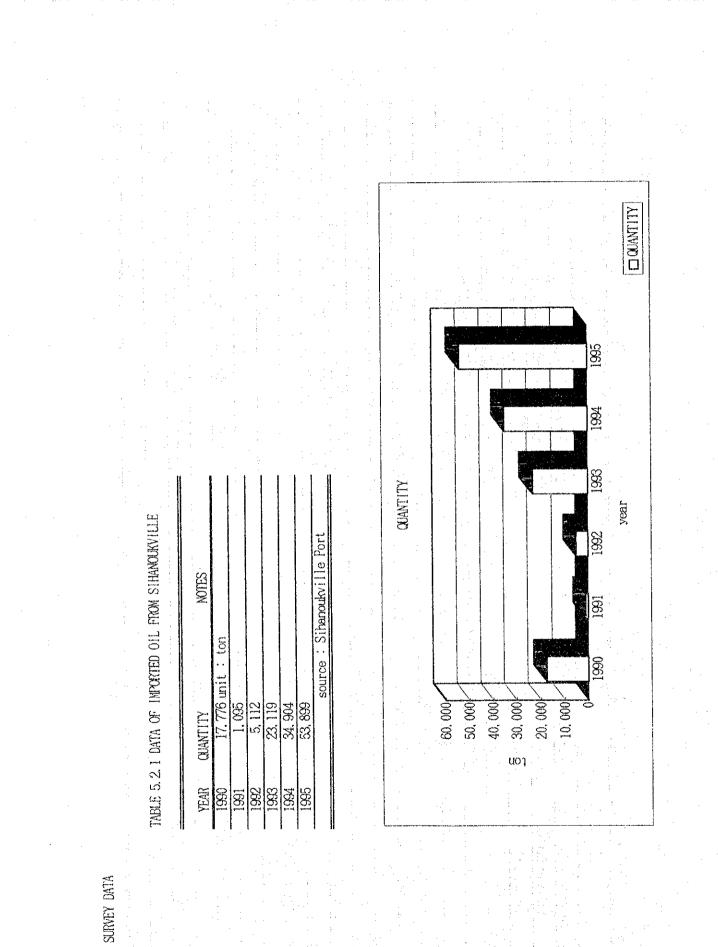
.B-47



ſ	Source of	Ships in which		
		waste oil is	Definition	Disposal methods
	waste oil	produced	Definition	Disposar methods
ł	Dilaa	Every ship	Is oily mixture collected in the	1. For almost every ship, bilge is
	Bilge	Every sinp	bottom of ship. Refers to mixed	
	· · ·		water of lub, oil or fuel oil in the	at a waste oil disposal facility. In
1			engine room and sea water.	large ships, however, bilge is
		4	engine room and sea water.	burned at an incinerator on the
ł				ship.
				2. Bilge is treated directly at a waste
				oil disposal facility.
ł	D. II.	Taultora fich	Refers to water loaded in the	(Coasting tankers)
	Ballast	Tankers, fish-	ballast tank or exclusive tank to	Ballast water is directly treated at a
		ing boats	stabilize a ship. Ballast water	waste water disposal facility.
	n an	· .	loaded in the exclusive tank on in	
			the tank well cleaned is called	Ballast water is usually collected as
		4 	clean ballast, and ballast water in	
			tank being dirty is called dirty	therefore no disposal is required (is
				called Load on Top method).
		1.6.1	ballast.	(Fishing boats)
				1. Ballast water is collected as collect
				oil using an oil separator on the
				ship.
				2. Ballast water is directly treated at a
				waste oil facility.
			T 1 d .han some oil and	Tank cleaning water is directly
	Tank cleaning	Tankers	Is produced when cargo oil and	treated at a waste oil disposal facility.
	water		fuel oil tanks are cleaned, and	For ocean going tankers, cargo oil
			when another cargo oil is to be	tanks are cleaned during a sail, and
			loaded and tanks are repaired.	the tank cleaning water is collected as
				slop oil and treated by Load on Top
				method.
				The collect oil is directly treated at a
	Collect oil	Every ship	Refers to collected oil produced	waste oil disposal facility. For large
	•		when bilge water is treated at an	ships, however, this collect oil is
			oil separator on the ship.	
				burned at an incinerator on the ship.
•	Slop oil	Tankers	Refers to oil produced by the	The slop oil is directly treated at a
			difference of the specific	waste oil disposal facility, For ocean
			gravities of water and oil, when	going tankers, the slop oil is produced
		1	dirty ballast water and tank	by Load on Top method.
			cleaning water are collected and	
			left still in a slop tank in the ship.	
14 - 1				TUbe ebudge to burned at an inclustrate
1. : 1	Sludge	Every ship	Refers to oily dirt mixture	The sludge is burned at an incinerator
1.	Sludge	Every ship	remained on the bottom of tanks in the ship.	on the ship. It is treated at a waste oil disposal facility.

SOURCES AND DISPOSAL METHODS OF WASTE OIL **TABLE 5.2-2**

Note : Load on Top method. In this method, ballast water is not thrown overboard, but treated by a suitable equipment in the ship. That is, the sea water in ballast water is separated and thrown overboard as much as possible, and then the remaining oil containing a slight water is collected in a specific tank (a slop tank).

This slop oil is added to cargo oil at the next oil loading.

TABLE 5.2-3 KIND OF SOLID WASTE

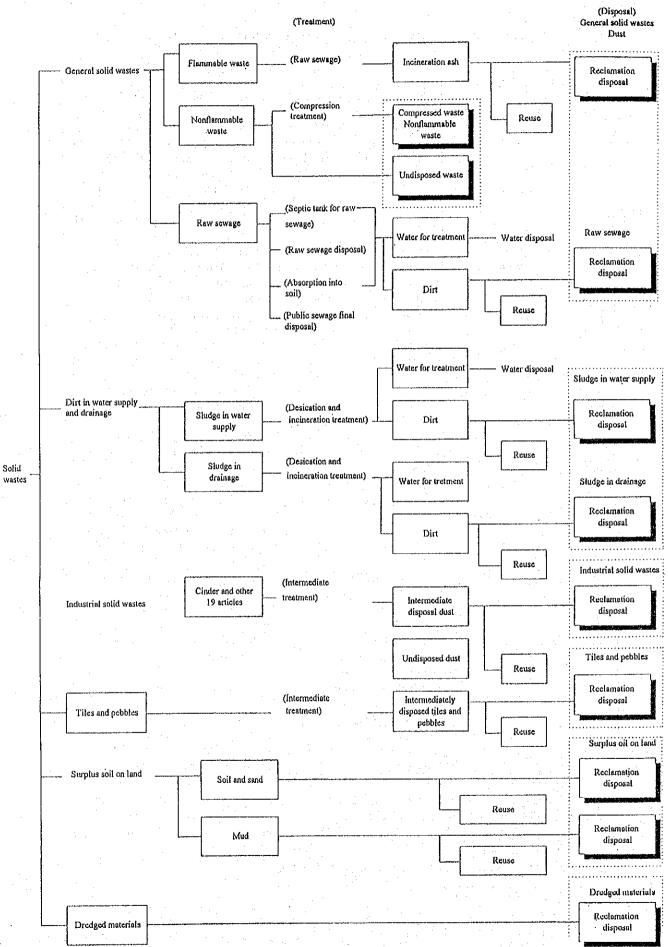


Table 5.2-4 Summary of Chemical Test Results of Sea Water Samples

						C	CHEMICAL	TEST	. II ISEA	TEST RESULTS (mo/l)					
TEST .	TEST METHOD	St 1	St.2	St. 3	St	4	St. 5	St.	0	St.	2	ъ.	8	St. 9	St. 10
		Surface	S		Surface	Middle	Surface	Surface	Middle	Surface	Middle	Surface	Middle	Surface	Surface
Ha Ha Ha Ha	I	6.62	6.61	6.60	6.60	6.60	6.56	6.53	6.53	6.13	6.13	6.57	6.57	6.64	6.65
Total Suspended Solids (SS)	APHA 2540 D	40	40	50	40	45	55	45	. 35	35	35	25	30	40	25
Chemical Oxygen Demand (COD)	(*)	0.5	0.5.	0.6	0.2	0.4	. 0.1	0.2	0.4	0.3	0.2	0.2	0.1	0.1	0.2
Dissolved Oxygen (DO)	APHA 4500-OC	4.7	5.6	.5.0	5.8	5.4	5.2	5.9	5.1	5.2	5.4	5.0	5.4	5.1	5.6
Oil & Grease (n-hexane soluble matter)	APHA 5520 B	9	11	10	ŭ Z		N.D.	13		D.N.	. 2 .	N.D.	8	- 11	22
Total Coniiform at 35°C/ 24hrs (n-hexane solube matter)	APHA 9222 B	40	2	ß	g	4	470	28	22	8	140	410	3	600	3
Total Nitrogen (T-N)	APHA 4500	0,66	1.0	0.65	0.68	0.69	0.77	0.73	0.55	0.67	0.52	0.69	0.67	0.52	0.25
Total Phosphorus (T-P)	(.)	0.03	N.D.	N.D.	N.D.	0.02	0.02	0.02	0.01	N,D.	N.D.	N.D.	N.D.	. N.D. :	<0.01
Total Mercury (T-Hg)	APHA 3500-Hg B	0.004	0.002	0.003	N.D.	0.003	N.D.	0.002	N.D.	0.002	0.002	N.D.	N.D.	N.D.	0,002
R-Hg	APHA 3500-Hg B	0.002	N.D.	0.002	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Cadmium (Cd)	APHA 3500-Cd B	0.002	N.D.	0.002	N.D.	0.002	N.D.	0.002	0.002	0.002	0.002	N.D.	0.002	N.D.	- 0.002 -
Cyanide (CN)	APHA 4500-CN F	0.07	0.04	0.09	0.03	0.04	0.04	0.04	0.04	0.03	0.04	0.07	0.09	0.04	0.09
Or-P		N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	·<0.01
Lead (Pb)	APHA 350-Pb B	0.27	0.19	0.14	0.22	0.21	0.08	0.15	0.29	0.16	0.23	0.21	0.2	N.D.	0.22
Chromium (Cr)	APHA 3500-Cr B	0:03	0.03	N.D.	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.05	0.02
Arsenic (As)	APHA 3500-As B	0.003	0.002	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.002	N.D.	N.D.
Polychlorinated Biphenyls (PCB)	APHA 4500-OC	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N,D,	N.D.	N.D.	N.D.
		-													

Note : (*) : - A Manual on Chemical Analysis of Coastal Water adn Bottom Sediment by Primary Production Department/Marine Fisheries Research Department, Singapore 1984.

