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APPENDIX

APPENDIX A

Table A-1 Recorded Current Speed and Direction at Station 03 Map Ta Phut, Rayong Province 21-22/06/89

Date	Time	Depth(m)					
		Surface		Middepth		Bottom	
		Speed (cm/s)	Direction (Degree)	Speed (cm/s)	Direction (Degree)	Speed (cm/s)	Direction (Degree)
21/06/89	15.00	34.56	270	-	-	-	-
21/06/89	16.00	42.12	270	-	-	-	-
21/06/89	17.00	40.68	270	-	-	-	-
21/06/89	18.00	41.76	270	37.08	280	27.00	270
21/06/89	19.00	25.20	290	26.64	270	24.84	280
21/06/89	20.00	13.68	110	12.96	50	15.84	310
21/06/89	21.00	15.48	300	13.32	310	7.20	120
21/06/89	22.00	17.28	100	15.84	50	12.96	60
21/06/89	23.00	23.40	110	25.20	85	29.52	90
21/06/89	24.00	16.20	140	20.52	60	21.60	70
22/06/89	1.00	19.44	130	23.40	90	18.72	60
22/06/89	2.00	14.40	80	19.08	30	18.36	130
22/06/89	3.00	14.40	150	15.12	20	30.96	160
22/06/89	4.00	14.40	50	13.32	80	23.04	150
22/06/89	5.00	27.36	150	17.64	150	17.64	110
22/06/89	6.00	26.64	95	29.52	93	18.72	91
22/06/89	7.00	37.80	120	28.08	100	26.64	90
22/06/89	8.00	44.28	100	45.00	100	38.52	90
22/06/89	9.00	55.80	90	52.20	90	30.60	91
22/06/89	10.00	54.36	91	52.20	91	24.12	91
22/06/89	11.00	40.68	90	37.08	90	16.20	91
22/06/89	12.00	32.04	90	23.40	92	19.08	120
22/06/89	13.00	26.64	90	23.04	110	19.80	180
22/06/89	14.00	13.68	80	27.72	290	15.48	272
22/06/89	15.00	19.08	271	42.84	271	34.56	270

Table A-2 Recorded Current Speed and Direction at Station 03 Map Ta Phut, Rayoung Province 24-25/11/89

Date	Time	Depth(m) Surface		Middepth		Bottom	
		Speed (cm/s)	Direction (Degree)	Speed (cm/s)	Direction (Degree)	Speed (cm/s)	Direction (Degree)
24/11/89	13.00	11.16	310	15.84	170	22.32	140
24/11/89	14.00	18.72	240	6.12	280	9.00	110
24/11/89	15.00	26.28	260	25.20	45	41.76	270
24/11/89	16.00	9.72	90	30.60	100	39.24	120
24/11/89	17.00	48.60	80	17.28	200	17.64	300
24/11/89	18.00	8.64	250	9.36	90	20.52	100
24/11/89	19.00	15.84	100	30.60	100	15.48	210
24/11/89	20.00	26.28	130	29.52	90	21.24	300
24/11/89	21.00	9.36	170	16.20	240	21.60	300
24/11/89	22.00	9.00	120	15.12	290	29.88	290
24/11/89	23.00	11.88	260	11.52	270	19.44	285
24/11/89	24.00	10.08	250	22.32	270	21.24	300
25/11/89	1.00	10.80	120	14.40	200	21.96	270
25/11/89	2.00	10.80	270	34.20	280	13.32	280
25/11/89	3.00	9.36	290	17.64	270	36.36	280
25/11/89	4.00	34.56	105	46.44	180	100.80	160
25/11/89	5.00	43.20	185	45.72	55	70.56	280
25/11/89	6.00	25.20	290	30.96	220	27.00	130
25/11/89	7.00	34.56	200	36.36	120	14.40	290
25/11/89	8.00	25.92	200	16.92	300	18.00	290
25/11/89	9.00	24.48	290	24.48	275	10.80	150
25/11/89	10.00	32.04	180	24.84	300	8.64	270
25/11/89	11.00	17.64	280	20.52	280	12.60	280
25/11/89	12.00	15.48	270	15.12	300	13.68	210

Table A-3: Wind data for October 1988 and June 1989 at Map Ta Phut area.

June 1989			November 1989		
Date	Mean speed (kms/hrs)	Prevailing Direction	Date	Mean speed (kms/hrs)	Prevailing Direction
1	3.6	SW	1	3.6	NE
2	3.6	SW	2	7.2	N
3	3.6	SSW	3	3.6	NE
4	3.6	SW	4	3.6	SE
5	7.2	SW	5	3.6	SE
6	3.6	SSW	6	3.6	N
7	3.6	SW	7	3.6	NE
8	3.6	SSW	8	3.6	NNE
9	3.6	SW	9	3.6	NE
10	7.2	S	10	3.6	NNE
11	7.2	SSW	11	3.6	N
12	7.2	SSW	12	3.6	NE
13	3.6	S	13	3.6	N
14	3.6	SSW	14	3.6	N
15	3.6	S	15	3.6	N
16	3.6	S	16	3.6	N
17	7.2	SW	17	3.6	NNE
18	3.6	SW	18	3.6	NNE
19	3.6	W	19	3.6	NE
20	3.6	SSW	20	3.6	NNE
21	3.6	SSW	21	3.6	NNE
22	3.6	SSW	22	3.6	N
23	7.2	WSW	23	3.6	NNE
24	3.6	WSW	24	3.6	NE
25	7.2	WSW	25	3.6	N
26	10.8	SW	26	3.6	N
27	7.2	S	27	3.6	NE
28	3.6	WSW	28	3.6	NE
29	3.6	WSW	29	7.2	NE
30	3.6	WSW	30	7.2	NE
Monthly total	144.0	SW	Monthly total	118.8	NE
Monthly mean	4.8	SW	Monthly mean	4.0	NE

