbers.
  3 Pollution category (A, B, C or D), for noxious liquid substances.

4 Names of manufacturers of substances, if appropriate, when known, or consignee or consignor.

5 Quantity.

Q 1 Condition of the ship as relevant.

2 Ability to transfer cargo/ballast/fuel.

R 1 Type of oil or the correct technical name of the noxious liquid discharged into the sea.

2 UN number or numbers.

3 Pollution category (A, B, C or D), for noxious liquid substances.

4 Names of manufacturers of substances, if appropriate, when known, or consignee or consignor.

5 An estimate of the quantity of the substances.

6 Whether lost substances floated or sank.

7 Whether loss is continuing.

8 Cause of loss.

9 Estimate of the movement of the discharge or lost substances, giving current conditions if known.

10 Estimate of the surface area of the spill if possible.

T 1 Name, address, telex and telephone number of the ship's owner and representative (charterer, manager or operator of the ship or their agent).

X 1 Action being taken with regard to the discharge and the movement of the ship.

2 Assistance or salvage efforts which have been requested or which have been provided by others.

3 The master of an assisting or salvaging ship should report the particulars of the action undertaken or planned.

3.2.2 After the transmission of the information referred to above in the initial report, as much as possible of the information essential for the protection of the marine environment as is appropriate to the incident should be reported in a supplementary report as soon as possible. That information should include items P, Q, R, S and X.

3.2.3 The master of any ship engaged in or requested to engage in an operation to render assistance or undertake salvage should report, as far as practicable, items A, B, C (or D), E, F, L, M, N, P, Q, R, S, T, U, X of the standard reporting format. The master should also keep the coastal State informed of developments.

3.3 Marine pollutants reports (MP)

3.3.1 In the case of actual discharge, primary MP reports should contain items A, B, C (or D), M, Q, R, S, T, U, X of the standard reporting format. In the case of probable discharge (see 3.4), item P should also be included. Details for P, Q, R, T and X should be as follows:

P 1 Correct technical name or names of goods.

2 UN number or numbers.

3 IMO hazard class or classes.

4 Names of manufacturers of goods when known, or consignee or consignor.

5 Types of packages including identification marks. Specify whether portable tank or tank vehicle, or whether vehicle or freight container or other cargo transport unit containing packages. Include official registration marks and numbers assigned to the unit.

6 An estimate of the quantity and likely condition of the goods.

Q 1 Condition of the ship as relevant.

2 Ability to transfer cargo/ballast/fuel.

R 1 Correct technical name or names of goods.

2 UN number or numbers.

3 IMO hazard class or classes.

4 Names of manufacturers of goods when known, or consignee or consignor.

5 Types of packages including identification marks. Specify whether portable tank or tank vehicle, or whether vehicle or freight container or other cargo transport unit containing packages. Include official registration marks and numbers assigned to the unit.

6 An estimate of the quantity and likely condition of the goods.

7 Whether lost goods floated or sank.

8 Whether loss is continuing.

9 Cause of loss.

T 1 Name, address, telex and telephone number of the ship's owner and representative (charterer, manager or operator of the ship or their agent).

X 1 Action being taken with regard to the discharge and movement of the ship.

2 Assistance or salvage efforts which have been requested or which have been provided by others.

3 The master of an assisting or salvaging ship should report the particulars of the action undertaken or planned.

3.3.2 After the transmission of the information referred to above in the initial report, as much as possible of the information essential for the protection of the marine environment as is appropriate to the incident should be reported. That information should include items P, Q, R, S and X.

3.3.3 The master of any ship engaged in or requested to engage in an operation to render assistance or undertake salvage should report, as far as practicable, items A, B, C (or D), M, P, Q, R, S, T, U, X of the standard reporting format. The master should also keep the coastal State informed of developments.

3.4 Probability of discharge

3.4.1 The probability of a discharge resulting from damage to the ship or its equipment is a reason for making a report. In judging whether there is such a probability and whether the report should be made, the following factors, among others, should be taken into account:

.1 the nature of the damage, failure or breakdown of the ship, machinery or equipment; and

.2 sea and wind state and also traffic density in the area at the time and place of the incident.

3.4.2 It is recognized that it would be impracticable to lay down precise definitions of all types of incidents involving probable discharge which would warrant an obligation to report. Nevertheless, as a general guideline the master of the ship should make reports in cases of:

.1 damage, failure or breakdown which affects the safety of ships; examples of such incidents are collision, grounding, fire, explosion, structural failure, flooding, cargo shifting; and

.2 failure or breakdown of machinery or equipment which results in impairment of the safety of navigation; examples of such incidents are failure or breakdown of steering gear, propulsion plant, electrical generating system, essential shipborne navigational aids.

APPENDIX 3

The Appendix of NAV 36/INF.8

EXAMPLES OF VTS COMMUNICATIONS

TO SUPPORT VTS FUNCTIONS

FOREWORD:

1. It is the ultimate goal of the IALA VTS Committee that a set of examples should exist which will result, over the years, in the possibility that standard messages may be used to describe most predictable circumstances. These messages will, of course, comply with all existing ITU and IMO regulations.

2. The following examples explain what is the practical purpose of the VTS functions as agreed by the IALA VTS Committee.

3. The examples refer to a wide spectrum of VTS Centres, from the large to the small, and from those with VHF only to those with the most sophisticated modern equipment. A brief inspection will allow a particular VTS Centre to identify a set of circumstances which are applicable to its own situation.

4. It is realized that the examples, as presented, can only represent a sample of all those that could exist.

5. The incidents describe are entirely fictitious, although some real names of VTS and ships are used. Every attempt has been made to reflect the level of authority which may exist in a given circumstance. Some examples are taken direct from everyday current usage at the VTS Centres concerned. These are specified.

6. VTS Centres, if using these examples are training tools, should make quite sure that the level of authority illustrated is fully compatible with their national or local laws or regulations on the subject.

7. No significance should be attached to the spelling of geographical names. Both Anglisised or National spellings are used depending on the circumstances of the case.

8 Work will continue towards the ultimate goal.

F.1 ACQUIRING DATA

1.1 Establishing identity of vessel

1.1.1

Scenario: Chaudron Traffic has an unidentified tanker within visual range, but the name of the ship cannot be seen. Chaudron Traffic uses the visual characteristics and the position of the unknown ship to try and establish her identity.

Message: 1. All ships, all ships. This is Chaudron Traffic, Chaudron Traffic.

Calling unknown ship with bridge aft and black funnel in position 175° from Chaudron South light distance 6 miles. Over.

Message: 2. Chaudron Traffic. This is Vikki W, Vikki W.