Table 5.2-5 Summary of Chemical Test Results of Seabed Soil Samples

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						CHEN	CHEMICAL TEST RESULTS (mg/kg)	SULTS (mg	g/kg)			
(**) 7.5 8.0 7.9 7.6 Fragment Fragment 8.1 (**) 18.0 20.6 5.8 26.3 100% of Shell 16.5 9.9 (**) 18.0 20.6 5.8 26.3 100% of Shell 4.3 3.5 (**) 147.6 34.55 11.35 90.65 100% of Shell 4.3 3.5 (*) 147.6 34.55 11.35 90.65 100% of Shell 4.3 3.5 (*) 147.6 34.55 11.35 90.65 100% of Shell 4.0 1980 (*) 3900 3390 1380 4330 100% of Shell 0.37 0.32 (**) 3900 3390 1380 430 100% of Shell 0.0 (**) 33 1.13 0.23 0.30 170% of Shell 0.0 (**) 3300 1380 1380 1380 100% of Shell 0.0 (**) 433 3.1 19		TEST METHOD				St. 4	St 5	St. 6		St. 8	St. 9	St. 10
(**) 16.0 20.6 5.8 26.3 100% of Shell 4.3 3.5 (**) 18.0 20.6 5.8 10 Fragment 4.3 3.5 (*) 147.6 34.55 11.35 90.65 100% of Shell 4.3 3.5 BS 1377 Part3:1990 1.03 1.13 0.233 0.80 Fragment 4.10 1980 BS 1377 Part3:1990 1.03 1.13 0.233 0.80 Fragment 0.37 0.32 (**) 3900 3390 1380 1330 100% of Shell 410 1980 (**) 3000 3390 1380 4330 10% of Shell 0.3 9.0 (**) 313 1.9 20 100% of Shell N.D. N.D. N.D. (**) 43051 1.1 0.17 1.5 100% of Shell 0.17 1.6 (**) EPA 3051 1.6 1.1 0.7 1.5 1.6 1.16 1.1 <	Soil:Water	(**)	7.5	8.0	6.2	7.6	100% of Shell Fragment	8.7	8,1	8.2	8.0	8.2
EPA 9071A 23 6.7 6.5 10 100% of Shell 4.3 3.5 (7) 147.6 34.55 11.35 90.65 Fragment 10.5 24 BS 1377 Part3:1990 1.03 1.13 0.23 0.80 100% of Shell 0.35 24 BS 1377 Part3:1990 1.03 1.13 0.23 0.80 100% of Shell 0.37 0.32 (**) 3900 3390 1380 4330 Fragment 410 1980 (**) 3900 3390 1380 4330 Fragment 0.3 0.001 (**) 4.3 3.1 1.9 20 100% of Shell 0.3 0.001 (**) 4.3 3.1 1.9 20 100% of Shell 0.01 100% (**) 4.3 3.1 1.9 20 100% of Shell 0.01 112 (**) N.D. N.D. N.D. Fragment 0.1 0.17 FEPA 3051	0°C (% wt.)	· ·	18.0	20.6		26.3	100% of Shell Fragment	16.6	6.6	17.5	4.6	. 4.2
(°) 147.6 34.55 11.35 90.55 Fragment Fragment 10.5 24 BS 1377 Parts: 1950 1.03 1.13 0.23 0.80 Fragment 0.37 0.32 BS 1377 Parts: 1950 1.03 1.13 0.23 0.80 Fragment 0.37 0.32 (**) 3900 3390 1380 4330 Fragment 410 1980 (**) 3900 3390 1380 4330 Fragment 410 1980 (**) 4.3 3.1 1.9 20 Fragment N.D. 0.001 (*) 4.3 3.1 1.9 20 Fragment N.D. 0.001 (*) 1.1 0.1 1.1 0.7 1.5 Fragment 1.2 0.5 FEPA 3051 1.6 0.78 0.72 Fragment 1.2 0.5 APHA 4500-CNF 1.12 0.3 0.72 Fragment 1.2 0.5 FEPA 3051 <td< td=""><td>xane soluble</td><td>EPA 9071 A</td><td>2.3</td><td>6.7</td><td>6.5</td><td>10</td><td>100% of Shell Fragment</td><td>4.3</td><td></td><td>3.1</td><td>2.8</td><td>3.5</td></td<>	xane soluble	EPA 9071 A	2.3	6.7	6.5	10	100% of Shell Fragment	4.3		3.1	2.8	3.5
BS 1377 Part3.1990 1.03 1.13 0.23 0.30 100% of Shell 0.37 0.32 (**) 3900 3390 1380 4330 100% of Shell 410 1980 (**) 3.300 3390 1380 4330 100% of Shell 410 1980 (**) 4.3 3.1 1.9 20 Togment 0.3 9.0 (*) 4.3 3.1 1.9 20 Tog% of Shell N.D. 0.001 (*) 4.3 3.1 1.9 20 Tog% of Shell N.D. 0.001 (*) N.D. N.D. N.D. N.D. N.D. N.D. 0.01 EPA 3051 1.6 1.1 0.7 1.5 Tog% of Shell N.D. 0.17 APHA 4500-CN F 1.12 0.6 0.72 Tog% of Shell N.D. 0.17 1.6 (*) 12 0.7 1.5 Tog% of Shell N.D. 0.17 1.6 A	emand (COD)		147.6	34.55	11.35	90.65	100% of Shell Fragment	10.5	24	59.35	1.85	14.45
(**) 3900 3390 1380 4330 4330 4300 4300 100% of Shell 410 1980 (*) 4.3 3.1 1.9 20 Fragment 0.3 9.0 (*) 4.3 3.1 1.9 20 Fragment 0.3 9.0 EPA 3051 0.002 0.001 N.D. N.D. N.D. N.D. 0.001 EPA 3051 1.6 1.1 0.7 1.5 Fragment 1.2 0.5 APHA 4500-CNF 1.12 0.78 0.72 100% of Shell 1.2 0.5 APHA 4500-CNF 1.12 0.3 0.6 0.8 100% of Shell 1.2 0.5 APHA 4500-CNF 1.12 0.3 0.6 0.8 100% of Shell 1.2 0.5 Fragment (*) 1.2 0.3 0.6 0.8 100% of Shell 1.1 1.6 (*) 1.2 0.3 0.6 0.8 100% of Shell 0.1	te (T-S)	BS 1377 Part3:1990	1.03	1.13	0.23	0.80	100% of Sheil Fragment	0.37	0.32	0.80	0.11	0.48
(*) 4.3 3.1 1.9 20 Too% of shell Fragment 0.3 9.0 EPA 3051 0.002 0.001 N.D. 0.002 100% of shell N.D. N.D. 0.001 EPA 3051 N.D. N.D. N.D. N.D. N.D. 0.001 EPA 3051 N.D. N.D. N.D. N.D. N.D. 0.001 EPA 3051 1.6 1.1 0.7 1.5 100% of shell N.D. N.D. N.D. APHA 4500-CN F 1.12 0.6 0.78 0.72 Fragment Fragment 1.2 0.5 APHA 4500-CN F 1.12 0.6 0.78 0.72 Fragment 1.2 0.5 (*) 1.2 0.5 0.5 1.2 100% of shell 0.17 1.6 (*) 1.2 0.3 0.6 0.8 Fragment 1.1 1.6 (*) 1.2 1.2 3.6 1.2 100% of shell 0.1 2.6 (*) 1.2 <td>in (T-N)</td> <td>(**) (**)</td> <td>3900</td> <td>3390</td> <td>1380</td> <td>4330</td> <td>100% of Shell Fragment</td> <td>410</td> <td>1980</td> <td>3460</td> <td>1150</td> <td>870</td>	in (T-N)	(**) (**)	3900	3390	1380	4330	100% of Shell Fragment	410	1980	3460	1150	870
EPA 3051 0.002 0.001 N.D. 0.002 Fragment N.D. 0.001 EPA 3051 N.D. N.D. N.D. N.D. N.D. N.D. N.D. EPA 3051 N.D. N.D. N.D. N.D. N.D. N.D. N.D. APHA 4500-CN F 1.12 0.6 0.78 0.72 Fragment 1.2 0.5 APHA 4500-CN F 1.12 0.6 0.78 0.72 Fragment 1.2 0.5 (*) 1.2 0.3 0.6 0.8 100% of Shell 0.17 1.6 (*) 1.2 0.3 0.6 0.8 100% of Shell 0.17 1.6 (*) 1.2 0.3 0.6 1.2 100% of Shell 0.1 1.6 (*) 1.2 0.3 0.6 1.8 100% of Shell 0.1 1.6 (*) 1.2 3.6 1.5 1.8 100% of Shell 1.7 2.6 EPA 3051	rus (T-P)	(*) (*)	4.3	3.1	1.9	20	100% of Shell Fragment	0.3	9.0	5.6	6.8	3.3
EPA 3051 N.D.	y (T-Hg)	EPA 3051	0.002	0.001	n Z	0.002	100% of Shell Fragment	N.D.	0.001	0.001	N.D.	0.001
EPA 3051 1.6 1.1 0.7 1.5 Fragment 1.2 0.6 APHA 4500-CN F 1.12 0.6 0.78 0.72 Fragment 0.014 0.17 (*) 1.2 0.6 0.78 0.72 Fragment 0.014 0.17 (*) 1.2 0.3 0.6 0.8 100% of Shell 0.014 0.17 (*) 1.2 0.3 0.6 0.8 100% of Shell 0.014 0.17 (*) 1.2 0.3 0.6 0.8 100% of Shell 0.1 1.6 EPA 3051 16 12 3.6 12 1.8 Fragment 1.7 6.9 EPA 3051 2.3 1.5 1.8 100% of Shell 1.7 6.9 1.2 EPA 3051 2.5 5.1 1.9 5.5 Fragment 1.7 6.9 1.2 EPA 3051 5.5 5.5 Fragment 1.7 6.9 1.2 1.6 1.2 1.6 1.2 1.6 1.2 1.6 1.2 1.6 1.2		EPA 3051	Q N	ŊD		N,D.	100% of Shell Fragment	N.D.	N.D.	N.D.	N.D.	N.D.
APHA 4500-CN F 1.12 0.6 0.78 0.72 Fragment Fragment 0.014 0.17 1.6 (*) 1.2 0.3 0.6 0.8 Fragment <0.1	(Cd)	EPA 3051	, 1.6	1.1	0.7	1.5	100% of Shell Fragment		0.5	11	<0.1	<0.1
(*)1.20.30.60.8100% of Shell Fragment < 0.1 1.6EPA 305116123.612 120% of Shell0.912EPA 305123221.51.8 700% of Shell1.76.9EPA 305123221.51.8 700% of Shell1.76.9EPA 30515.55.11.95.5 70% of Shell2.12.6EPA 30516.55.11.95.5 70% of ShellN.D.N.D.EPA 30516.9876.31.8 70% of ShellN.D.N.D.EPA 305149876.31.8 70% of Shell0.55.9EPA 305192561970 70% of Shell6.423	(CN)	APHA 4500-CN F	1.12	0.6	0.78	0.72	100% of Shell Fragment	0.014	0.17	0.35	0.13	0.18
EPA 3051 16 12 3.6 12 10% of Shell 0.9 12 EPA 3051 23 22 1.5 18 100% of Shell 1.7 6.9 EPA 3051 23 22 1.5 18 700% of Shell 1.7 6.9 EPA 3051 5.5 5.1 1.9 5.5 Fragment 2.1 2.6 EPA 3051 5.5 5.1 1.9 5.5 Fragment 0.7 6.9 EPA 3051 4.9 87 6.3 18 700% of Shell N.D. N.D. EPA 3051 92 56 19 70 100% of Shell 0.5 5.9		£	1.2	0.3	0.0	8.0	100% of Shell Fragment	<0.1	1.6	13	2.1	1.2
EPA 3051 23 22 1.5 18 100% of Shell 1.7 6.9 Fragment EPA 3051 5.5 5.1 1.9 5.5 Fragment 2.1 2.6 7 EPA 3051 5.5 5.1 1.9 5.5 Fragment 2.1 2.6 7 EPA 3051 5.5 5.1 1.0 6.5 8 7 6.9 7 6.9 7 6.9 7 6.9 7 6.9 7 6.9 7 6.9 7 6.9 7 7 6.9 7 7 7 6.9 7 7 7 6.9 7 <td< td=""><td>(q</td><td>EPA 3051</td><td>16</td><td>12</td><td>3.6</td><td>4</td><td>100% of Shell Fragment</td><td>റ</td><td>12</td><td>16</td><td>2.4</td><td>16</td></td<>	(q	EPA 3051	16	12	3.6	4	100% of Shell Fragment	റ	12	16	2.4	16
EPA 3051 5.5 5.5 100% of Shell 2.1 2.6 EPA 3051 5.5 5.1 1.9 5.5 Fragment 2.1 2.6 EPA 3270 (MOD) N.D. N.D. N.D. N.D. N.D. N.D. N.D. EPA 8270 (MOD) N.D. N.D. N.D. N.D. Fragment 0.5 5.9 EPA 3051 49 87 6.3 18 Fragment 0.5 5.9 EPA 3051 92 56 19 70 100% of Shell 64 23	1 (Cr)	EPA 3051	23	22	1.5	18	100% of Shell Fragment			1.1	- 7.0 -	7.4
EPA 8270 (MOD) N.D. N.D. N.D. 100% of Shell N.D. N.	(As)	EPA 3051	1.50	5.1	1.9	5.5	100% of Shell Fragment	2.1	2.6	3.2	1.5	1.7
EPA 3051 49 87 6.3 18 100% of Shell 0.5 5.9 EPA 3051 92 56 19 70 100% of Shell 64 23	ohenyls (PCB)	EPA 8270 (MOD)	N.D.	N.D.	N.D.	N.D.	100% of Shell Fragment	N.D.	N.D	D Z	N.D.	N D
EPA 3051 92 56 19 70 70 50 100% of Shell 64 23	Cu)	EPA 3051	49 c	87	6.3	,	100% of Shell Fragment	0.5		13,	26	4.9
	(u)		92	26	19	70	100% of Shell Fragment	64	23	41	12	15