Source : Meteorological Department

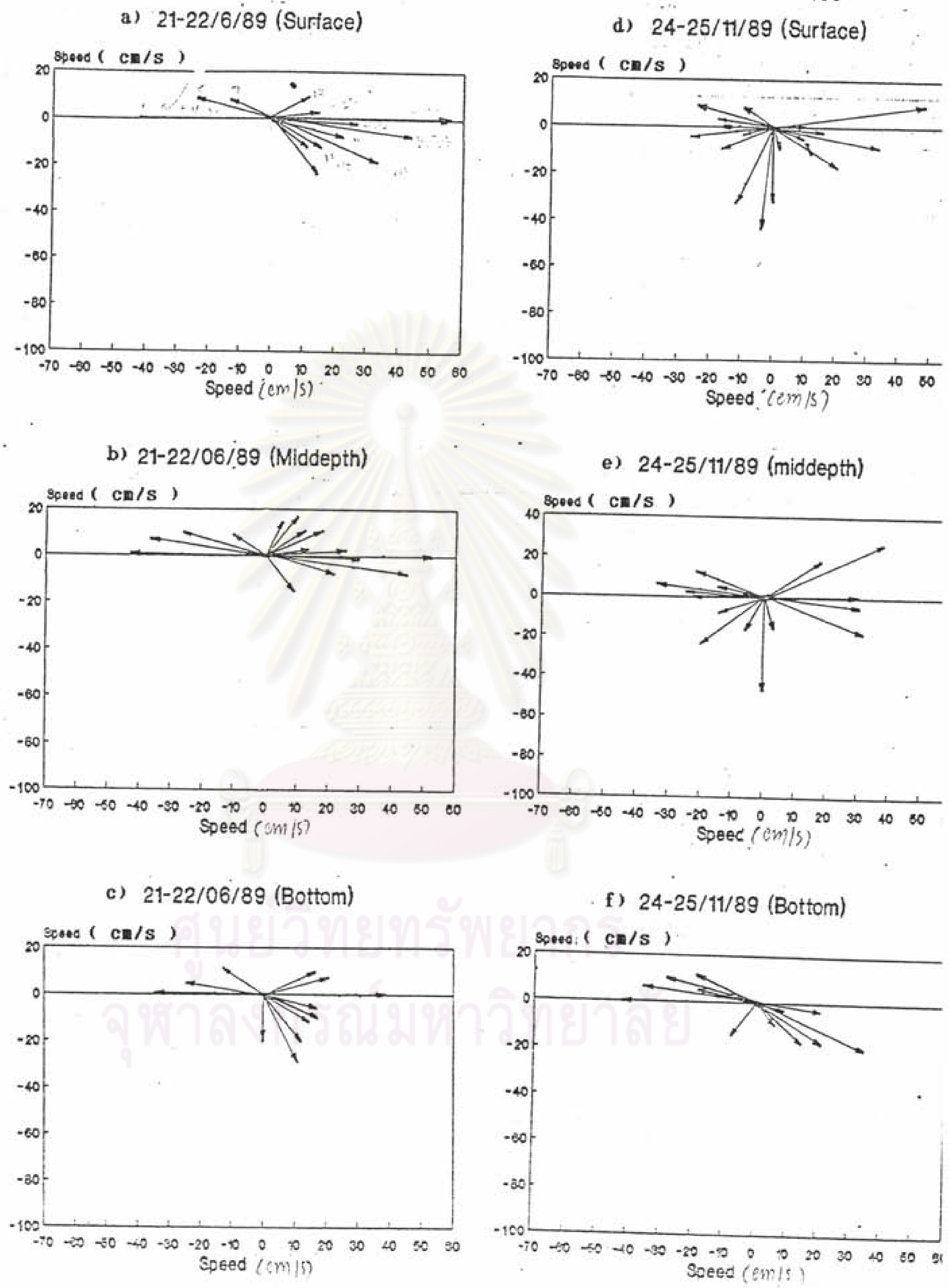


Figure A-1 The hourly recorded current from Station 03.

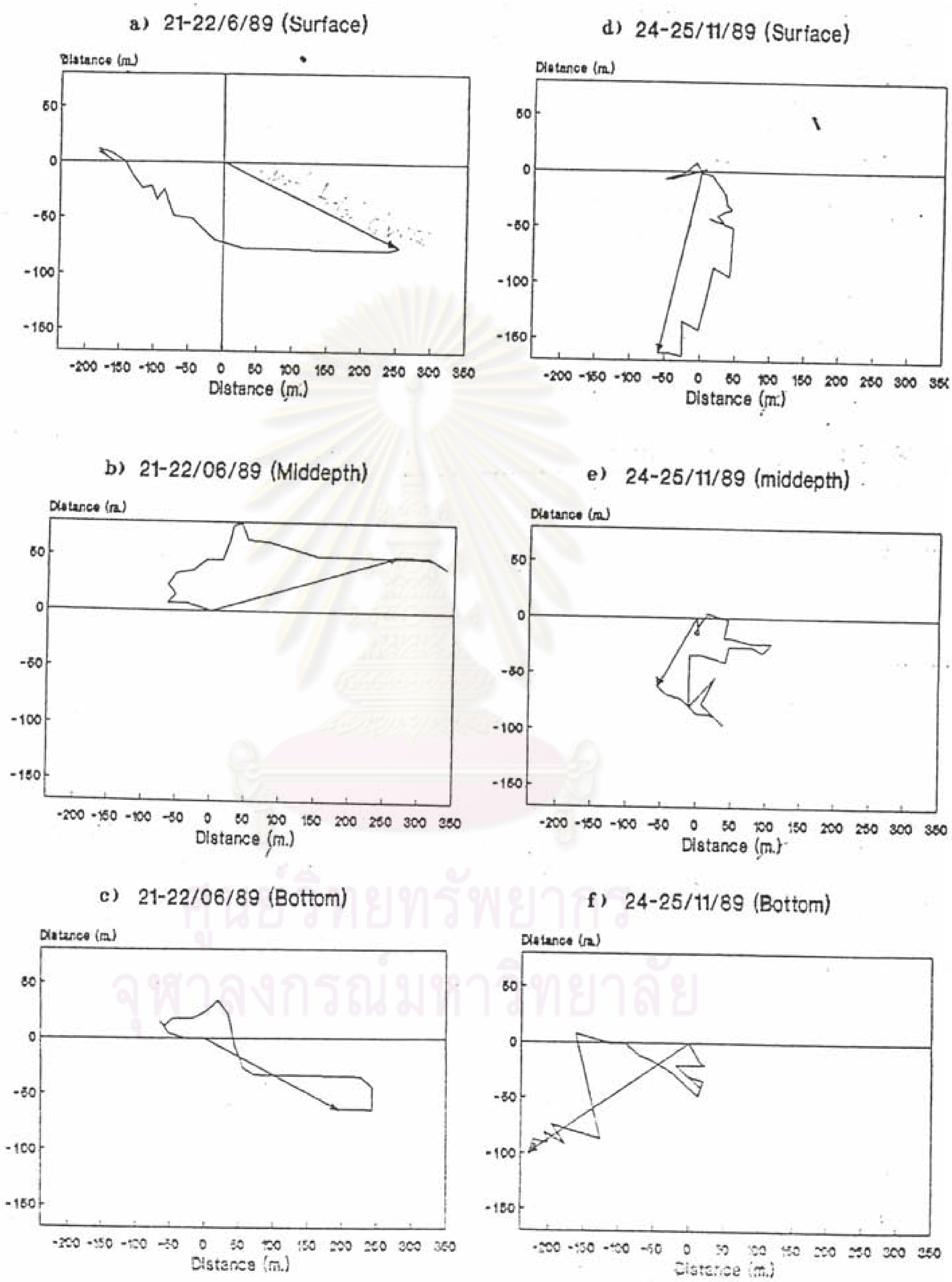


Figure A-2 The progressive vector diagrams from current measurement at Station 03

APPENDIX B

Table B-1 List of standard aliphatic hydrocarbons with their retention time and Kovats index in this study.

	Compounds	Retention Times	Kovats Index
C15	normal pentadecane	10.38	1500
C16	normal hexadecane	11.89	1600
C17	normal heptadecane	13.37	1700
Pris	Pristane (2,6,10,14-tetramethyl pentadecane)	13.51	1709
C18	normal octadecane	14.75	1800
Phy	Phytane (2,6,10,14-tetramethyl hexadecane)	14.92	1813
C19	normal nonadecane	16.07	1900
C20	normal eicosane	17.34	2000
C21	normal heneicosane	18.56	2100
C22	normal docosane	19.73	2200
C23	normal tricosane	20.86	2300
C24	normal tetracosane	21.94	2400
C25	normal pentacosane	23.00	2500
C26	normal hexacosane	24.01	2600
C27	normal heptacosane	24.75	2700
C28	normal octacosane	25.48	2800
C29	normal nonacosane	26.75	2900
C30	normal triacontane	28.02	3000
C31	normal hentriacontane	29.34	3100
C32	normal dotriacontane	30.84	3200

Table B-2 N-alkane from the Map Ta Phut sediments collected in October,1988 (ng/g dry sediment).