Bridge aft tanker with black funnel in position 175° from Chaudron South light, distance 6 miles.
Over

1.1.2 *In format actually in use at DOVER.*

Scenario: Channel Navigation Information Service (CNIS), (Dover Coastguard), observes a ship in the South West Lane. Dover broadcasts to establish her identity, according to laid down procedures.

Broadcast: All ships in Dover Strait. This is Dover Coastguard.

In the South West Lane at 0535 GMT. New ship track letters Alpha Bravo, in position bearing 135° from Dover West Breakwater distance 5 miles approximate track 051°. Approximate speed 12 kt this track appears to contravene Rule 10 of the Traffic Regulations. I say again ......
Dover Coastguard.
Out.

Message: To individual ship.

Unknown ship in position 135° from Dover West Breakwater distance 5 miles. This is Dover Coastguard.
Information: According to my radar your course is in contravention of Rule 10 of the Collision Regulations.
Dover Coastguard.
Out.

1.1.3

Scenario: Ship Sarah W makes a position report. Chaudron Traffic has two echoes on its radar near the reported position. The VTS Operator at Chaudron Traffic reacts:

Message: 1 Sarah W. This is Chaudron Traffic.

Information: There are two radar echoes at your reported position. Both echoes indicate ship headings of 089°.
Question: Are you the leading ship or the second ship?
Over.

Message: 2 Chaudron Traffic. This is Sarah W.

Answer: I am the leading ship.
Over.

Message: 3 Sarah W. Chaudron Traffic.

Message received: You are the leading ship.
Thank you.
Out.

1.1.4 *In format actually in use at Maas Approach, Rotterdam.*

Scenario: The ship Daylight Desperado is proceeding Southwards along The Netherlands coast and did not send an ETA-telegram requesting a pilot. According to her position she is almost in the Separation zone of the Maas North TSS and according to her course she intends to cross the fairway and pilot vessel cruising grounds at Maas Centre Buoy. Apparently her charts are old and do not show the relevant TSS's She did not report to Maas Approach as required.

Message: 1 All ships, all ships. This is Maas Approach.

Calling unknown ship in position 015° from Maas Centre Buoy, distance 8 miles and 090° 2.7 miles from Mike November Number four buoy.
Over.

Message: 2 Maas Approach. This is Daylight Desperado.

In position 015° from Maas Centre Buoy, distance 7.5 miles.
Over.

Message: 3 Daylight Desperado. Maas Approach.

Information: Your present position and course do not comply with Rule 10 of COLREG.
Information: The Southbound lane of the Maas North TSS is intended to be used only by vessels bound for Rotterdam and/or the Maas Centre Pilot Station.
Information: If you steer for the Mike November Number 2 buoy, keeping it on your starboard side and then for the Mike Whiskey Number 6 buoy you might not interfere too much with the traffic in the vicinity of Maas Centre Buoy.
Information: If you wish I can supply you with bearing and distances to MN 2 as well as MW 6 buoy. When passing MN 2 buoy switch to VHF channel 02 and call Pilot Maas. From there on Pilot Maas will give you ADVICE on the courses to steer. Maas Approach.
Out.

1.2 Initial Reporting Procedures

Scenario: The container ship CMB Europe, call sign ONDA is on voyage from Montreal, Canada to Felixstowe, England with a general cargo including:

IMDG	Code 2	2950 kilograms
	Code 3	84711 kilograms
	Code 6	7111 kilograms
	Code 7	48000 kilograms
	Code 8	145405 kilograms
	Code 9	272 kilograms

Ships draft is 9.10 metres forward 9.25 metres aft, and she plans to follow the inshore traffic zone. Her ETA Felixstowe is Day 6 at 1300 UTC and her ETA Sunk Pilot at 1100 UTC. She has no doctor and 26 total complement. Present course 093°, speed 16.9 knots. ETA Bishop Rock Day 5 at 0330 UTC, leaving area at 0500 UTC. Next report will be made on Day 5 at 1100 UTC.

Message: Dover Coastguard. This is CMB Europe.

A	Alpha	CMB Europe - ONDA
B	Bravo	05 01 00 Z
C	Charlie	4842 N 0702 W
E	Echo	093
F	Foxtrot	169
G	Golf	Montreal
H	Hotel	05 03 30 Z
I	India	Felixstowe 06 13 00 Z
J	Juliet	Pilot Sunk 06 11 00 Z
K	Kilo	05 05 00 Z
L	Lima	RL-076-Beachy Head-Inshore Traffic Zone
M	Mike	VHF Ch 16 - GNI 500 kHz
N	November	05 11 00 Z
O	Oscar	FWD 9.10 AFT 9.25
P	Papa	General in containers - Dangerous cargo stowed as per IMDG Code
		Code 2 2950 kilograms
		Code 3 84711 kilograms
		Code 6 7111 kilograms
		Code 7 48000 kilograms
		Code 8 145405 kilograms
		Code 9 272 kilograms
V	Victor	No Medic
W	Whiskey	26
X	Xray	Nil

Over.

1.3 Way point procedures

1.3.1

Scenario: The ship Christina is inward bound to Hamburg, and already has a Pilot embarked. She is in a position with Elbe Light Vessel bearing 360°, distance 2 miles, at Waypoint Number 11. Her course is 095°, her speed 15 knots.

Message: 1. Deutsch Bucht Revier Radio. This is Christina.

Movement Report

A	Alpha	Christina
B	Bravo	31 23 05 UTC
C	Charlie	Waypoint Number 11 Bearing 180° from Elbe Light Vessel distance 2 miles
E	Echo	095°
F	Foxtrot	15 knots

Over.

1.3.2

Scenario: Gaynor W is participating in the Bay of Fundy VTS system. She fails to report at Waypoint (Calling in Point) 3A. Fundy Traffic intervenes.

Message: 1. Gaynor W. This is Fundy Traffic.

Question: What is your report for Calling in Point 3 Alpha?
Over.

Message: 2. Fundy Traffic. This is Gaynor W.

Answer: Report for Calling in Point 3 Alpha.

A	Alpha	Gaynor W
B	Bravo	26 15 30 Local
D	Delta	Calling in point 3 Alpha
I	India	St John 26 20 00 Local
L	Lima	Approved Traffic Lane
S	Sierra	Wind South West 5. No ice.

Over.

1.4 Other Reports

1.4.1 Breakdowns

Scenario: Vikki W has lost ability to go astern and therefore cannot comply with COLREG. Therefore she cannot comply with the requirements of Chaudron VTS. Her position is near Buoy N 12, Snake Bend. Chaudron VTS reacts by withdrawing clearance and advises Vikki W to anchor.