	·				:	· . · ·													* .	
					1993	1994	[] 1995		NON											
	NOTES								JAN MAR MAY JUL SEP	month						Fourism, Tourist Magazine 1995				
BY MONTH		1995	15,934	15,107 20,000 r				4	5	19,624	18,029	na	na -	na ************************************	152,583	source : Ministry of Tourism,				
URWEY DATA TABLE 5.3-1 VISITORS' ARRIVALS TO CAMBODIA BY	YEAR	1994	13,136	14,847	15,143	15,149	12,140	11,470	15,030	14,743	12,931	8 15,332	7 18,614	26 18,082	176,617			· · · · · · · · · · · · · · · · · · ·		
SURVEY DATA TABLE 5.3-1 VISITORS	HUNOM	1993	JAN 13,722	Provide FEB Provide 11,638	MAR 11,877				<u></u>	AUG 9,712	SEP 8,998		NOV 8,237	DEC 13,926	A COTAL 0000118,183					
								I	B-5:	3										-

TABLE 5.3-2 TOURIST INFORMATION	
ITEMS DATA UNIT RATIO	ES
ratio :compared with the data of 1994	
Total numbers of hotel 37 nos 127% na : not available	
government facilities 2 nos 100%	
private sector 35 nos 129%	
Total numbers of room 778 nos 121%	
government facilities 31 nos 91%	
private sector 747 mos 123%	
Numbers of visitor	
delegations 12,494 p/year na official visiting : national & international delegations	
26,636	
international 5,487 p/year 125%	
	÷
source :1995 statistics of Sihanoukville	

SURVEY DATA OF SHANOUKVILLE

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SURVEY

4-1 POWER SUPPLY SYSTEN
· · ·

SURVEY ITEMS	and the second
Name of authority	Sihanoukville power station
Capacity	Total: 3700 KVA, (total of equipment capacity)
	1000 KVA x 3 sets
	350 KVA x 2 sets
Voltage	6000 KVA
Start of construction	1983 (constructed by grant aid by USSR)
Start of operation	1985
Unit rate of electricity	grade 1 government facilities : 16 cent
	grade 2 family houses : 20 cent
	grade 3 private company (including hotels): 25 cent
New project	
	1 Construction of new power plant
	PHASE 1 (completed engineering work by Ariston Eng. Co.)
	Financial source : ADB (35,000,000 \$)
	Canacity : 5000 KVA (2500 KVA x 2 sets)

Capacity : 5000 KVA (2500 KVA x 2 sets) PHASE 2 (not yet approved) Start of construction : 1997 Start of operation : 1998 Lapacity . Juvo N

 2 Construction of new power supply cables to oil port area

 Starting date is not fixed by the authority

 Other information

1 Existing power plant does have not sufficient capacity against the demand of electricity in the town, Covered only 30% of its demand.

2 The biggest beer factory (Angkor beer) in the Sihanoukville is using own generator units for the operation.

3 There are no power supply cable lines in the existing fishing village around project site.

SYRVEY DATA

	WATER NOTES	COST	(\$/MONTH)	90 data : 1995 and 1996	111	108	113	99	120	110	108.	128	119	110	• 105	151	147	175	
SHANOUNILLE POIT	WATER	COST CONSUMPTION CO	(\$/WONTH) (M3/MONTH) (\$/MC	409	3927 502 1	4598 487 10	4767 512 1	3281 448 9	3472 542 1		5945 485 10	3562 578 1	3546 541 1	3224 492 1	4275 4276 10	7932 ************************************	7563 496 1	7406 502 1	
TABLE 5.4-2 ENERGY CONSUMPTION OF SHANXURVILLE PORT	В	CONSUMPTION	(KWH/MONTH)	JAN, 1995 37092	FEB 28050	MAR 32845	APR 34054	MAY 23436	JUN 24806	JUL 27212	AUG 29744	SEP 17831	OCT 0CT 17730	NOV 16124	DEC 21378	JAN,1996 40700	FEB 38568	MAR 37769	