n-alkane	Nearshore station																					Offshore station						Klong
	n	n1	n2	n3	n4	n5	n6	n7	n8	n9	n10	n11	n12	n13	n14	n15	n16	n17	n18	n19	n20	o1	02	o3	o4	o5	o6	c
15	14.0	8.6	18.2	12.6	3.0	14.8	5.2	6.6	24.4	1.0	6.8	3.0	5.7	2.7	24.2	14.4	8.6	8.3	3.8	1.2	5.2	45.6	221.0	54.6	35.2	39.7	28.6	6.3
16	27.1	17.3	17.7	26.5	4.6	29.2	6.7	33.6	48.7	37.0	34.6	4.6	7.9	7.9	32.1	29.2	7.1	16.3	2.1	3.4	3.8	28.6	191.8	38.7	67.4	77.3	35.6	21.3
17	136.2	40.5	96.1	78.6	80.8	91.6	14.4	80.9	143.0	89.0	104.8	76.9	76.0	23.6	129.5	40.3	26.4	43.9	21.9	23.7	30.4	154.6	278.6	68.9	98.2	87.2	120.3	32.6
18	54.5	19.6	18.1	13.5	21.7	18.6	4.6	12.9	87.9	18.9	25.7	7.8	19.6	11.6	35.1	18.6	16.1	13.4	2.2	6.8	1.6	45.8	324.4	35.8	65.3	78.1	102.3	28.6
19	79.4	20.3	37.2	25.6	34.7	19.5	22.0	0.0	35.8	12.8	0.0	24.9	17.6	23.9	62.5	19.5	21.6	15.9	2.5	7.4	2.3	65.3	277.2	42.6	154.2	120.3	92.2	42.3
20	47.8	21.6	12.2	14.8	19.6	22.3	0.8	8.7	18.9	9.6	9.0	12.8	15.8	25.2	23.6	22.3	23.4	6.7	2.1	3.6	3.2	68.7	291.6	56.3	45.6	70.5	12.3	19.3
21	49.5	31.5	54.9	75.9	55.3	65.8	1.6	24.1	88.2	26.5	24.8	25.6	43.9	34.8	85.2	65.8	86.4	24.9	21.1	53.2	14.1	132.5	123.5	88.4	53.1	48.6	65.2	32.1
22	20.1	13.2	2.7	34.7	32.8	3.8		5.9	9.0	6.5	6.1	13.6	21.0	19.9	6.4	3.8	19.0	22.0	1.5	32.6	25.2	92.7	81.1	65.4	23.1		3.0	15.6
23	8.3	3.5	1.0	18.9	15.5	3.9		13.8	10.0	15.2	14.3	12.8	11.4	13.8	3.3	3.9	16.1	17.3	28.7	28.9	30.6	65.4		32.1	3.0		2.2	12.3
24	4.2	2.6	0.9	6.9	9.9	3.6		7.8	7.5	8.6	8.1	6.7	6.7	8.8	3.2	1.6	3.7	8.8	0.5	14.2	16.4	46.5		11.9				8.6
25	4.5	1.9	0.5	3.1	3.1	3.2		15.7	5.9	17.2	8.0	4.1	2.0	4.1	1.0	0.3	1.1	4.1	0.6	8.3	12.1	10.3		6.3				5.2
26	1.7		0.4	0.6				8.1	4.6	8.9	6.4	0.2		1.2	0.6				0.1	6.3	6.1	6.2						3.2
27	2.0							3.2		3.5	3.3									1.5	4.4							0.2
28																					1.8							
29																					0.5							
30																					0.2							
Tot.N	449.2	180.6	259.8	311.7	281.0	276.3	55.3	221.4	483.7	254.7	251.9	193.0	227.6	177.5	406.7	219.8	229.6	181.6	87.1	191.1	157.9	762.2	1789.2	501.0	545.1	521.7	461.7	227.6
%RECOV	94.6	78.6	76.3	77.6	92.2	86.1	76.1	78.6	98.2	74.6	81.1	88.4	74.4	64.2	79.1	84.6	83.7	77.1	67.1	77.9	87.3	76.1	83.8	89.1	85.9	94.9	85.9	89.3

Table B-3 N-alkane from the Map Ta Phut sediments collected in June,1989 (ng/g dry sediment).

n-alkane	Nearshore																					Offshore						Klong
	Station																					Station						
	n	n1	n2	n3	n4	n5	n6	n7	n8	2n9	n10	n11	n12	n13	n14	n15	n16	n17	n18	n19	n20	o1	o2	o3	o4	o5	o6	c
15	111.6	6.9	13.8	6.7	2.9	38.2	3.0	4.6	7.5	29.6	26.5	6.5	1.1	12.6	18.7	12.5	5.9	7.6	3.86	4.6	10.2	14.6	35.2	23.6	45.9	54.0	38.6	35.4
16	136.1	25.6	5.6	2.5	4.0	4.6	4.6	2.2	18.7	18.0	16.1	8.6	2.3	26.5	25.4	10.7	6.6	6.3	3.14	5.6	6.2	25.2	67.4	48.9	55.1	13.2	62.7	58.6
17	150.4	112.6	85.1	27.1	25.9	28.6	67.9	25.8	27.3	95.3	85.3	32.6	9.5	78.6	135.6	28.9	18.6	47.6	26.19	15.7	74.6	136.4	77.5	67.8	88.3	126.7	140.9	126.9
18	226.9	32.7	18.2	6.7	12.0	4.5	16.9	2.1	4.5	14.7	15.6	8.9	2.3	13.5	56.7	49.2	45.8	10.3	2.84	5.3	12.3	48.7	75.5	65.9	42.9	60.5	126.2	72.1
19	79.7	13.6	38.3	44.1	23.9	2.6	34.7	1.6	9.7	6.9	13.2	3.6	7.5	25.6	28.7	48.6	37.4	3.6	2.34	14.6	5.1	51.5	96.7	88.4	79.9	224.7	88.7	68.6
20	166.0	16.3	13.1	13.2	7.9	3.3	17.9	1.4	4.5	20.4	18.3	3.6	14.6	14.8	22.1	41.8	39.5	5.6	3.16	3.5	7.0	62.7	66.4	43.3	65.2	185.8	32.2	64.3
21	127.6	42.3	84.6	74.8	8.2	15.6	55.9	25.6	11.4	19.8	28.5	36.2	27.8	65.3	11.7	56.6	51.0	15.6	16.18	17.6	29.6	122.5	102.6	83.2	99.4	217.8	75.8	46.1
22	151.7	32.9	91.8	12.4	2.1	21.3	31.9	27.7	0.6	158.3	55.7	25.8	15.6	45.2	5.6	32.3	25.8	35.1	24.26	65.2	54.6	107.1	45.9	32.9	75.6	18.9	16.2	24.9
23	93.0	18.3	57.3	6.7	7.6	30.6	13.3	30.9	1.3	90.2	79.1	35.6	13.6	23.6	3.7	20.7	7.4	45.6	29.64	45.2	74.6	88.6	88.6	23.9	45.2	11.5	4.4	17.6
24	98.1	3.4	31.7	6.1	2.7	13.2	6.7	24.1	0.7	45.2	92.3	2.3	6.5	12.3	2.2	10.3	3.8	22.3	18.17	38.7	35.5	68.7	36.4	18.6	32.8	8.5	1.2	8.4
25	23.0	2.1	10.1	1.3	1.0	15.6	4.9	16.3	1.2	71.6	64.2	2.1	1.3	3.1	1.8	5.2	1.7	18.6	13.84	26.5	24.7	31.3	16.7	12.1	24.5	6.6		3.7
26	14.7	1.8	3.3			8.6	0.9	8.8	0.1	39.4	14.8	1.5		0.6	0.9	3.0	1.4	8.3	8.41	14.3	13.6	11.3		8.2	11.8	4.9		1.1
27	7.4		0.6			3.2		1.1		12.5	12.7				0.3			7.1	4.6	6.0	10.2	8.2						0.6
28	3.4							0.5		15.1	3.9							3.2	1.5	1.2	5.2	4.5						0.2
29	2.6							0.3			1.9							0.3	0.5		2.6	1.6						
30								0.1			1.6								0.1		0.6							
Tot.N	1392.0	308.5	453.1	201.6	98.1	189.9	258.6	173.1	87.5	637.1	529.7	167.3	102.1	321.7	313.4	319.7	244.9	237.1	158.7	264.0	366.6	782.9	708.9	516.8	666.6	933.1	586.9	528.5
%RECOV	91.5	88.6	79.6	87.7	85.6	71.6	67.2	85.6	95.2	88.6	91.1	86.9	74.8	69.8	91.2	93.7	88.1	72.6	71.8	88.4	79.8	79.6	89.3	91.6	91.2	95.4	92.4	86.6