Message: 1. Chaudron Traffic. This is Vikki W.

Breakdown. Warning: My position buoy N 12 Snake Bend. Unable to go astern.
Over.

Message: 2. Vikki W. This is Chaudron Traffic.

Warning received: You are unable to go astern.
Information: Clearance withdrawn.
Advice: You have permission to anchor clear of fairway until breakdown repaired.
Over.

1.4.2 Deviations

Scenario: Jack W is following the deep water fairway within the jurisdiction of Manche VTS. This fairway is well offshore and Jack W is badly affected by an offshore gale. She is forced to deviate into the inshore shallow draft fairway.

Message: Manche Traffic. This is Jack W.

Deviation.
Information: I am deviating.
Direction: Towards inshore fairway.
Reason: Gales make offshore route dangerous for me.
Over.

1.4.3 Observations (sightings from vessel)

Scenario: Gaynor W sights a container adrift in the North Atlantic. She reports this fact to Ouessant VTS Centre.

Message: 1. Ouessant Traffic. This is Gaynor W.

Warning: Container adrift in position 48° 20'N 06° 05'W. Dangerous to shipping.
Over.

Message: 2. Gaynor W. Ouessant.

Warning received: Container adrift in position 48° 20'N 06° 05'W. Dangerous to shipping. Thank you.
Out.

F.2 ALLOCATION OF SPACE

2.1 Traffic Separation Schemes: Information on existence and status. *In format actually in use at DOVER.*

Scenario: An unknown vessel is proceeding on a course of 061° contrary to the general traffic flow in the South West bound traffic lane in the Dover Strait. The Channel Navigation Information Service reacts.

Message: All ships in Dover Strait. This is Dover Coastguard.

In the South West lane. At time 1400 GMT. New ship track letter ZULU in position bearing 135° from Dover West breakwater distance 5 miles approximate Track 061° approximate speed 16 knots. This track appears to contravene Rule 10 of the Traffic Regulations.
Information: According to my radar your course is in contravention of Rule 10 of the Collision Regulations.
Over.

2.2 Designated fairway

Scenario: The yacht Princess Possum is proceeding on a course of 095° at 20 knots, a collision course with the inwards bound HMS Sceptre in Smeaton Passage, Plymouth. Plymouth Naval VTS reacts.

Message: Yacht Princess Possum, Yacht Princess Possum. This is Queens Harbour Master, Queens Harbour Master.

Information: Your course is in contravention of Rule 9 of COLREG and the Rules of this Port.
Instruction: Leave the Smeaton Passage fairway. I repeat. Leave the Smeaton Passage fairway.
Over.

2.2.1 **Designated Fairway (when VTS has lower executive powers)**

Scenario: The yacht "Morning After" is proceeding on a course of 350° at 6 knots, South of the prohibited yachting area off Fawley Refinery, Southampton Water. "Morning After" is registered outside Britain, and is not aware of local rules. Southampton VTS reacts.

Message: Yacht Morning After, Yacht Morning After. This is Southampton Traffic, Southampton Traffic.

Information: Your course will take you into an area prohibited to yachts.
Advice: Alter course towards Eastern shore of Southampton Water, and proceed to your berth in the Hamble River.
Over.

2.3 **Dedicated Special Area**

Scenario: The Arctic Fisher has entered the dedicated 500 metre exclusion zone around the oil rig Auk Bravo. The rig reacts.

Message: Arctic Fisher, Arctic Fisher. This is Auk Bravo, Auk Bravo.

Information: You are within the 500 metre dedicated exclusion zone around this rig.
Advice: Stand clear outside the 500 metre zone.
Over.

2.3.1 **(when the oil rig exerts all its authority to avoid imminent danger)**

Scenario: Scenario as in 2.3 above, Arctic Fisher continuing towards the rig.

Message: Arctic Fisher, Arctic Fisher. This is Auk Bravo, Auk Bravo.

Information: You are on collision course with this rig.
Warning: Your action is dangerous. The British Government will be informed.
Instruction: Alter course immediately and leave this area.
Over.

2.4 **Separation distances or times**

2.4.1

Scenario: The ship Sarah W is proceeding along the same fairway as the Victoria Prima. She is trying to overtake without permission from Chaudron VTS, which requires a separation of 1000 metres, stern to bow. No overtaking is allowed.

Message: Sarah W, Sarah W. This is Chaudron Traffic, Chaudron Traffic.

Information: You are too close to Victoria Prima. Minimum separation is 1000 metres.
Advice: Maintain distance of 1000 metres astern. Do not overtake.
Over.

2.4.2 When VTS exerts its full authority

Scenario: The scene set in 2.4.1 continues. Sarah W does not heed the advice given by Chaudron Traffic. Chaudron Traffic reacts.

Message: Sarah W, Sarah W. This is Chaudron Traffic, Chaudron Traffic.

Warning: You are too close to Victoria Prima.
Instruction: You must slow down. I repeat. You must slow down. Do not overtake. The Rules of this Port include penalties for not carrying out the instructions of this Vessel Traffic Centre.
Over.

2.4.3

Scenario: Victoria Prima is proceeding Southwards in the Suez Canal. She is required to maintain a 10 minute interval from the previous ship, Gaynor W. As she passes El Firdan Signal Station she makes the following:

Message: El Firdan, El Firdan. This is Victoria Prima, Victoria Prima.

Question: At what time did Gaynor W pass you?
Over.

2.5 Entry into or departure from a VTS area (with agreement). (Establishing a sailing plan)

2.5.1

Scenario: The Ship Gaynor W is approaching the Port of Gothenberg from the West, having already complied with the Port's requirements concerning advance reporting. Her present position is bearing 260° distance 7 miles from Vinga Island, and she is entering at boundary Sector E. She uses the IMO SRS.

Message: 1. Gothenberg Traffic. This is Gaynor W.

Entry Report

A	Alpha	Gaynor W
B	Bravo	15 15 20 UTC
H	Hotel	15 15 25 UTC
		Boundary Sector Echo

Over

Message: 2. Gaynor W. This is Gothenberg Traffic.

Advice: Proceed to Pilot station.
Out.

2.5.2 When VTS exerts its full authority

Scenario: Gaynor W is approaching Vinga Pilot station, which is 2 miles distant. Gothenburg Traffic has found out that Gaynor W has too deep a draft for the Vinga Fairway, and orders her to divert to the Trubaduren Pilot Station.

Message: Gaynor W. This is Gothenburg Traffic.