BRWEY DATA OF SIHANOUKVILLE TABLE 5.4-3 FRESH WATER SUPPLY SYSTEM IN SIHANOUKVILLE SURVEY ITEMS SURVEY TEMS SURVEY TEMS SURVEY TEMS D SURVEY TEMS D Name of authority Sianoukville Water Supply Authority D Name of authority SURVEY TEMS Sianoukville Water Supply Authority D Name of authority Name of authority Subply Authority Name of authority Amouton To0450 M3/year Production record Nater sources Natural water and 4 nos. of deep well water, depth of Start of operation Imber of families and companies Approx. 7000 Number of families and companies Approx. 7000 Biggest consumet of water Angkor beer factory, consumption : 1000 M3/month Unit cost of water Approx. 700 Dist cost of water Approx. 700 nos Stended pipeline in 1995 650 M3/month : 500 Riel/M3 Record of repaired pipeli	Y SYSTEM IN SIHANOUKVILLE Y SYSTEM IN SIHANOUKVILLE Sianoukville Water Supply Authority Max. 2000 M3/day Max. 2000 M3/day T00450 M3/year :1995 700450 M3/year :1995 700450 M3/year :1995 Aptros. 7000 Angkor beer factory. consumption : 1000 M3/month grade 1 0 to 30 M3/month : 500 Riel/M3 grade 2 31 to 500 M3/month : 900 Riel/M3 grade 3 over 501 M3/month : 900 Riel/M3 Aptros. 700 nos
TER SUPPL banies in pipes	l water,(depth (1000 M3/month iel/M3 tiel/M3
TER SUPPL banies in pipes	l water,(depth (1000 M3/month el/M3 tiel/M3 tiel/M3
FABLE 5.4-3 FRESH WATER SUPPLY SYSTEM IN SIHANOUKVI SURVEY ITEMS Sianoukville Water Supply Auth Vame of authority Sianoukville Water Supply Auth SURVEY ITEMS Sianoukville Water Supply Auth Vame of authority Sianoukville Water Supply Auth Sapacity of water supply Max. 2000 M3/day Production record 700450 M3/year :1995 Production record 700450 M3/year :1995 Vater sources Natural water and 4 nos. of deep Vumber of families and companies Approx. 7000 Siggest consumer of water Angkor beer factory, consumpti Jnit cost of water Angkor beer factory, consumpti Jnit cost of water Angkor beer factory, consumpti Vumber of branches from main pipes Approx. 700 Vumber of branches from main pipes Approx. 700 nos Strended pipeline in 1995 2050 M Specification of pump From pond to treatment facilitie	l water,(depth de
SURVEY ITEMSName of authoritySianoukville Water Supply AuthorityName of authoritySianoukville Water Supply AuthorityCapacity of water supplyMax. 2000 M3/dayProduction record700450 M3/year :1995Production record700450 M3/year :1995Water sources1958-1960Number of families and companiesApprox. 7000Siggest consumer of waterAngkor beer factory, consumptiJuit cost of watergrade 10 to 30 M3/month : 50Siggest consumer of waterApprox. 700 nosSiggest consumer of pipeline in 19952050 MStrended pipeline in 19952050 MSpecification of pumpFrom pond to treatment facilitie	l water,(depth o loo0 M3/month eel/M3 tiel/M3 tiel/M3
er HELMS supply s and companies of water of water s from main pipes in 1995 in 1995 in pipeline in 1995 imp	.(depth (//3/month
supply sand companies of water es from main pipes in 1995 in pipeline in 1995 imp	p well water,(depth of well : 100 M) ion : 1000 M3/month ion : 1000 M3/month i00 Riel/M3 900 Riel/M3
companies et main pipes fe ine in 1995	p well water,(depth of well : 100 M) ion : 1000 M3/month ion : 1000 M3/month i00 Riel/M3 900 Riel/M3
es es	p well water,(depth of well : 100 M) ion : 1000 M3/month ion Stiel/M3 700 Riel/M3 900 Riel/M3
Ç.	p well water,(depth of well : 100 M) ion : 1000 M3/month ion Stel/M3 700 Riel/M3 900 Riel/M3
S S	ion : 1000 M3/month i00 Riel/M3 700 Riel/M3 900 Riel/M3
Ŷ.	ion : 1000 M3/month i00 Riel/M3 700 Riel/M3 900 Riel/M3
/ater om main pipes 995 eline in 1995	ion : 1000 M3/month 500 Riel/M3 700 Riel/M3 900 Riel/M3
om main pipes 995 eline in 1995	00 Riel/M3 700 Riel/M3 900 Riel/M3
om main pipes 995 eline in 1995	700 Riel/M3 900 Riel/M3
om main pipes 995 eline in 1995	900 Riel/M3
om main pipes 995 eline in 1995	
995 elne in 1995	
eline in 1995	
	es 100 M3/h, 135 m, 3 sets
New project provide the second s	f water, water authority planned construction of new water supply facilities
and construction will be started	be started 1997 financed by WDB.
Proposed capacities of water supply	upply : 4000 M3/day
Other information	
	Due to shortage of water, water authority supplied fresh water only for port office,
not including water to be used for ship in the port	for ship in the port.
2 Under the operation of UNTAC bore holes (approx.	C,bore holes (approx. 10 to 20 m) are used for resource of water.
3 Shallow bore holes (5 to 7 m) a	3 Shallow bore holes (5 to 7 m) are used for resource of water in the fisherman's area at project site.
4 In general, one shallow bore ho	w bore hole is able to cover water consumptions for two families.

SIHANOUKVILLE	
ð	
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TABLE 5.4-4 TELEPHONE DISTRIBUTION SYSTEM	ION SYSTEM IN SIHANOUKVILLE
SURVEY ITEMS	DESCRIPTION STATES AND STATES
Name of authority Sihano	Sihanoukville Telecommunication Office, SAMART communication, etc.
	Total : 250 lines, (total of exchanger capacity)
	Existing subscribers : 200 sets
Employee 28 per	28 personnel
Start of construction 1993 (1993 (extended in 1993 by UNTAC)
Unit rate SHV t	SHV telecommunication office : admission fee : 250 \$,
Significant and the second	Inside of Shinoukville : 20%/month
Other states and states	Other area : 50 cent/minutes
New project	
The second s	l Installation of new telephone exchanger,
Cap	Capacity: 1000 lines
Star	Start of construction : 1997
Syst	System : TDMA system
Other information	
1 There	1 There are no extension plan of telephone distribution cables for fishing village
2 Gover	Government had made 10 years jointventure agreement with Indonesian company in 1995
Cam	Cambodia government : 51%, Indonesia company : 49%
and the second se	3 Overseas telephone utilizing satellites belong to Australia
the second se	4 Information of SAMART(private TEL company)
Subs	Subscriber of SAMART in Cambodia : 9000 (65% of market share)
Sub	Subscriber of SAMART in Shihanoukville : 300
5 Other	Other private telephone company :
1) Mo	1) Motorola, 2) Camtel, 3) Shinovatra, 4) Traisailcom

TABLE 5.5-1 POPULATION IN SHIANOUKVILLE (THREE DISTRICTS)

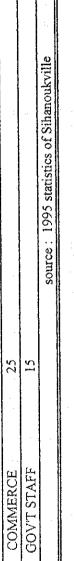
NOTES	POPULATION							1386 1388 1388 1388	year			source : Sihanoukville municipallity
			120000	100000	uosı Ö Ö			MALE	FEMAL			e : Sihanouk
TOTAL	66,363	68,904	73,979	74,102	84,678	87,283	100,366	105,548	104,195	119,567	120,782	source
FEMAL	35,836	36,987	35,264	39,429	51,483	45,643	52,229	54,441	53,104	61,352	61,886	
MALE	30,527	31,917	38,715	34,673	33,195	41,640	48,137	51,107	51,091	58,215	58,896	
YEAR	1985	1986	1987	1988	6861	1990	1661	1992	1993	1994	1995	

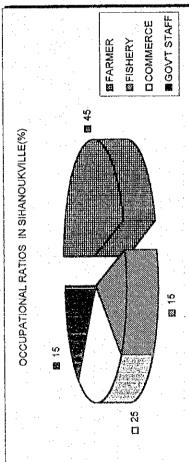
DATA	
SURVEY	

CVILLE		
I SIHANOUK		
TABLE 5.5-2 OCCUPATIONAL RATIOS IN SIHANOUKVILLE	RATIO(%)	
TABLE 5.5-2 OCCU	CATEGORY	

	NOTES	120782	
		total of population in 1995: 120782	data source : municipality
	RATIO(%)	45	15
TAPLE OF THE OWNER TO THE TOTAL OF THE TAPLE	CATEGORY	FARMER 45	FISHERY

25













IOUKVILLE natio :compared with the data of 1994 Ha : hectare	height aeight	data source :1995 statistics of Sihanoukville
IN SIHANOUH RATIO 95% ratio 150% Ha : 307%	182% high height 360% low height 49%	data
RODUCTS UNIT Ha ton/year ton/year	ton/year ton/year ton/year	
RICULTURAL PR DATA 8,807 1.8 16,000	155 36 150	
TABLE 5.5-3 MAJOR AGRICULTURAL PRODUCTS IN SHANOUK VILLE ITEMS DATA UNIT RATIO Rice field area 8,807 Ha 95% ratio compa Productivity 1.8 ton/Ha 150% Ha hectare Production 16,000 ton/year 307%	Potato (1) Potato (2) Other vegetable	

SURVEY DATA OF SHANOUKVILLE

 TABLE 5.5-4
 STATISTICS OF FISH CAUGHT IN SIHANOUK VILLE (1)

11 EIVIO	DATA	UNIT	RATIO	NOTES	
All kind of fresh fish	9,100	ton/year	- 105%	ratio : compared with the data of 1994	
fresh shrimp	814	ton/year	119%	na : not available	
fresh fish	7,231	ton/year	101%		
other fishery	873	ton/year	129%		
Dry fish					
pony fish	790	ton/year	200%		
other dry fish	52	ton/year	144%		ومعسوبة مناسبي فلبلب البوت المالي والمالي المالي المالي المالي المالي المالي المالي المالي الم
dry shrimp	13	ton/year	59%		
dry fish for animal's foods	130	ton/year	152%		
	-				
Fish oil	196,000	liter/year	100%		
Nursery of fish	67	place	na	206480 M2	
private pond	a	place	na	203600 M2	
government organization	36	place	na	2880 M2	
			-		
				source :1995 statistics of Sihanoukville	
			- - -		