Table B-4 List of the standard aromatic hydrocarbonds with their aromatic retention index (in this study)

No.	Compound	Retention Time	Aromatic Retention Index (ARI)
1	Naphthalene	4.67	0.00
2	2-Methylnaphthalene	6.05	53.28
3	Biphenyl	7.26	100.00
4	2,6-Dimethylnaphthalene	7.61	106.14
5	Acenaphthelene	8.23	117.01
6	Acenaphthene	8.74	125.96
7	Dibenzofuran	9.21	134.21
8	Fluorene	10.20	151.58
9	1-Methylfluorene	11.98	182.81
10	9-Fluorenone	12.42	190.53
11	Dibenzothiophene	12.58	193.33
12	Phenanthrene	12.96	200.00
13	Anthracene	13.10	203.34
14	1-Methylphenanthrene	14.87	245.58
15	Fluoranthrene	16.53	285.20
16	Pyrene	17.15	300.00
17	11 H-Benzo(b)fluorene	18.52	335.58
18	1,1-Binaphthyl	19.93	373.51
19	Benzo(a)anthracene	20.89	397.14
20	Chrysene	21.00	400.00
21	Benzo(e)pyrene	24.71	490.71
22	Benzo(a)pyrene	24.79	492.67
23	Perylene	25.09	500.00
24	Dibenz(a,h)anthracene	27.48	571.13
25	Benzo(ghi)perylene	28.45	600.00

APPENDIX C

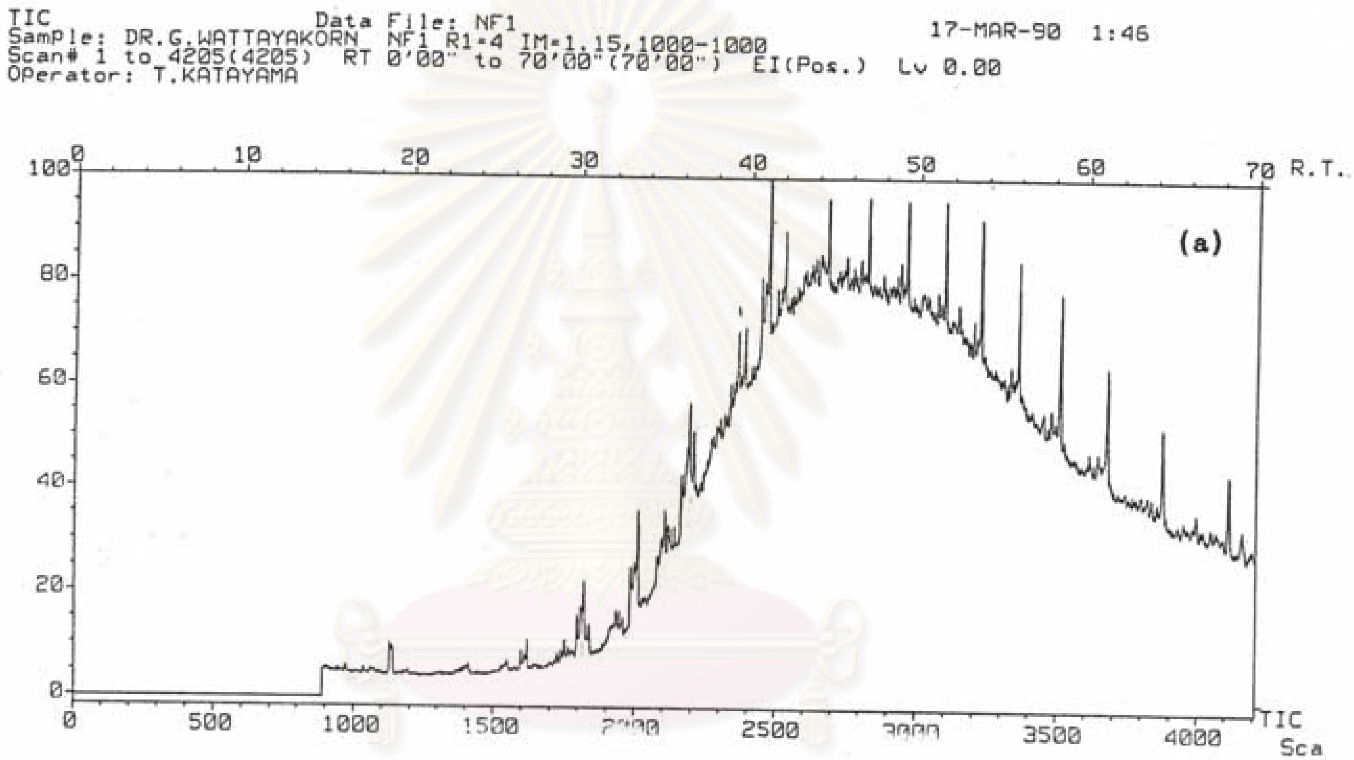
Figure C-1 Total Ion Chromatogram (TIC) of column chromatographic fraction of aliphatic hydrocarbons.

a) TIC

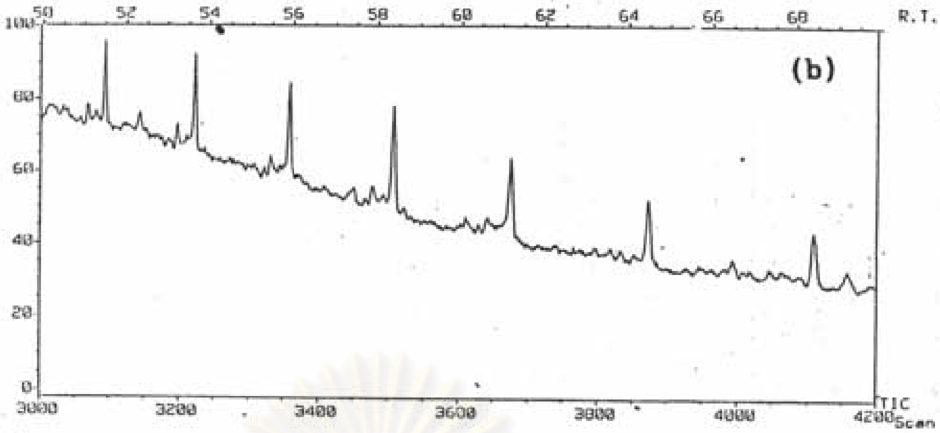
b) some part of TIC

c) mass spectrum of n-C_{25} ($C_{25}H_{52}$)

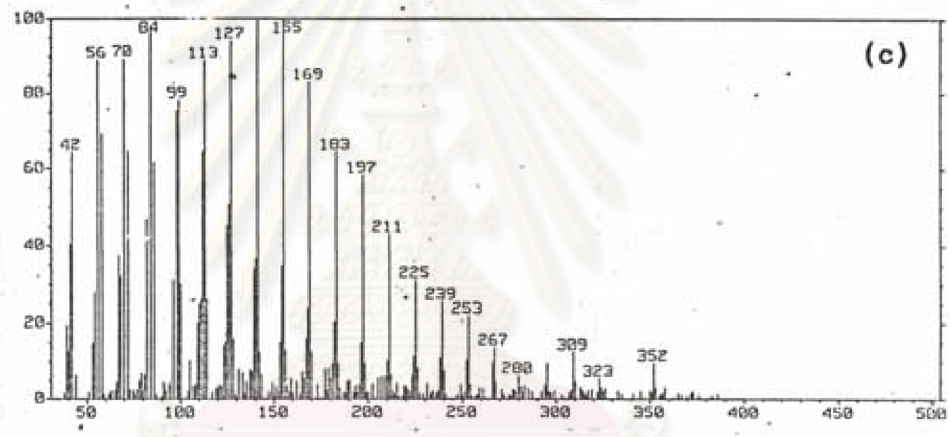
d) mass spectrum of n-C_{29} ($C_{29}H_{60}$)