Information: Your draft is too great for the Vinga Fairway.
Instruction: Proceed to the Trubaduren Pilot Station for your Pilot. You must use the Trubaduren Fairway.
Out.

2.5.3

Scenario: The ship Vikki W has cleared Zandvlietsluis and is approaching the boundary of the Terneuzen Radar area, at E7 buoy. Time 0930 local. She uses IMO SRS.

Message: 1. Terneuzen Traffic. This is Vikki W.

Departure Report

A	Alpha	Vikki W
B	Bravo	26 09 30 Local
K	Kilo	Leaving Terneuzen system Buoy E7

Over

Message: 2. Vikki W. This is Terneuzen Traffic

Information received
Advice: Contact Vlissingen Traffic VHF CH 12
Out.

2.5.4 Normal Pilotage Service suspended

Scenario: Megagas is approaching Cherbourg Area Helicopter Service (call sign HELIPILHAUT) eastbound for Europort. Severe gales from south prevent helicopter operating. Jobourg Traffic co-ordinates, and informs ship that Pilot will board by boat north of CH1 buoy in longitude 01° 45' West. Jobourg requests confirmation that message has been received.

Message: Megagas. This is Jobourg Traffic.

Information ONE: Normal Pilotage suspended. Helipilhaut service not operating, reason: gales.
Information TWO: Pilot will board by boat at position: bearing 315° from CH 1 buoy distance one mile longitude 01° 45' West.
Please acknowledge.
Over.

2.6 Movement within sub-areas of the VTS

Scenario: Sarah W is approaching St John's, Newfoundland. She will enter the St John's VTS in 15 minutes, having obtained ECAREG clearance 24 hours earlier. She makes her standard report and requests clearance to enter St John's.

Message: 1. St John's Traffic. This is Sarah W.

A	Alpha	Sarah W
B	Bravo	10 15 15 Local
C	Charlie	095° from Fort Amherst distance 13 miles
I	India	St John's 10 16 05 Local
L	Lima	275°
S	Sierra	Wind West force 5

Request clearance to enter.
Over.

Message: 2. Sarah W. This is St John's Traffic

Information: You are cleared to enter.
Out.

2.6.1 When VTS issues advice, and instructions regarding clearance

Scenario: As for 1.3.3 Sarah W makes her standard ECAREG report to St John's, and clearance is given. Using previous information St John's believes Sarah W may have dangerous cargo on board.

Message: Sarah W. This is St John's Traffic.

Information: Your clearance withdrawn.
Advice: Make a new ECAREG report containing full details of dangerous and pollutant cargoes under Item Papa in your report.
Instruction: Do not enter Canadian waters until clearance is received from this or other Canadian Coastguard Traffic Centre.
Out.

2.6.2 Movement within sub-areas of the VTS

Scenario: Sarah W is approaching St John's, Newfoundland. She will enter the St John's VTS in 15 minutes, having obtained ECAREG clearance 24 hours earlier. She makes her standard report and requests clearance to enter St John's.

Message: 1. St John's Traffic. This is Sarah W.

A	Alpha	Sarah W
B	Bravo	10 15 15 Local
C	Charlie	095° from Fort Amherst distance 13 miles
I	India	St John's 10 16 05 Local
L	Lima	275°
S	Sierra	Wind West force 5

Request clearance to enter.
Over.

Message: 2. Sarah W. This is St John's Traffic

Information: You are cleared to enter.
Out.

2.7 Deviation from previously agreed sailing plan

2.7.1

Scenario: Tug Kelly has the drilling rig Itinerant Driller in tow, and is manoeuvring with difficulty. She requires to enter Chaudron, where Itinerant Driller will have a refit. She is making 3 knots only, and will occupy the fairway for 2 hours. Chaudron responds by refusing clearance until extra tugs can arrive and a clear fairway can be arranged.

Message: 1. Chaudron Traffic. This is Kelly.

Information: I am restricted in my ability to manoeuvre.
Reason: Drilling rig Itinerant Driller in tow.
Information: Maximum speed 3 knots.
Over.

Message: 2. Kelly. This is Chaudron Traffic.

Information received: You are restricted in your ability to manoeuvre and you have Itinerant Driller in tow.
Instruction: Do not enter.
Advice: Wait for tugs Donner and Blitzen.
Information: Expect delay period: Two hours.
Out.

2.7.2 Changes of intended movement

Scenario: Gaynor W is bound for Bremerhaven container terminal, and is currently inward bound near Hohe Weg radar tower. She receives orders from her agent to proceed to Bremen Neustandter Hafen before berthing at Bremerhaven. Bremerhaven acknowledges.

Message: 1. Bremerhaven Revier Traffic. This is Gaynor W.

Information: Position Hohe Weg Radar Tower.
New destination: Bremen Neustandter Hafen.
Over.

Message: 2. Gaynor W. This is Bremerhaven Revier Traffic.

Understood: New destination Bremen Neustandter Hafen
Information: Your berth Bremen Neustandter Hafen 2.
Over.

2.7.3 Unusual hazards in the system

Scenario: The ship Vikki W is approaching Waypoint number 1 near Radar Vasskanen in the Gothenburg Traffic area. Gothenburg Traffic has already broadcast navigational warnings that the Tall Ships race is commencing, but is making sure that Vikki W has received the message.

Message: Vikki W. This is Gothenburg Traffic.

Warning: Tall Ships race will commence Alvsborg Bridge at time 1200 UTC.
Information: Large numbers small craft in Gothenburg approaches.
Advice: Anchor near present position until time: 1600 UTC.
Over.

2.8 Compulsory agreement with sailing plan for certain categories of vessel

Scenario: Vikki W, a partly loaded tanker carrying low flash-point cargo, is approaching Chaudron Harbour. Her inert gas system has failed, and her empty cargo tanks are no longer inerted as required by local regulations. Cargo tanks 4 and 5, previous cargo gasoline, are affected. Chaudron Traffic reacts.

Message: 1. Chaudron Traffic. This is Vikki W.

Information: Inert gas system breakdown. Cargo tanks 4 and 5 previous cargo gasoline not now inerted.
Over.

Message: 2. Vikki W. This is Chaudron Traffic.

Information: Your vessel does not comply with the regulations of this port.
Instruction: Do not enter fairway. Await further advice.
Out.

2.9 Mandatory Pilotage Area

Scenario: Gaynor W is approaching the port of Sete, France, and has already entered the inbound fairway. She will enter the compulsory pilotage area two miles from Alpha Buoy, and has no pilot on board. Sete VTS reacts.

Message: Gaynor W, Gaynor W. This is Sete Traffic, Sete Traffic.