			· · · ·								 66[L	· · · · ·							
	ES			ORDS						8	661 661 861	YEAR				heries				
	NOTES			FISH CAUGHT RECORDS						9	861	YE	· · · ·		source : Ministry of Agriculture, Forestry, and Fisheries	994 ,Dep't of Fisheries			•	
3					· . · ·	10,000	8.000	NOUL	4. 000 2. 000	i i	861	:			griculture, Forest	sction . 1980 - 1994				
STATISTICS OF FISH CAUGHT IN SIHANOUKVILLE (2)						-	3								: Ministry of Ag	Fishery data collection			 	
UGHT IN SIH	L	7		c		e	·	e	d	e	c		U	r						
OF FISH CA	UNIT	ton	ten	ton	ton	ton	ton	ton	ton	ton	ton	ton	ton	ton	ton	ton				
	CAUGHT	500	247	1,002	2,068	1,363	2,248	1,202	5,150	7,890	9,120	- 9,300	8,300	8,600	8,560	8,700				
SURVEY DATA TABLE 5.5-5		1980	1981 -	1982	1983	1984	1985	1986	1987	1988	1989	1990	1661	1992	1993	1994				· .

THE PORT PROJECT
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TABLE

LONG TERM PLAN

	ITEMS	PLAN I	PLAN 1	PLAN 1	PLAN 1	PLAN 2	PLAN 2	PLAN 2	PLAN 2
		CASE HI,MI	CASE H1,M1	CASE H2,M2	CASE H2,M2	CASELI	CASE L1	CASE L2	CASE L2
		CON. ST	OPE. ST	CON. ST	OPE. ST	CON. ST	OPE. ST	CON. ST	OPE. ST
SOCIAL F	SOCIAL ENVIRONMENT								
Receitleme	Resettlement of inhabitants	C	U	U	с С	С	υ	Q	С
Economic activities	activities	×	×	x	Х	Х	×	×	×
Traffics a	Traffics and life facilities	J	U	ပ	c	C C	J	v	с
Division	Division of regional area	U	C	×	х	C	с С	×	×
Historical	Historical and cultural heritage	×	×	×	X	X	×	×	X
Water ris	Water right and common right	×	×	×	Х	x	×	×	×
Hveiene	Hypiene and health	×	×	Х	X	×	×	×	X
Waste an	Waste and Parbage	×	×	×	X	X	X	×	X
Risks an	Risks and hazards	×	x	х	X	X	$\mathbf{x} = \mathbf{x}$	Х	×
NATUR	NATURAL ENVIRONMENT								
Topogra	Topography and geology	×	×	х	×	х	X	×	×
Soil erosion	ion	×	x	x	×	×	x	×	x
Underer	Underground water	x	x	Х	×	×	×	X	×
Hvdrolo	Hydrological regime for river and lake	ပ	C	C	c	×	×	×	X
Coastal zone	zone	0	X	ပ	x	c	×	С	×
Ecology.	Ecology, fauna, flora	ф	х	В	×	B	×	в	х
16 Metcorology	IOEV	×	х	x	×	×	×	×	×
Landscape	De	×	×	×	×	X	×	×	×
POLLUT	POLLUTANT								
Air pollution	Ition	X	x	X	×	x	х	×	X
Water po	Water pollution	В	x	В	×	an a B an an	x	ß	x
Soil con	Soil contamination	×	Х	х	×	×	×	×	X
Noise ar	Noise and vibration	X	х	×	×	×	×	X	x
Y and subsidence	sidence		×	Х	x	х	x	×	×
Offensive odor	e odor	×	Х	Х	×	Х	x	X	X

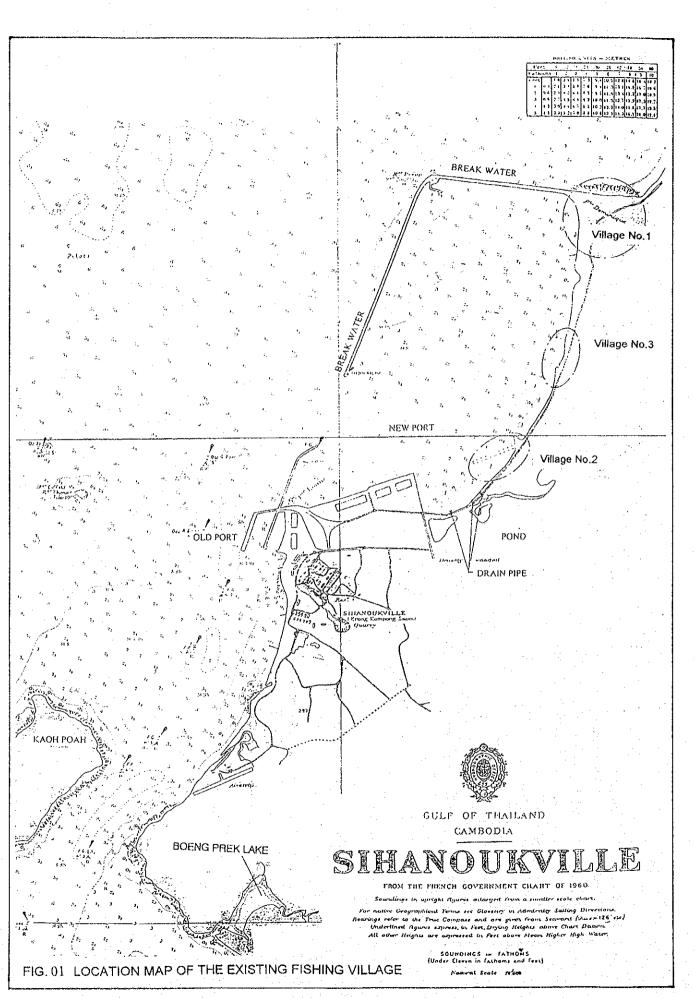
NOTES: A : Relatively high magnitude of impact is expected B : Relatively medium magnitude of impact is expected

C : Relatively low magnitude of impact is expected

X : No effect is expected

CON.ST.: Construction Stage OPE.ST.: Operation Stage

Explanation of each plan shall be referred to Section -5 of Interim Report "Matrix of Element for Environmental Impact" shall be referred to Fig. 13