TIC
Data File: NF1
Sample: DR.G.WATTAYAKORN NF1 R1=4 IM=1.15,1000-1000
17-MAR-90 1:46
Scan# 1 to 4205(4205) RT 0'00" to 70'00"(70'00") EI(Pos.) Lv 0.00
Operator: T.KATAYAMA
R.T.
(a)
TIC
Sca

TIC Data File: NF1 17-MAR-90 1:46
Sample: DR.G.WATTAYAKORN NF1 R1-4 IM=1.15,1000-1000
Scan# 3000 to 4200(4205) RT 49'56" to 69'55"(70'00") EI(Pos.) Lv 0.00
Operator: T.KATAYAMA



MASS SPECTRUM Data File: NF1 17-MAR-90
Sample: DR.G.WATTAYAKORN NF1 R1-4 IM=1.15,1000-1000
RT 55'55" EI (Pos.) GC 450.6c BP: m/z 155.0000 Int. 73.0297 Lv 1.00
Scan# (3359) - (3365) [coef. 1.00], AMW = 137.288(105.532)



MASS SPECTRUM Data File: NF1 17-MAR-90 1:46
Sample: DR.G.WATTAYAKORN NF1 R1-4 IM=1.15,1000-1000
RT 61'09" EI (Pos.) GC 450.6c BP: m/z 113.0000 Int. 61.1649 Lv 1.00
Scan# (3673) - (3664) [coef. 1.00], AMW = 126.019(93.516)

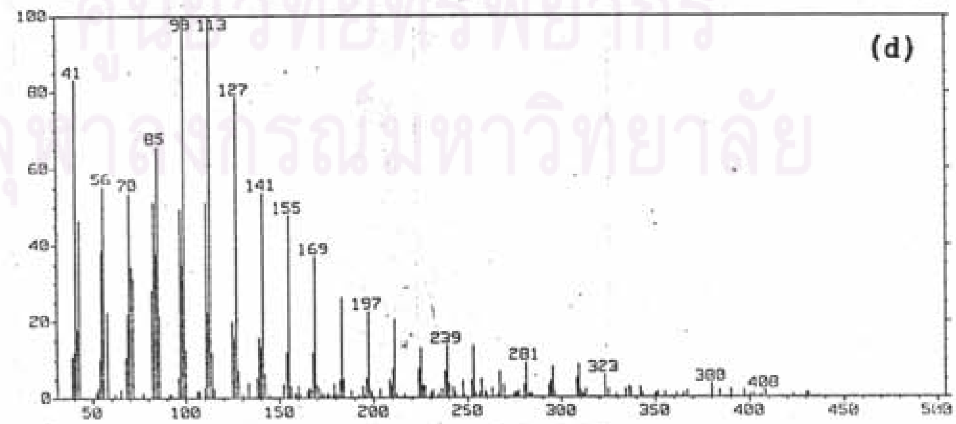


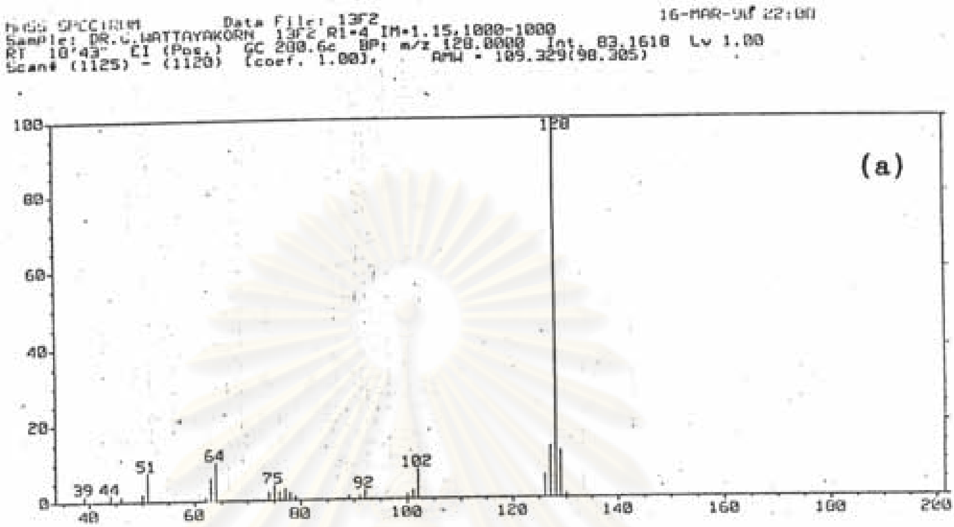
Figure C-2 Mass spectrum of aromatic hydrocarbons.