Information: You are approaching a mandatory pilotage area, which commences two miles from Alpha Buoy. You must take a pilot.
Instruction: do no proceed inwards without a pilot.
Over.

2.9.1 Mandatory Pilotage Area (when the VTS merely issues a reminder)

Scenario: The ferry Sally Ann is approaching Newhaven. She is not a frequent visitor to that port, although other ships of the same company use it frequently. Newhaven VTS gives a reminder.

Message: Sally Ann, Sally Ann. This is Newhaven Traffic, Newhaven Traffic.

Information: Pilotage is mandatory for Newhaven Port. You must take a Pilot unless you have a valid Pilotage Exemption Certificate.
Over.

2.10 Equipment to be provided compulsorily on board

Scenario: The Tanker Vikki W is approaching United States waters. An ARPA in full working order is a statutory requirement. San Francisco VTS establishes whether Vikki W complies with regulations

Message: Vikki W, Vikki W. This is San Francisco Traffic, San Francisco Traffic.

Question: Is your ARPA in compliance with the regulations and in full working order?
Over.

2.11 Compulsory use of port resources

Scenario: The ship Sarah W is inwards bound to Grangemouth, in the Firth of Forth, Scotland. Her route takes her through the Naval port of Rosyth. Forth Navigation Service informs her of the facts.

Message: Sarah W. This is Forth Navigation Service.

Information 1: Your inwards route passes through the Naval Port of Rosyth.
Information 2: Movements of large Navy ships are taking place and your sailing plan may be affected.
Instruction: You must obey the instructions issued to you by the Queens Harbour Master regarding navigation in the Naval Port of Rosyth.
Out.

2.12 Static situations

2.12.1 Anchoring

Scenario: Sarah W has arrived off Fos, and is awaiting the departure of another ship before berthing. She informs Marseille Traffic of her anchor position in Fos West anchorage 165° distance 2 miles from North East end of They de la Gracieuse, and enquires when she will be berthing. Marseille Traffic responds with berthing information.

Message: 1. Marseille Traffic. This is Sarah W.

Information: I am anchored. Position: bearing 165° from North East end They de la Gracieuse.
Question: What time am I berthing?
Over.

Message: 2. Sarah W. This is Marseille Traffic.

Information received: You are anchored. Position: bearing 165° from North East end They de la Gracieuse.
Answer: You are berthing in period: two hours.
Information: Pilot will board you in period: one hour.
Out.

2.12.2 Allocation of berth

Scenario: Sarah W is in the Hamburg Port area and requests berthing instructions. Hamburg Port Traffic responds.

Message: 1. Hamburg Port Traffic. This is Sarah W.

Question: What is my berth number?
Over.

Message: 2. Sarah W. This is Hamburg Port Traffic.

Answer: Information ONE: Your berth is Petroleumhafen 3.
Information TWO: Your berth available at 2300 local.
Out.

2.12.2.1 Allocation of berth (when VTS issues both advice and instructions)

Scenario: As 2.11.2, but Sarah W is delayed by non-availability of docking pilot. Hamburg Traffic acts.

Message: Sarah W. This is Hamburg Port Traffic.

Information: Your docking Pilot is delayed. He will board you at 0030 tomorrow at Pilot Station Bubendieweg.
Advice: You should anchor Cuxhaven area to river Pilot's advice.
Instruction: Do not anchor in Hamburg Port area.
Out.

2.12.3 Allocation of mooring place

Scenario: The tanker Indian Venture is shortly to discharge her cargo at Buj-Buj, Calcutta. She will lay-by at buoys. Calcutta VTS informs.

Message: Indian Venture. This is Calcutta Traffic.

Information: Your lay-by berth is Buj-Buj buoys numbers 3 and 4.
Advice: Have Hoogli heavy mooring gear ready.
Over.

2.12.4 Allocation of anchorages

Scenario: Sarah W is arriving off Fos, and expects to go to anchor before berthing. She calls Marseille Traffic, and it responds.

Message: 1. Marseille Traffic. This is Sarah W.

Question: What is my designated anchor position?
Over.

Message: 2. Sarah W. This is Marseille Traffic.

Answer: Information: Your designated anchorage is within Marseille compulsory pilotage area. Pilot will board you to proceed to your designated anchorage in position 165° from North East end of They de la Gracieuse distance 2 miles.
Instruction: Do not proceed until Pilot is on board.
Out.

2.12.5 Allocation of locks

Scenario: Gaynor W is approaching the Port of Antwerp, and is due to pass through Zandvlietsluis. She follows local procedures, and reports in, and receives lock allocation.

Message: 1. Zandvliet Radio. This is Gaynor W.

Information: My position now off Konijnenschor. Sailing upstream.
Over.

Message: 2. (later) Zandvliet Radio. This is Gaynor W.

Information: My position now of Zuid Saeftingo, heading for Zandvleit Lock.
Over.

Message: 3. Gaynor W. This Zandvliet Radio.

Information received.
Information: Your hailing number for Zandvliet Lock is 05. Your locking in time is interval: 30 minutes.
Out.

F.3 ROUTINE CONTROL OF VESSELS

3.1 Broadcast Information

Scenario: Chaudron VTS Centre, combining the functions of a Through Traffic (coastal) VTS and a Port VTS wishes to broadcast a diverse set of information to all ships in the area at 1200 UTC.

The information consists of the following:

- Meteorological information: Wind, South-West, Beaufort force 4. Sea slight. Rain showers, visibility one mile, decreasing. Pressure 1015 millibars falling. Hydrographic data: Predicted time of high water, Chaudron Harbour entrance: 1520 local, height 6.4 metres. Sécurité message: Sunken barge in position 270° 2.5 miles from Chaudron Lighthouse. All ships keep clear.

Traffic information:

1. Warning: New ship track letter V VICTOR in the North-East bound lane in position bearing 325° from Chaudron Lighthouse at distance 2.3 miles approximate course 223° speed 16 knots. This course does not comply with Rule 10 of COLREG.
2. Many yachts are reported in the North-East lane in the vicinity of Chaudron Landfall buoy. A careful lookout is advised.

Vessels with exceptional characteristics: There is a survey vessel working in the South-West bound lane reported in position bearing 300° from Chaudron Lighthouse distance 5.2 miles approximate course 052° speed 2 knots. A wide berth is advised.

Pilotage information: Chaudron Pilot vessel withdrawn from service. Pilot boat will meet inbound ships at inshore pilot station buoy K2.

Message: All ships, all ships. This is Chaudron Traffic. Information broadcast for 1200 UTC.