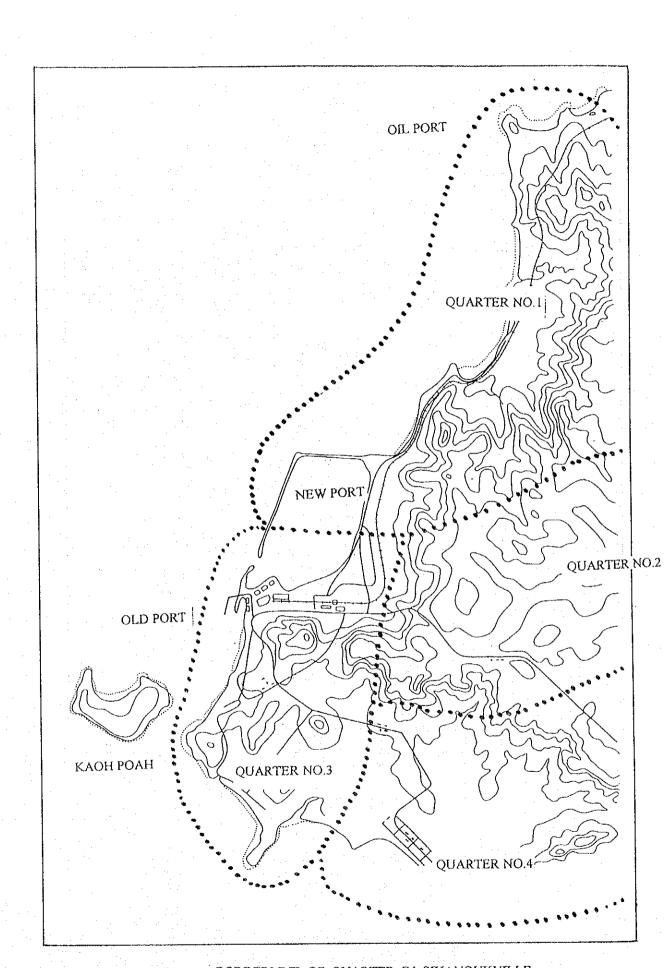


FIG. 02 BORDERLINE OF QUARTER IN SIHANOUKVILLE

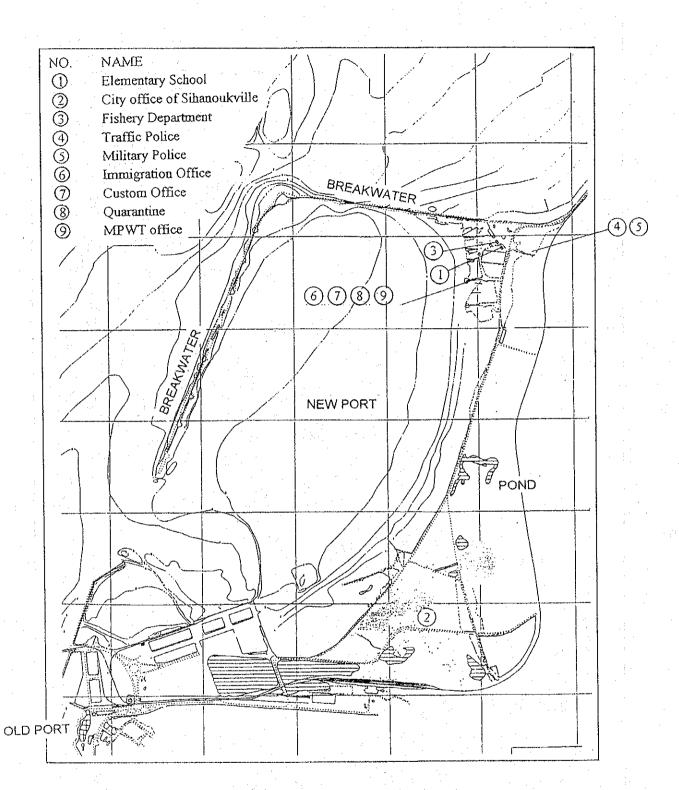


FIG. 03 LOCATION OF GOVERNMENT OFFICES

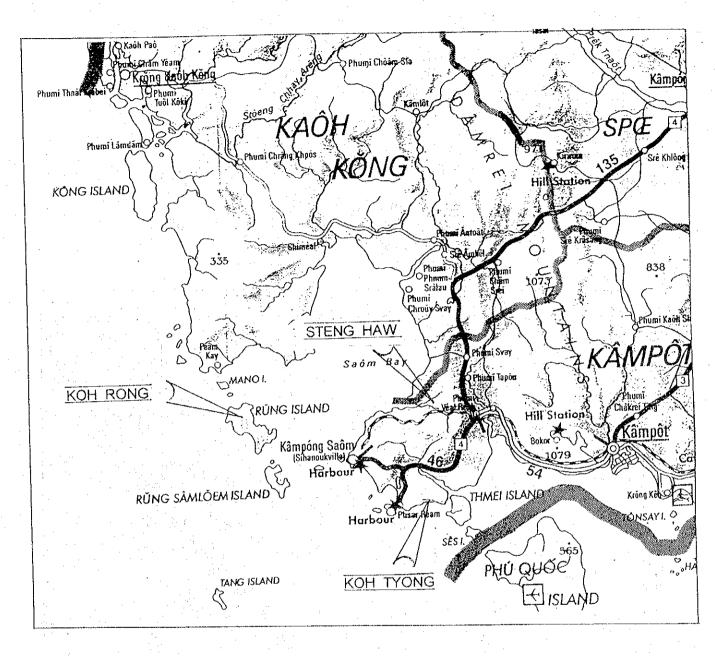
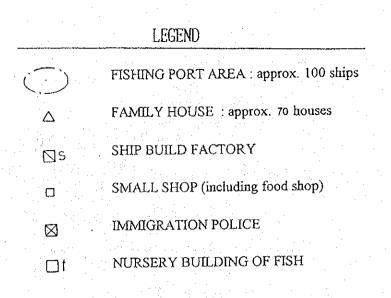


FIG. 04 PROPOSED LOCATION FOR RESETTLEMENT



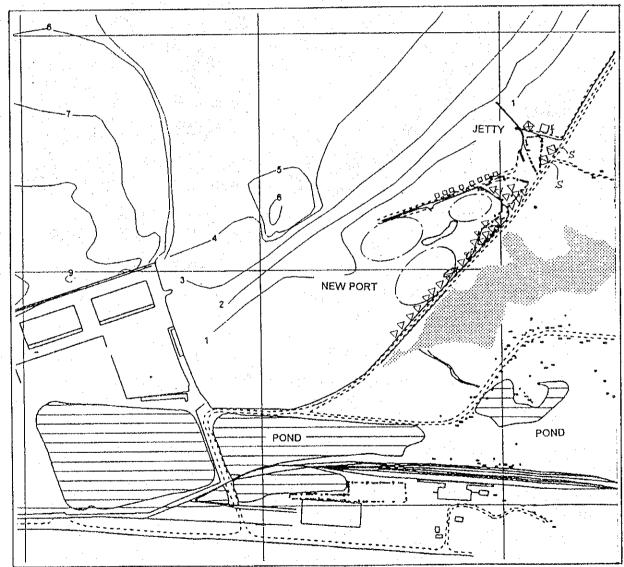
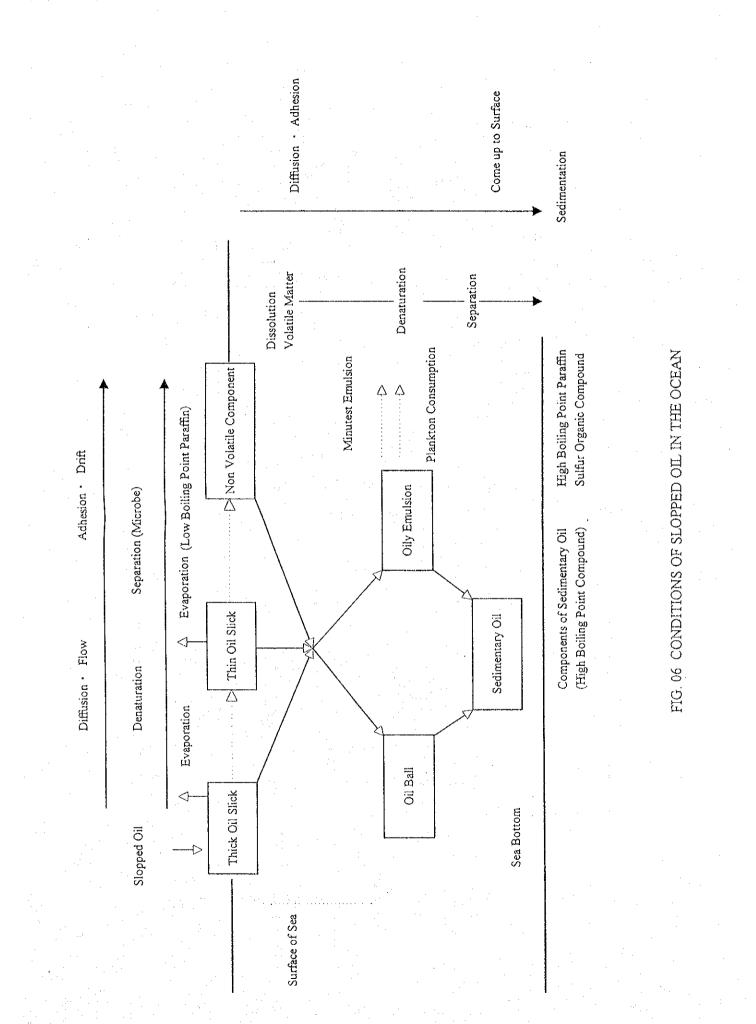
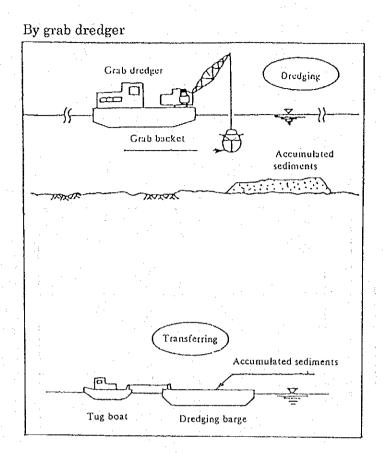
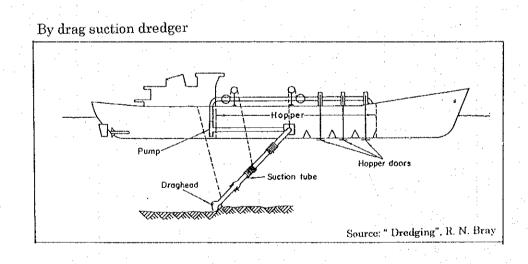


FIG. 05 SITE PLAN OF FISHING PORT (QUARTER NO.3)