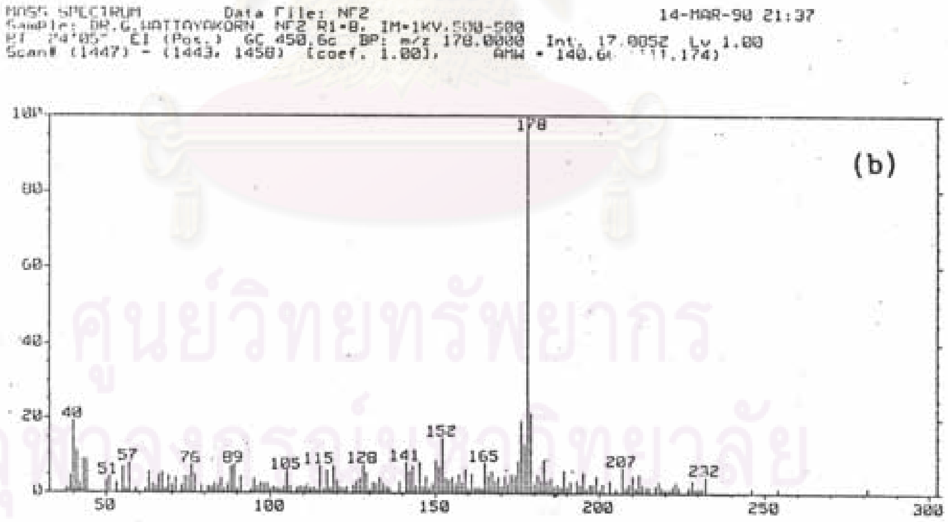
a) Naphthalene

b) Phenanthrene/Anthracene

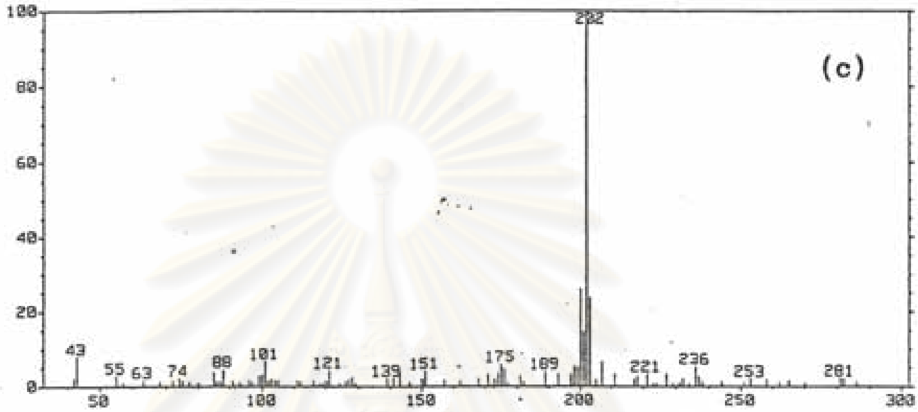
c) Fluoranthene/Pyrene

d) 1,1-Binaphthyl

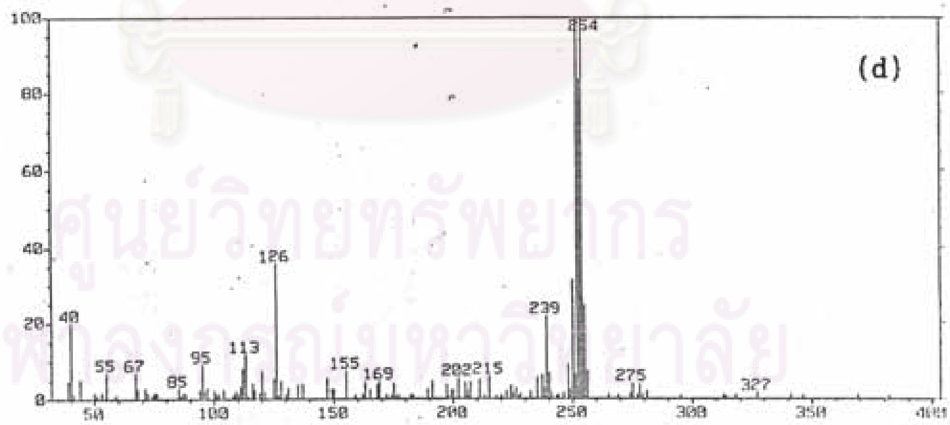

MASS SPECTRUM Data File: 13F2 16-MAR-90 22:00
Sample: DR.G.WATTAYAKORN 13F2 R1-4 IM-1.15,1000-1000
RT 10'43" EI (Pos.) GC 200.6c BP: m/z 128.0000 Int. 83.1618 Lv 1.00
Scan# (1125) - (1120) [coef. 1.00], AMW - 109.329(98.305)
(a)
128
39 44
51
64
75
92
102


MASS SPECTRUM Data File: NF2 14-MAR-90 21:37
Sample: DR.G.WATTAYAKORN NF2 R1-8, IM-1KV,500-500
RT 24'05" EI (Pos.) GC 450.6c BP: m/z 178.0000 Int. 17.0052 Lv 1.00
Scan# (1447) - (1443, 1458) [coef. 1.00],
(b)
178
40
51
57
76
89
105
115
128
141
152
165
207
232

MASS SPECTRUM Data File: NF2 14-MAR-90 21:37
Sample: DR.G.WATTAYAKORN NF2 R1-8, IM-1KV,500-500
RT 20'04" EI (Pos.) GC 450.6c BP: m/z 202.0000 Int. 20.6757 Lv 1.00
Scan# (1686) - (1691) [coef. 1.00], AMW = 176.200(148.974)



MASS SPECTRUM Data File: 13F2 16-MAR-90 22:08
Sample: DR.G.WATTAYAKORN 13F2 R1-4 IM-1.15,1000-1000
RT 51'58" EI (Pos.) GC 450.6c BP: m/z 254.0000 Int. 41.7176 Lv 1.00
Scan# (3122) - (3126) [coef. 1.00], AMW = 202.510(156.373)



APPENDIX D

Five Steps of Old Ship-Breaking Process and an Environmental Protection

This information is obtained from the Thai International steel Co.,Ltd. The five steps of an old ship scraping process are as follows:-

1. Transfer of oil from engine room onto container boat.

After the vessel is anchored at the designated area, the vessel will be checked for free gas by surveyors of the Harbor Department. Oil and oil mixed with water from the engine room are then transferred to an oil container boat and onto oil container, respectively (Figure D-1 . During this step, an expertise of oil transferring is essential to prevent oil contamination to the marine environment.

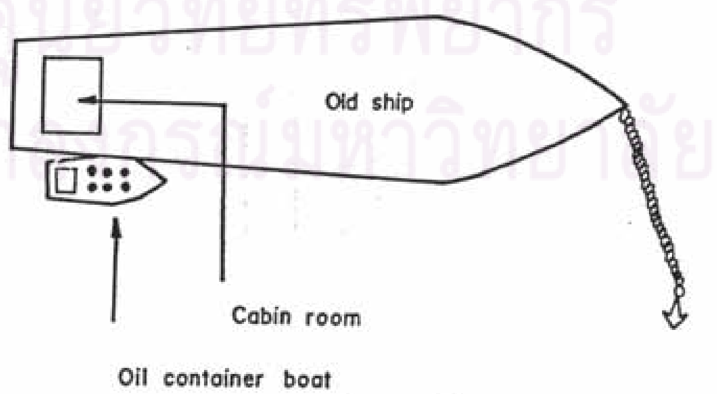


Figure D-1 Transfer of oil from the engine room.

2. Relocation of furniture from cabin room onto the pier.

After the oil is transferred from an engine room onto an oil container boat, the next step is the relocation of furniture from the cabin room onto the temporary pier. Environmental impacts occurred during this step may be caused by waste or garbage dropping into the water.