A	Alpha	Sécurité. Sécurité. Sunken barge in position bearing 270° from Chaudron Lighthouse distance 2.5 miles. ADVICE: Keep well clear.
E	Echo	Wind: South-West, force 4. Sea slight. Rain showers. Visibility: 1 mile decreasing. Pressure: 1015 millibars falling.
F	Foxtrot	Chaudron Pilot vessel withdrawn from service. Pilot boat will meet inbound ships at inshore pilot station buoy K2.
L	Lima	WARNING: ONE: New ship track letter V VICTOR in North-East bound lane in position bearing 325° from Chaudron Lighthouse distance 2.3 miles, course 223° speed 16 knots. This course does not comply with Rule 10 of COLREG. TWO: Many yachts are reported in North-East lane in vicinity of Chaudron Landfall buoy ADVICE: Keep a careful look-out.

This is Chaudron Traffic. End of Information Broadcast.
Out.

3.2 Dedicated to a single ship. Providing or updating data necessary for decisions to be taken on board a vessel

Scenario: Gaynor W is due to take a Pilot at Les Escoumins, St Lawrence Waterway. Winter approaches, and Gaynor W is not sure of the ice situation at the pilot station, and in the Waterway. Les Escoumins responds.

Message: 1. Les Escoumins Traffic. This is Gaynor W.

Question: What is the ice situation at Les Escoumins Pilot and in St Lawrence Waterway?
Over.

Message: 2. Gaynor W. Les Escoumins Traffic.

Answer: Information: Les Escoumins pilot station ice free. Navigation possible to Quebec for non ice strengthened vessels, to Montreal for ice strengthened vessels. Navigation closed upstream of Yamachiche.
Out.

3.2.1 Reduced visibility

Scenario: Vikki W arrives off the Elbe Light Vessel in bad weather with poor visibility, and is informed that the Pilot vessel is sheltering at Cuxhaven, where the Pilot will board. Cuxhaven Traffic informs Vikki W of the situation and offers Radar Assistance. (Note: see "German Bight Passage Planning Guide".)

Message: Vikki W. This is Cuxhaven Revier Traffic.

Information ONE: Normal Pilotage suspended. Elbe Pilot Vessel on station at Cuxhaven. Reason: severe gales.
Information TWO: Visibility in Elbe approaches 100 metres. Fairway closed at Grosser Vogelsand to vessel not using Radar Assistance to Navigation.
Question: Do you want Radar Assistance to Navigation?
Over.

3.3 Providing/updating information

3.3.1

Scenario: The ship Vikki W is proceeding inwards to Chaudron Port in fog, and is receiving radar assistance. This takes the form of constant information concerning her position with regards the "Radar Guideline" (centre of fairway), her position along the track, and her tendency away from, or towards, the track. Vikki W is to port of her guideline.

Message: Vikki W. Chaudron Traffic.

Information: Position: buoy number 25 distance 200 metres RED from radar guideline 167. Track: closing guideline.
Out.

3.3.2

Scenario: Deep draught tanker Gargantua and small ship Jack W are in the Chaudron river. Gargantua is inbound, Jack W is outbound. Chaudron Traffic reacts.

Message : Jack W. This is Chaudron Traffic.

Information: Deep draught ship Gargantua is ahead of you distance 1500 metres on opposite course. She is in centre of fairway.
Advice: Keep to the starboard side of the fairway.
Over.

3.4

Scenario: Vikki W is proceeding inwards along the restricted fairway to Chaudron Port. The visibility is poor, and Vikki W is using her ARPA to maintain her track. Additional information is being supplied by Chaudron Traffic, who have a Pilot on duty. The heading marker on Vikki W's ARPA becomes faulty.

Message: Vikki W. This is Chaudron Traffic.

Warning: Your present track diverging from Radar Guideline 086. Your present position 400 metres GREEN from guideline.
Advice: Alter course to port to regain track.
Information: Pilot on duty here. Full navigational assistance available if required.
Over.

F.4 MANOEUVRES TO AVOID COLLISIONS

4.1 Monitoring traffic and communications between vessels to detect and analyse potentially dangerous situations

Scenario: Chaudron VTS detects a series of small echos near the main fairway into Chaudron Port. She asks Gaynor W, the nearest ship, to report what can be seen.

Message: 1. Gaynor W. This is Chaudron Traffic.

Question: Do you have small craft in your vicinity?
Over.

Message: 2. Chaudron Traffic. This is Gaynor W.

Answer: Affirmative. Two dismasted small yachts drifting in fairway. These yachts are a danger to navigation.
Over.

Message: 3. Gaynor W. This is Chaudron.

Information received: Dismasted yachts constitute a danger to navigation. Thank you.
Out.

4.1.1 Analysing potential dangerous situations

Scenario: Gris Nez VTS observes several vessels South West bound in the North East bound traffic lane. Two ships, Gaynor W and Victoria Prima are in the North East bound lane, and have already reported in to Gris Nez Traffic. Gris Nez checks the position of the ships and analyses the position before reporting to Gaynor W and Victoria Prima.

Message: 1. Victoria Prima. This is Gris Nez Traffic.

Information: Several vessels ahead of you which are not complying with COLREG.
Question: What is your position, course and speed?.
Over.

Message: 2. Gris Nez Traffic. This is Victoria Prima.

Answer: Information: Position 235° from Gris Nez distance 5 miles, course 061° speed 15 knots.
Over.

Message: 3. Gaynor W. This is Gris Nez Traffic.

Information: Several vessels ahead of you which are not complying with COLREG.
Question: What is your position, course and speed?
Over.

Message: 4. Gris Nez Traffic. Gaynor W.

Answer: Information: Position 270° from Gris Nez distance 4 miles, course 070° speed 12 knots.
Over.

Message: 5. Gaynor W and Victoria Prima. This is Gris Nez Traffic.

Information: Three vessels ahead of you proceeding on course 210°.
Over.

4.2 Exchange of information with regard to intended ship/ship manoeuvres

Scenario: Two vessels, Jack W and Kate W are proceeding Westwards from Europe to the Atlantic Ocean, and are nearing the Dover Strait. They communicate and agree to use the English Inshore Traffic Zone instead of the IMO Routeing Scheme for the area. Channel Navigation Information Service (Dover Coastguard) analyses the situation and intervenes.

Message: 1 Jack W. This is Kate W.

Information: I intend using Inshore Zone Westbound to avoid heavy traffic in Westbound lane.
Over.

Message: 2. Kate W. This is Jack W.

Information: I intend to use same route.
Over.

Message: 3. Jack W and Kate W. This is Dover Coastguard.