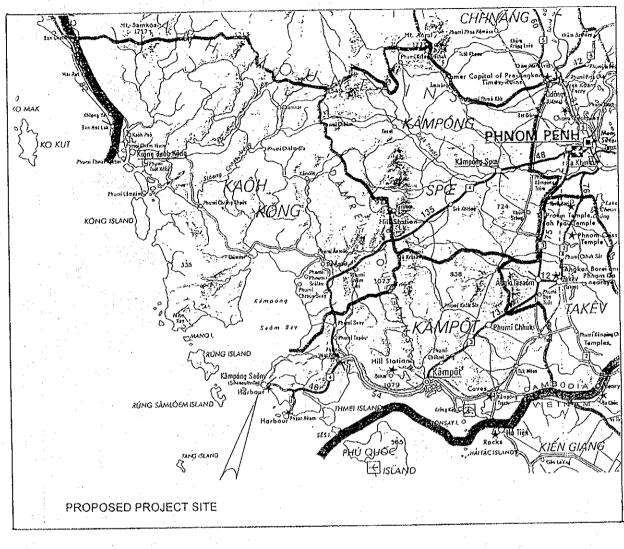




FIG. 08 ROUTE FOR RAILROAD AND NATIONAL ROUTE NO.4

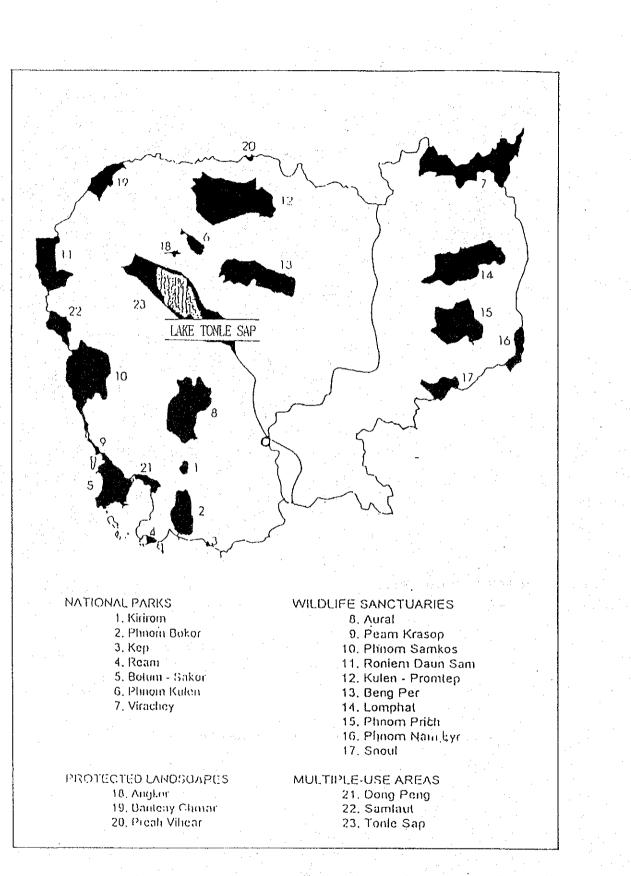


FIG. 09 AREAS DESIGNATED AS PROTECTED AREAS

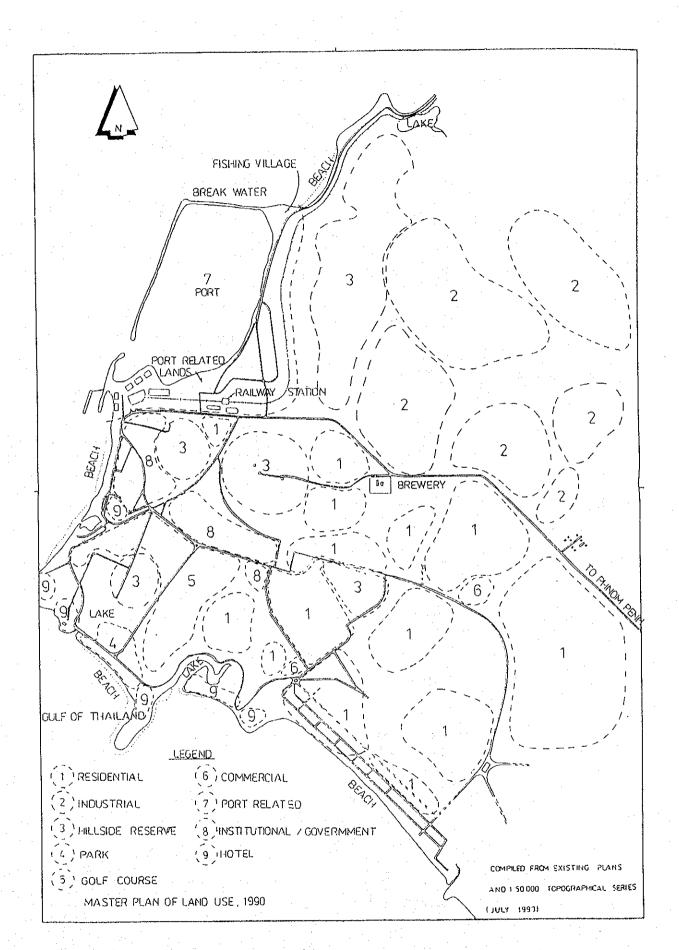


FIG. 10 MASTER PLAN OF LAND USE, 1990

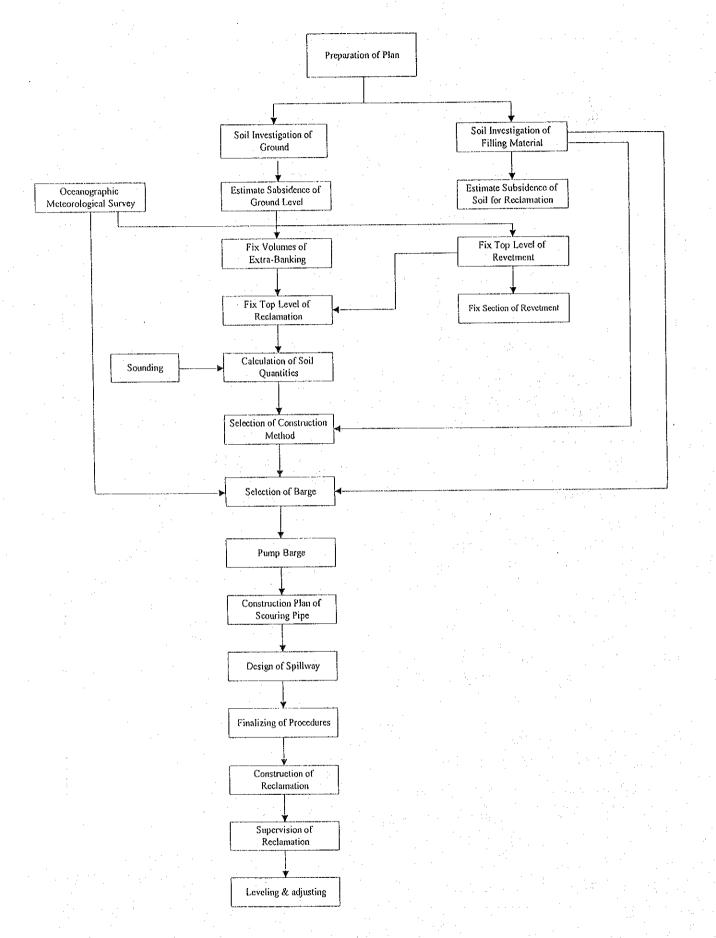
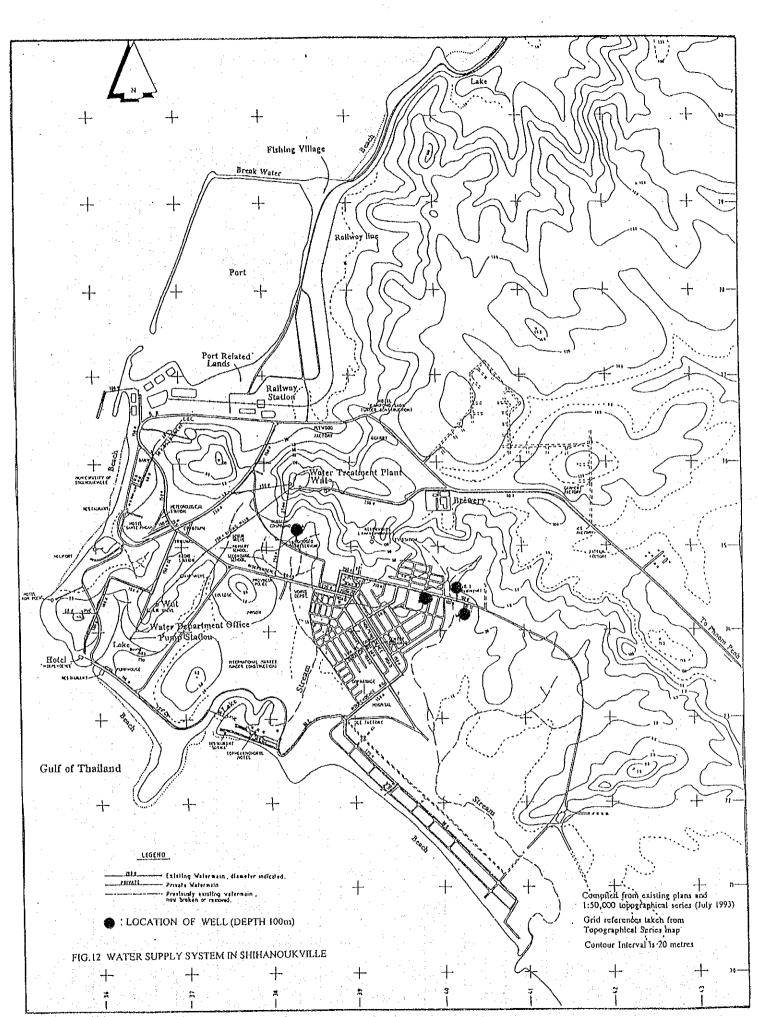


FIG. 11 WORK PROCEDURES OF RECLAMATION



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FIG 13-1 Matrix of Element for Environmental Impact