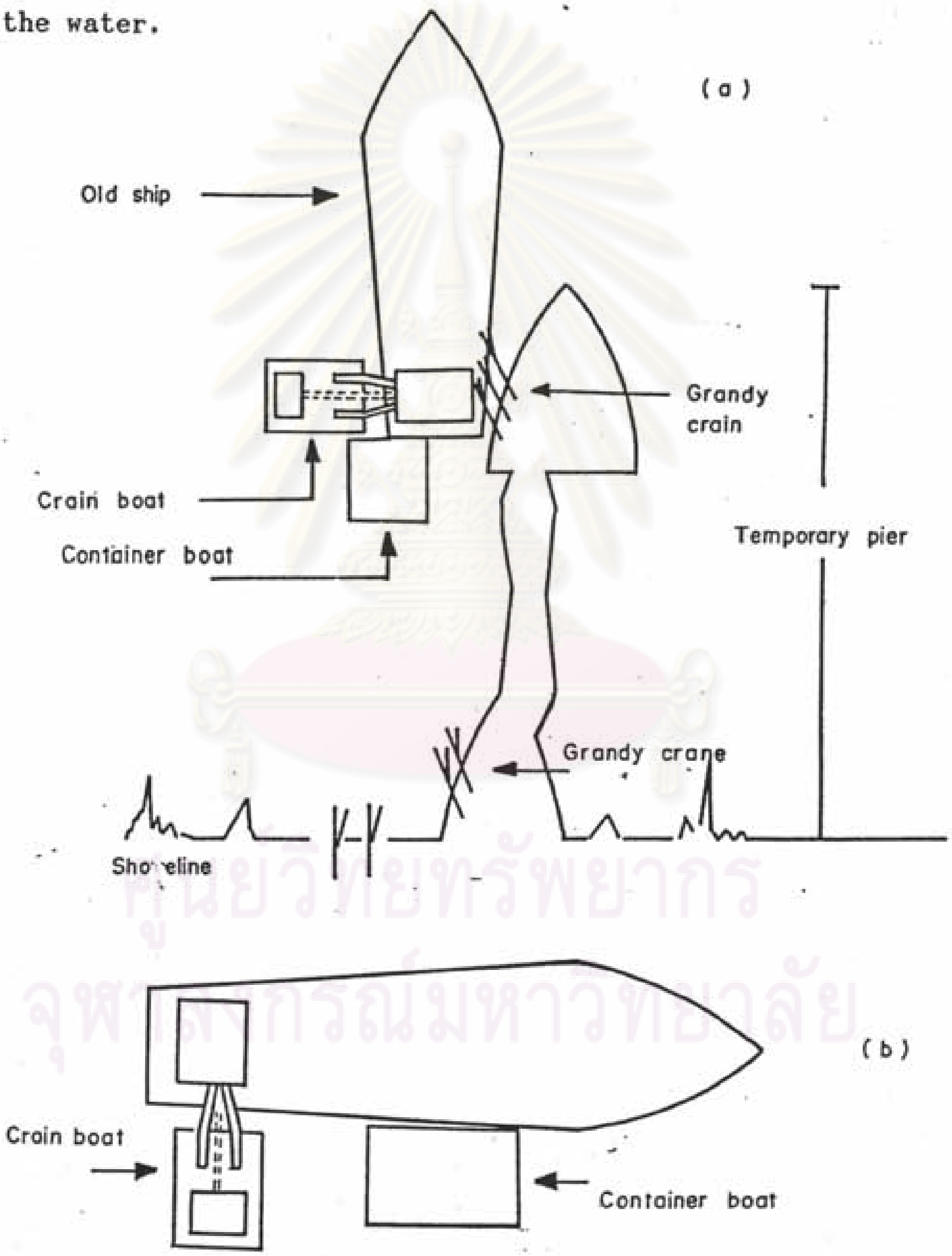


Figure D-2 Relocation of furniture from cabin room.
(a) vessel is anchored at the temporary pier.
(b) vessel is anchored offshore.

3. Scraping forward of the old ship.

After step 2, a breaking activity will be carried out. Grandy crain and thrown will be used to haul steel scraps onto the temporary pier (Figure D-3). No environmental impact occurred during this step is foreseen.

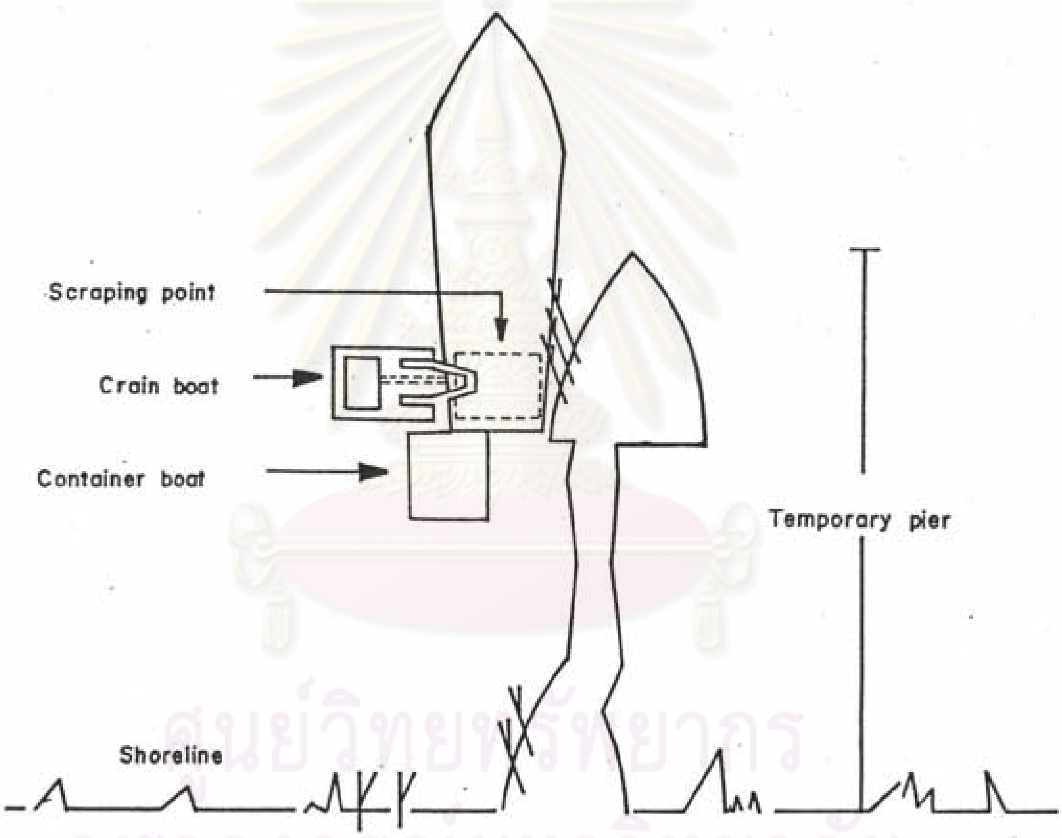


Figure D-3 Scraping forward of the old vessel.

4. Scraping of engine room and stern of the old ship.

As soon as the stern is hauled close to shore and the side of the boat is attached to the pier, an ocean boom will be deployed (Figure D-4) to prevent oil drifting.

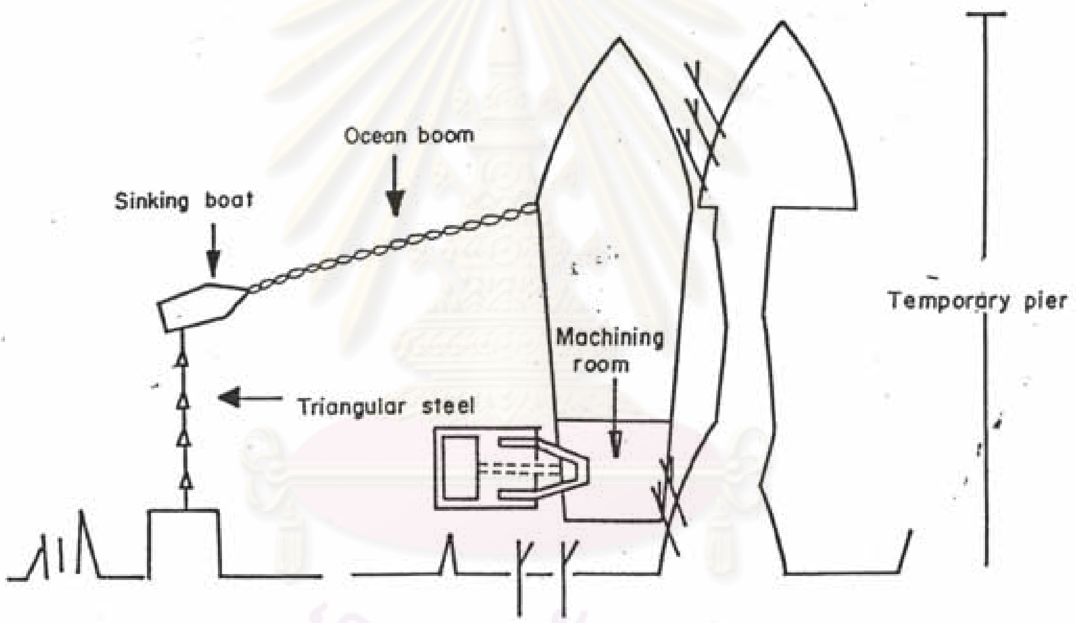


Figure D-4 Scraping of engine room and stern of the old ship.

Steel scraps from an old vessel are transferred via a grandy crane to the pier on shore and then scraping processes on the shore starts. Oily machines are burnt to destroy a surface coated oil. Unburnt and contaminated oil in the water can be recovered by chemical dispersant.

In this step, a serious concern is a contamination of oil into seawater, sediment and shoreline. In case of oil contamination occurs, an ocean booms are used to prevent oil from drifting out.

In this research, at this period, the environmental data have been collected for seawater and sediment samples. Unfortunately, the information on the exact starting and ending dates of the operations are not available. However, the obtained results can be used to evaluate the impact of the ship-breaking activities on marine environment.

5. Scraping of the old vessel.

At this last activity, the rest of the old vessel is scraped, started from the stern toward the bow (Figure D-5).