Information 1: COLREG apply in Dover Strait. You are reminded of the requirements of COLREG Rule 10.
Information 2: Inshore Traffic Zones shall not normally be used by through traffic which can safely use the appropriate traffic lane.
Out.

4.3 Providing warnings regarding close quarter situations

Scenario: Two ships, Victoria W and Sarah W, are approaching Snake Bend near Chaudron Port. The high river banks near Chaudron make VHF contact between the ships impossible, but Chaudron VTS has both radar scanners and VHF which cover the area. Without affecting the tactics on the ships bridges, Chaudron VTS arranges a safe passing between the two ships.

Message: 1. Victoria W. This is Chaudron Traffic.

Question: What is your position and speed?
Over.

Message: 2. Chaudron Traffic. This is Victoria W.

Answer: Information: Position 5 miles West of Snake Bend, speed 10 knots.
Over.

Message: 3. Sarah W. This is Chaudron Traffic.

Question: What is your position and speed?
Over.

Message: 4. Chaudron Traffic. This is Sarah W.

Answer: Information: Position 7 miles East of Snake Bend, speed 15 knots.
Over.

Message: 5. Victoria W. This is Chaudron Traffic.

Information: Ship Sarah W Westbound speed 15 knots. Present position 7 miles East of Snake Bend. CPA in 29 minutes.
Advice: COLREG apply in Chaudron Traffic Area. Advise you keep to starboard side of fairway.
Out.

Message: 6. Sarah W. This is Chaudron Traffic.

Information: Ship Vikki W Eastbound speed 10 knots. Present position 5 miles West of Snake Bend. CPA in 29 minutes.
Advice: COLREG apply in Chaudron Traffic Area. Advise you keep to starboard side of fairway.
Out.

4.3.1

Scenario: The motor yacht Kate W is crossing the Dover Strait Traffic separation scheme, prior to her maiden voyage to Port Banus. Her course made good is at 90° to the traffic flow, but her heading is 15° from the recommended direction. Because Kate W has an English skipper, Channel Navigation Information Service communicates.

Message: 1. Kate W. This is Dover Coastguard.

Question: What is your position, course and speed?
Over.

Message: 2. Dover Coastguard. This is Kate W.

Answer: Information: My position is 280° from Gris Nez light distance 3.5 miles course 166° speed 14 knots.
Over.

Message: 3. Kate W. This is Dover Coastguard.

Information: COLREG Rule 10 state that you should cross the traffic lane as near as possible at 90°. This means that your head should be at 90° to the direction of traffic flow.
Out.

4.3.2

Scenario: Two large racing yachts, Bang On and Fast Party are approaching the finish line of the Quick Brew Cup off Chaudron Port. Both yachts have full radio equipment but no Radar. The wind is gale force, with zero visibility. Each yacht is determined to win, but is unaware of the others presence. Chaudron VTS reacts.

Message: 1. Fast Party. This is Chaudron Traffic.

Information: You have another vessel on your starboard side, range 0.5 miles, closing, bearing constant. CPA is collision in 10 minutes.
Over.

Message: 2. Chaudron Traffic. This is Fast Party.

Information received. Thank you.
Over.

Message: 3. Bang On. This is Chaudron Traffic.

Information: You have another vessel on your port side, range 0.4 miles, closing, bearing constant. CPA is collision in 08 minutes.
Over.

Message: 4. Chaudron Traffic. This is Bang On.

Information received. Thank you.
Over.

Message: 5. Bang On and Fast Party. This is Chaudron Traffic.

Advice: Apply COLREG Rule 19 at once.
Out.

F.5 ENFORCEMENT FUNCTIONS

5.1 Monitoring routine procedures

5.1.1 Communications

Scenario: Sarah W is inward bound to Port Alberni, Vancouver Island and is making her report to Tofino VTS. The fishing boat Rogue Rascal decides that this is a good time to engage her colleague Midnight Madness in light conversation. Tofino reacts.

Message: 1. Tofino Traffic. This is Sarah W.

Entry report

A	Alpha	Sarah W
B	Bravo	15 20 21 UTC
D	Delta	270° from Amphitrite Point distance 10 miles
I	India	*You should have seen the one I had last night. Why he must have been all of five feet long and 60 pounds.....*

Message: 2. Rogue Rascal. This is Canadian Coastguard Tofino Traffic. Seelonce. Seelonce. Your broadcast has been monitored by this station and is in contravention of Radio Rules. Maintain silence on this frequency. Use VHF Channel 06 for intership working.
Out.

Message: 3. Sarah W. Tofino.

Say again. All after Entry Report.
Over.

5.1.2 Reporting

Scenario: Gaynor W is approaching Deutsche Bucht, and is in a position 1 mile West of Deutsche Bucht light vessel. She has made no General Movement Report at Waypoint 80. Deutsche Bucht Revier Radio reacts.

Message: 1. Gaynor W. This is Deutsche Bucht Revier Radio.

Question: What is your position, course and speed?
Over.

Message: 2. Deutsche Bucht Radio. This is Gaynor W.

Answer: Information: My position 232° from Deutsche Bucht Light Vessel distance 3 miles course 085°, speed 4 knots approaching Pilot Vessel. Over.

Message: 3. Gaynor W. Deutsche Bucht.

Information: 1. Federal German Regulations state that you must make a movement report before entering German waters.
Information: 2. You did not make a movement report at Waypoint 80.
Advice: Make your waypoint 80 report now.
Over.

Message: 4. Deutsche Bucht. This is Gaynor W.

Information: Movement report for Waypoint 80.
Name: Gaynor W
Position: Deutsche Bucht Light Vessel
Dimensions: Length 260 metres, draft 14 metres
Destination: Bremerhaven.
Out.

5.2 Monitoring compliance with legislation and rules

5.2.1 International

Scenario: The attack carrier "Genghis Khan" is proceeding in the South West Bound lane of the IMO routeing scheme. Many ships are using the lane, and the Genghis Khan wishes to launch fighter aircraft. She turns into the empty waters of the separation zone, between 8 and sixteen miles from the French Coast. Ouessant VTS reacts.

Message: 1. Genghis Khan. This is Ouessant Traffic.

Information 1: Your present position is inside the separation zone between the inner North East bound traffic lane and the South West bound lane.
Information 2: Rule 10 of COLREG apply in this area. Your present position and course does not comply with this Rule.
Over.

Message: 2. Ouessant Traffic. This is Warship Genghis Khan.

Information received.
Information: This ship is not bound by the requirements of COLREG.
Out.

Message: 3. Genghis Khan. This is Ouessant.