										· ···			- 1								1					
	Element of					_								2 04						1.7.		6.04	erati	00		
1	1	1.Ch	ange	3 Of Γ	latur	e	÷			2.GC	onstri	lictio	n	3.Str	uciu	re				4. Lra porta		o.Op	erau	on	÷ -	
	Impact	1.1	1.2	1.3	1.4	15	1.6	1.7	1.8	21	22	2.3	2.4	3.1	3.2	3.3	3.4	3.5	3.6	1		5.1	5.2	5.3	5.4	5.5
·										<u> </u>	~~~	~														{
i.		lets	vemer	Ľ	Charin	Port	Excavation					Vork		. 6			sa		<u>ب</u>			se	ter	Waste & Garbage	Noise & Vibration	und wate
Type of		e ori	npro	atio	 စို	ະ ອີບ	Ш Ф	D)		ation	:	ete V		apir	თ		aciliti	nent	Vate			st G	Va	ଏ ଅ	& Vî	of Cr
Environmen	tal Event	Drainage outlets	River Improvement	Reclamation	Dredging : Charinel	Dredging : Port	Cutting & E	Banking	Quarry	Excavation	Piling	Concrete Work	Paving	Landscaping	Building	Road	Port Facilities	Revetment	BreakWater	inland	Marine	Exhaust Gas	Waste Water	Waste	Noise	Pumping of Ground water
1. Topography	1.1 Topography	x	х	х			х	х	х	x					х	х	X	:								X
	1 2 Soil Condition						х	х	х				3	X			х									
2.Climate	2.1 Temperature																									
	2.2 Sunshin																			ļ						
	2.3 Wind Direction																									
	and Velocity				x	х				•							·	<u>.</u>		ļ						· .
3.Water	3.1 Surface Water	х	х	x	х	х	X	х	X				X	X	X	X	X	X	ļ	. 			Х			
	3.2 Ground Water	х	x							: :			X	X				ļ		<u> </u>		ļ) 			X
1.1	3.3 Sea Water	X	x	X	х	Х		Н									X		X		· ·		X			l
	3.4 Water Quality	X	x	X	X	X		1	X				I		:		 		X	ļ	<u> </u>	ļ	X	X		l
	3.5 Water																1									
	Temperature				X	X					ļ		. 	ļ			ļ	 	ļ. '	· · ·			X			
4. Atomosphere	4.1 Quality				<u> </u>		ļ															X				
	4,2 Noise &							} .								1 -					.		1.1			
	Vibration		<u> </u>	 	<u> </u>	X	<u> </u>	X			<u>↓×</u>		1							<u>×</u>		<u> </u>			X	
5 Biology	5.1 Natural Fiora	X			<u>×</u>	X				<u> </u>				· .					X		<u> </u>	<u>x</u>				X
	5.2 Artificial Forest		ļ											<u> </u>		<u> </u>	<u> </u>	<u> </u>								<u> </u>
	5.3 Terrestrial									1							1 .		÷.,		·		÷.,			x
	Biology		X	X										+				1		<u> </u>		X				<u>†</u>
	5.4 Hydrobios	X	X	X	X	X	<u> </u> -		÷						┼		<u> </u>					 .				<u> </u>
	5.5 Natural	·				1		· ·			·		1													
	Monument 5.6 Ecosystem	x	x	X	X	X	x	X	X				.	x	-	1		x	X		x	x	X	X	X	X
6 Landscope	6.1 Mountains		· ·	† î		Ê	X		X	1	1		X	1^	1.	:		$\frac{1}{1}$		-	1			X		+
- Canascope	6.2 Hills	-	1				X	1	X				X				1	+	1		1	1		X		
	6.3 Rural	1	\uparrow	\uparrow		1		1		1	1			1	-		1	-		1				X	1	1
	6.4 Urban	1			1		1					<u> </u>	X	1	1					ŀ			1	X		
	6,5 River , Lake			1	1		1		1	1	1	1				1						Γ			}	
	and Pond		х	X														1		<u> </u>			X	<u> </u>		
	6.6 Coast	X	X	X	X	X	X	X		X		_		X		X		X					X	X		<u> </u>
7.Natural	7.1 Local			ļ	.					1				1		1						Į				
Phenomena	Weather			1				<u> </u>		<u> </u>		<u> </u>	<u> </u>	<u> </u>	ļ						<u> </u>	1	. 		_	<u> </u>
	7.2 Rainfalt								Į				1		1				.] .		
	/Detuge		X	X		X	X		X	₋		X	X	X	<u> x</u>	X		X		_	<u> </u>		X			
	7.3 Stream/Outflow	ļ				ł		1.		Ì	1							1	1		1		1		1	Ì
	of soil		X	X	<u> x</u>	<u> ×</u>							<u> </u>	-			+-	<u> </u>	. <u> </u>				×		+	
	7.4 Ground Water/ground	<u>i</u>		-																						x
	7.5 Ground/							T														.				
	vibration						-				<u> ×</u>				-	-	+			×				+-	<u> </u>	
8.Cultural	8,1 Ruins and																	· •				1.				
Assets	Relics					-	-		+	+	+	-		-	- - -	┽╴	+-		-	-	-		1	+	-	+
	8.2 Buried cultur	as		ł						1	· ;				1.										1.	
· L	Assets	I			<u>مألم</u>	, I ,						<u> </u>	<u>_ l</u>	_ .		1	<u></u>							~~~~		مبسطمه

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FIG 13-2	Matrix of	ričinčii		yimentar	μηρασι

1 A.	Element of		÷ * -								÷															
		1.Change of Nature						n 2011		2.Construction				3.Structure						4 Trans-		5.Operation				
			1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	3.5	3.6	4.1		5.1	5.2	5.3	5.4	5.
Type of Environmental Event		Change of Channels	River Improvement	Reclamation	Dredging : Channel	Dredging : Port	Cutting & Excavation	Banking	Quarry	Excavation	Piling	Concrete Work	Paving	ping	Building	Road	Port Facilities	Revetment	Break Water	iniand	Marine	Exhaust Gas	Waste Water	Waste & Garbage	Noise & Vibration	Pumoing of Ground water
	0.1.11.1	0	<u> </u>	<u>u</u>		<u> </u>		- ^{LLL}	<u> </u>		<u>u</u> .		<u>u</u> .		ш	<u></u>	<u> </u>	<u>u</u>			<		1-	-		- ⁰ .
9.Inhabitants	9.1 Living Candilion										x			ļ		X		x		x	x		x	x	:	
	9.2 Economic																								<i>j.</i>	-
	Activity				x	X			Ĺ											X	X					ļ
10,Industry	10.1 Condition of													•						· .			ļ			
	Employment			· • • • • •				ļ	. 	×	×	X	X			ļ				X	X	-	ļ			Ľ
	10.2 Local							ĺ						ł												ļ
	Industry, etc.	X		X	X.	x	_			X	X	X	X			<u> </u>				X	X					┝
1.00	11.1 Port	<u>^</u>		<u> </u>	^							<u> </u>							·		x					┢
UI Sea Alea	11.3 Tourism			·•	· · · ·	• • • •							 .		<u> </u>					X	X		1 ***		•	1
12.Utilization	12.1 Agriculturat				 				1												ļ					ĺ
of Water	Water					L					<u> </u>					<u> </u>						ļ	 			
	12.2 Waterworks				· · ·			1	:			ļ		l	<u>x</u>	<u> </u>	<u>x</u>			<u> </u>	ļ	ļ	X	ļ]]
	12.3 Industrial							1				1	ļ				ł					<u> </u> .				ŀ
•	Water												ļ							<u> </u>			┢──	<u> </u>		-
· · · · ·	12.4 Others			· ·				+			ļ	ļ	<u> </u>		x	<u> </u>	x		<u> </u>							-
13.Infrastruc- ture, elc.	13.1 Electricity 13.2 Road &	. <u> </u>				 		+		<u> </u>			• • • • • •		<u> </u>		\uparrow					1	[<u>†</u>
ture, etc.	Traffics		ŀ		1						· · ·									x			1			ĺ
	13,3 Other		[<u> </u>		<u> </u>					···-			1									1			
	Transportation	<u> </u>	L	 	· · ·	ļ .	<u> </u>	· .		<u> </u>			<u> </u>	L		ļ				 	X		ļ			<u> </u>
	13,4 Waterworks	ļ	ļ			 		ļ				-		ļ	X	_	X			· ·	ļ	 	 	ļ	ļ	Ļ
н 	13.5 Sewageworks		1			 	<u>.</u>		. 		· · ·		.		X	<u> </u>	 .		ļ	 	ļ		X			-
	13.6 Park & Green			<u> </u>				+		. <u>.</u>		·	<u> </u>	<u> ×</u>	-	₋	<u> </u>		·	<u> </u>						+
	13.7 Disposal					ŀ		}																x		
	Facility of Solid Waste	1			·				:		1	-							·	1.	·			^		

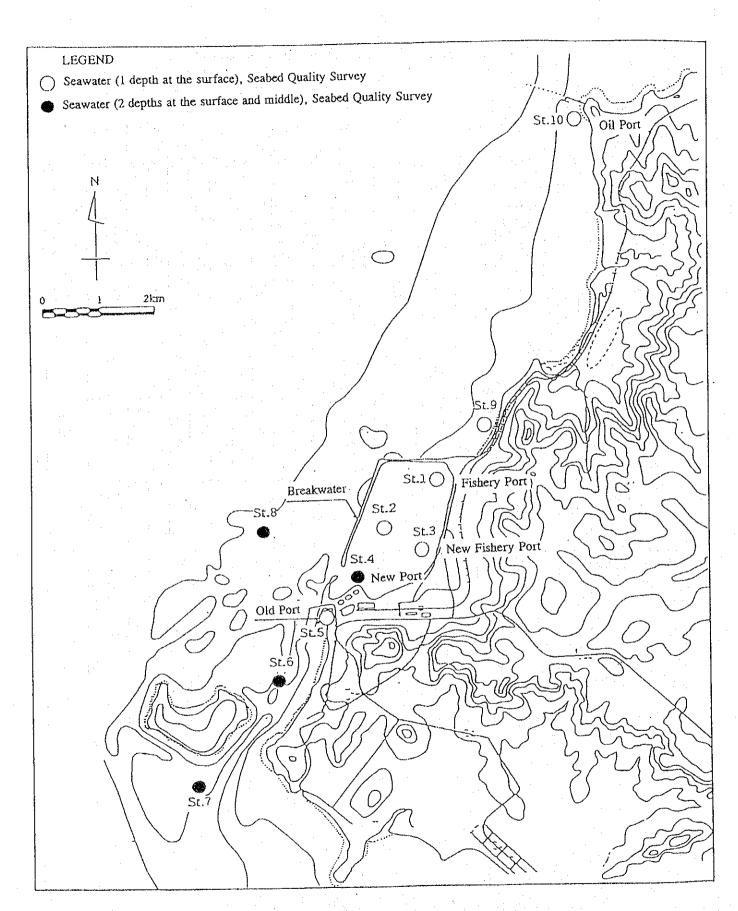


FIG. 14 LOCATION MAP OF SEAWATER AND SEABED QUALITY SURVEY

المتحافية المحافية المتحافية المحافية المستقلين والمتروب والمتحرين والمحافية والمحافية والمحافية والمحاور والمحاور

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