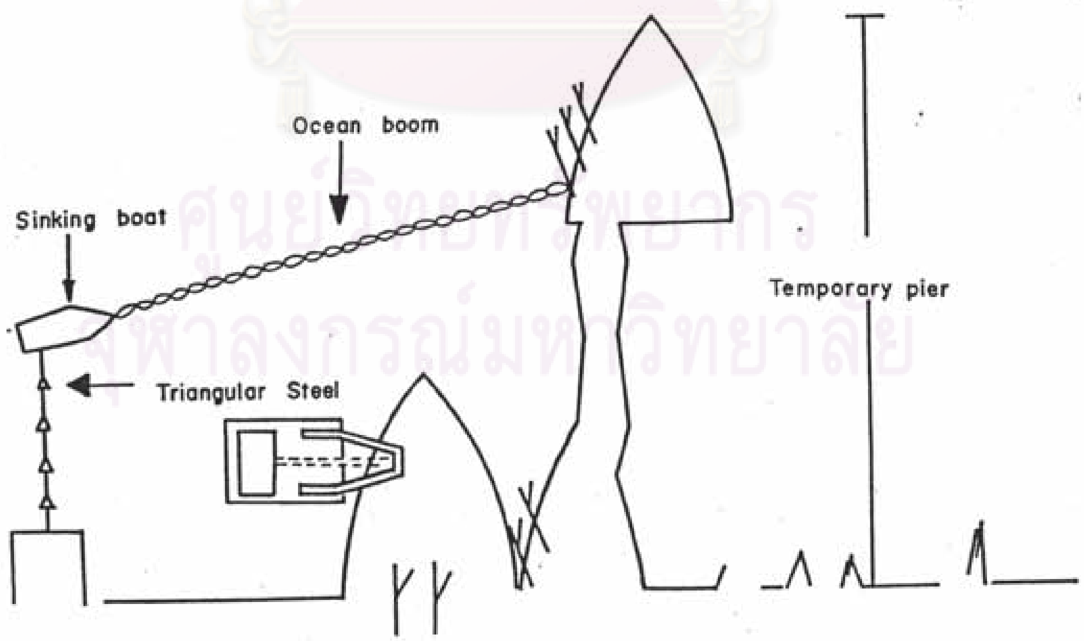


Figure D-5 Scraping of the old vessel.

Table D-1 The breaking records of the Thai International Steel Co.,Ltd. during 1985 to 1989 .

YEAR	NAME	COUNTRY	VOLUME (TON)	KIND OF SHIP	OPERATION TIME
1987	SEA PETRO	JAPAN	10210	Gas container	-
	MENA	THAILAND	13865	Tanker	-
	SIAM	THAILAND	13380	Tanker	-
1986	PICHIT SAMUT	THAILAND	3640	Cargo vessel	-
	HUA HIN	MALAYSIA	1485	Tanker	-
	EFYR	GERMANY	15271	Tanker	-
	MILLY	MOLTA	6898	Cargo vessel	-
	DREZDEN	CAYMAN ISLAND	13021	Tanker	June16-July18
	TEXACO TEXAS	PANAMA	8440	Tanker	July15-Aug16
	POSIDON	GREEK	9383	Tanker	Aug7-Sep3
	ALYCIA	GREEK	8576	Cargo vessel	Oct28-Nov24
	LIMBAZHI	USSR	7038	Tanker	Nov17-Dec6
	SEALUCK	MOLTA	8700	Cargo vessel	Dec6-Dec24
	PACIFIC VIKING	SINGAPORE	2048	Cargo vessel	Dec18-Dec30
1987	COMPASS DRILLER	GERMANY	5531	Drilling vessel	Feb10-Mar4
	GALINI	GERMANY	23654	Tanker	Mar1-Apr30
	PETROSTAR XV	SAUDI ARABIA	18478	Tanker	May1-June25
	PAISI	HONDURUS	1407	Cargo vessel	June25-July3
	ENERGY MOBILITY	LIBERIA	33155	Tanker	June28-Sep30
	NIC	LIBERIA	10498	Tanker	Aug8-Oct17
1988	JUMPA	THAILAND	7160	Cargo vessel	Mar16-May15
	HOI AN	VIETNAM	4297	Cargo vessel	Feb22-Mar11
	SAROS	XYPRUS	4201	Cargo vessel	Mar7-Mar18
	SUNGARI	GERMANY	39797	Gas container	Mar27-Jun19
1989	CP-17	THAILAND	1655	Tanker	Feb27-Mar17
	ELSA	LIBERIA	19584	Tanker	Apr25-May31
	ZARRA	AJMAN	32809	Tanker	
	-FORWARD				Aug5-Sep25
	-AFTER				May31-Aug31
	BONI	GERMANY	39540	Tanker	Oct9- Dec20

There are two enterprises located in the Map Ta Phut area namely Thai International Steel Co.,Ltd.(TIS) and Thai Hua Lee Co.,Ltd. which are already in operation. The Thai Hua Lee Co.,Ltd., however, is a small factory and less production capacity of crude steel per year when compared to TIS. Thus, this study are followed the breaking activities schedule of TIS.

Conditions for the operators set by the Local Harbor Master for ship-breaking operations

From the Revolutionary Announcement No.48, the following activities must be done by ship-breaking operators.

1. Materials left from ship-breaking have to be transferred onshore, it is not permitted to be thrown into the water.

2. Adequate fire fighting equipments, oil dispersant and other oil combating equipments must be provided.

3. Fire gas system have to be provided in the ship to avoid explosion.

4. All tanks in the ship have to be cleaned to avoid marine pollution.

5. Net and other equipments to be used to collect the materials left from ship-breaking activities should be provided so that those materials will not be thrown into the water.

6. Permanent booms have to be deployed around the ship to control the oil spill to spread within it's boundary.

7.Strictly follow other laws and regulations concerned.

Status of ship-breaking industry in Thailand.

1. The ship-breaking industry is the enterprise which is in conformity with the Investment Promotion Act of the government, but is in progress with private enterprises initiation.

2. There are two important areas of ship-breaking:

In Changwat Rayong, Map Ta Phut area, the government leading industrial complex were established as planed by the National Economic and social Development Board of Thailand (NESDB). In 1990, two enterprises are found to be located in this area which are the Thai International Steel Co.,Ltd. and the Thai Hua Lee Co.,Ltd. These two enterprises are already in operation.

In the south area of the southwest Prachuab Kirikhan Province, two ship-breaking factories are located: Thai International Ship-breaking Co.,Ltd. and Thong Talay International Co.,Ltd.

3. For available data, the steel consumption in terms of crude steel are about 2,300,000 tons/year (in 1989) and tends to increase every year . The production capacity of six electric furnace steelmakers in Thailand totals about 650,000 tons but the actual production being about 300,000 to 350,000 tons. Thus, it means that iron product are locally insufficient and the steel must be imported.

VITA

Miss Pornsri Suthanaruk was born in Chainat Province, Thailand on January 10, 1963. She graduated with the degree of Bachelor of Science from the Department of Marine Science, Chulalongkorn University, in 1984. Her experiences include working as a staff for the Chao Phraya Project and ASEAN - Australia Cooperative Programme on Marine Science : Living Resources with emphasis on mangrove and Coral Reef Ecosystems, at the Office of the National Environment Board of Thailand during 1985 - 1989. In 1988, she was awarded by the National Research Council of Thailand and UNDP/UNESCO a Certificate on the Second Intensive Research Programme of Ranong Mangrove Ecosystem, Thailand, under the UNDP/UNESCO Regional Mangroves Project RAS/86/120 : Integrated Multidisciplinary Survey and Research Programme of Ranong Mangrove Ecosystem, Thailand. At present she is working as an environmental scientist at Department of Mineral Environment, Ministry of Industry.