Information 1: I say again. Your present position and course does not comply with Rule 10 of COLREG.
Information 2: You are within the territorial waters of France.
Instruction: Leave French territorial waters or return to waters within the IMO Routeing system.
Information 3: Your actions will be reported to your Flag State.
Out.

5.2.2 National Rules

Scenario: Within an extension of national waters in the German Bight, laden deep draft tankers have absolute right of way over other ships. Tanker Megagas is inbound to Emden, and Sarah W is in her locality. Wilhelmshaven VTS assesses the situation and reacts.

Message: 1. Sarah W. This is Wilhelmshaven Traffic.

Information 1: Deep draft tanker Megagas is in your area. Our radar plot shows her on your port side and crossing on constant bearing.
Information 2: Special local rules apply in German Bight. It is your duty to keep clear of Megagas.
Over.

Message: 2. Wilhelmshaven Traffic. This is Sarah W.

Information received.
Information: I do not accept modification of COLREG. I do not agree to keep clear of Megagas.
Out.

Message: 3. Sarah W. This is Wilhelmshaven Traffic.

Information 1: Special local rules in German Bight fall under Rule 1 of COLREG and apply to you.
Instruction: Give way to tanker Megagas.
Information 2: Your behaviour will be reported to the Federal German Government for possible further action.
Out.

5.2.3 Local Rules

Scenario: The ferry Jehaz al Mai is leaving Marseille bound for Barcelona. She is steering to cross the main fairway leading towards Fos. The container ship American New York is inbound to Fos, and local Rules give her full right of way, even though Jehaz al Mai is on her starboard side. Fos VTS reacts.

Message: 1. Jehaz al Mai. This is Fos Traffic.

Information 1: Regulations for the Port area of Fos give complete right of way to inbound vessels entering Fos, and using designated fairway.
Information 2: Ship American New York has passed buoy inbound and is in designated fairway.
Instruction: You must alter course to avoid impeding the navigation of American New York.
Over.

Message: 2. Fos Traffic. This is Jehaz al Mai.

Instruction received.
Information: I have altered course to avoid impeding American New York.
Over.

Message: 3. Jehaz al Mai. This is Fos Traffic.

Information received. Thank you.
Out.

5.3 Monitoring effect of corrective actions

5.3.1 See scenario for 5.2.1 and associated messages.

Message: 4. Ouessant. This is Warship Genghis Khan.

Information: My position and course now in compliance with COLREG Rule 10, in South West bound lane of Ouessant Routeing system.
Over.

Message: 5. Genghis Khan. This is Ouessant Traffic.

Information received.
Information: Your position agrees with our radar plot. Thank you for your co-operation.
Out.

5.3.2 See scenario for 5.2.2, and associated messages.

Message: 4. Wilhelmshaven Traffic. This is Sarah W.

Instruction received.
Information: I have stopped to give Megagas free passage.
Over.

Message: 5. Sarah W. This is Wilhelmshaven Traffic.

Information 1: Your action agrees with our radar plot.
Information 2: Your final co-operation has been recorded.
Out.

F.6 REMEDIAL FUNCTIONS

6.1 Detection and data collection regarding incidents

Scenario: (See also 6.2.1) St John's VTS seeks all available information concerning the ship in distress, Colander Two. HMCS Margaree responds.

Message: 1. Margaree. This is St John's Traffic.

Question: What information do you have concerning casualty Colander Two?
Over.

Message: 2. St John's Traffic. This is Margaree.

Answer: Information: Ship Colander Two sinking. Cargo dangerous pollutant chemicals. Damage to environment certain. Alert all relevant Government departments. Persons on board: 26. Endeavouring helicopter rescue, reason heavy pollution in water. Long range helicopter requested. Will transfer survivors to Gaynor W which has large helicopter pad.
Out.

6.2 Announcing an emergency or other extraordinary situation

6.2.1

Scenario: Ship Colander Two is in distress of the East Coast of Newfoundland, Canada. St John's VTS is the controlling station for the distress communications, and broadcasts to all ships.

Message: Mayday Relay, Mayday Relay, Mayday Relay.
All ships, all ships.
This is St John's Traffic, St John's Traffic.
Mayday Relay Colander Two.

Information 1: Ship Colander Two reported sinking in position 050° from Fort Amherst distance 15 miles.
Information 2: On scene commander HMCS Margaree. Ships Gaynor W and Vikki W standing by.
Information 3: Distress Traffic only on VHF Ch 16. All other traffic use VHF Ch 11.
This is St John's Traffic.
Out.

6.2.2

Scenario: Gaynor W is approaching Chaudron in high winds. A container ship ahead is caught by the winds. Chaudron VTS warns Gaynor W.

Message: Gaynor W. This is Chaudron Traffic.

Warning: Large container ship is blocking fairway ahead of you.
Advice: Do not proceed past buoy Number 1.
Information: You may use South Anchorage if required.
Out.

6.3 Contribution to remedial action on board the ship involved in an incident

Scenario: As for 5.2.3. In this case, however, Jehaz al Mai gives more information on her movements, and the consequences of those movements, to assist Fos VTS.

Message: 1. As for 5.2.3

Message: 2. Fos Traffic. This is Jehaz al Mai.

Instruction received.
Information: I have altered course to avoid impeding American New York. My present course 180° speed 20 kts. My closest approach to American New York in 05 minutes distance 1.6 miles.
Over.

Message: 3. As for 5.2.3, Message 3.

6.4 Assistance to third parties

Scenario: Chaudron Port uses a large off-shore pilot cutter to supply Pilots to incoming ships. Information received by Chaudron Traffic indicates that there will be an influx of ships due to a dock strike on a large off-shore island. Chaudron Traffic informs the cutter.

Message: Chaudron Pilot vessel. This is Chaudron Traffic.

Information: Twenty ships diverted from Saxon port expected Chaudron in next 24 hours.
Information: Ships include large tankers and one in number 3000 TEU container vessel.
Advice: Suggest your Pilot arrangements are adjusted accordingly.
Over.

F.7 OTHER FUNCTIONS

7.1 Liaison between vessel and shore parties (movements, facilities or extraordinary circumstances).

Scenario: The tug Bustler is due to give assistance to Gaynor W. She fails to make VHF contact and asks Chaudron Traffic to give her Gaynor W's ETA.

Message: 1. Chaudron Traffic. This is Tug Bustler.

Question: What is ETA of Gaynor W?
Over.

Message: 2. Tug Bustler. This is Chaudron Traffic.

Answer: Information: ETA of Gaynor W is 15 08 30 Local.
Out.
