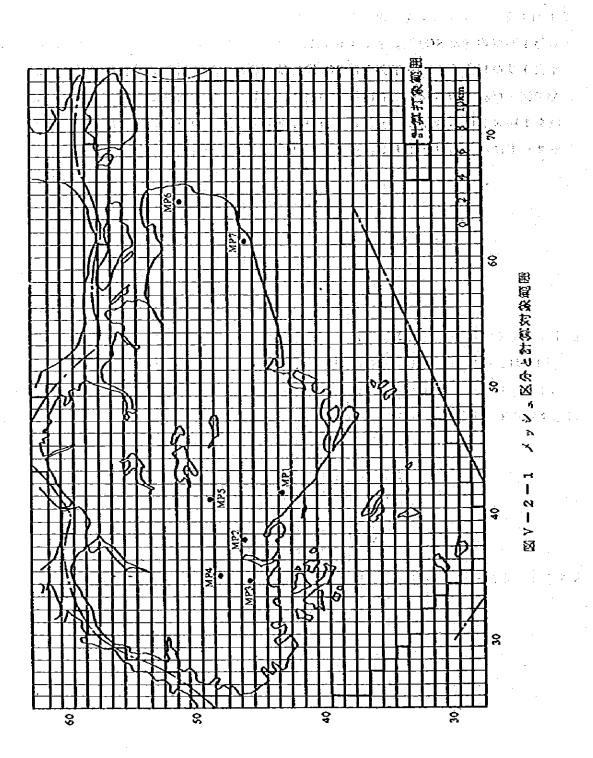
第2章 SO1予測シミュレーションの結果

第1章で述べた SO2予測シミュレーションモデルを用いて,第単腸で推定した現状(1981 年次)及び将来(1990年次)の SO3排出量が排出された場合の現状及び将来の SO2環境濃度 を予測した。その結果を以下に示す。なお、予測地点は、MP1~MP7の測定点及び対象地 域を1 km×1 kmに区分したメッシュの中心点である。そのメッシュ区分と計算対象範囲は図 Y -2-1 に示すとおりである。

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 $s\in -30$ 

12 美作語 **測定点の予測結果**でもないが、またものである。「「atention」」のである。

名 勘定点における SO: 環境濃度の年平均値の予測結果を表 Y ー 2 ー 1 に示す。これをみると, 1981 年次では 6.7 ppb ~ 23.2 ppb であったのが, 1990 年次では 9.5 ppb ~ 39.9 ppb となり,

2.8 ppb~16.7 ppb 増加している。1981年次における名刻定点の寄与率をみると、固定発生源 (工場・事業場)が29~74%、給約が6~11%、パックグランドが19~64%となっ ている。なお、パックグランドの意味については前章(1-2-6)を参照されたい。濃度の 低いMP6, MP7を除いたMP1~MP5における1981年次の寄与率は、固定発生源が 64~74%, 給約が6~9%、パックグランドが19~29%となっている。これらの寄与 率は1990年次においても大きな変化はみられない。

予制濃度の最も高いMP3についてみると, SO,環境濃度の予測値は1981年次の232 ppb から1990年次では39.9 ppbに増加している。MP3における固定発生源の寄与率は1981年 次で74%, 1990年次で80%を占めている。

			· · · ·						
<b>谢 定 局</b>	対象 年次	(参考) 実現 <b>没</b> 度 (ppb)	予病改度 (ppb)	<b>固定発生源</b> (工場・ 事業場) (ppb)	寄与率 (%)	船船 (ppb)	寄与来 (%)	パ ヮ ク グランド (ppb)	寄与率 (%)
	1981	14.2	15.9	1010	64	1.46	ġ	4.3	27
MP1) N.U.S	1990		21.6	13.66	63	223	1Ò	5.7	26
	1981	14.6	16.7	1121	67	1.1.4	7	4.3	26
MP2) J.T.C.HALL	1990		24.7	17.30	70	1.74	7	5.7	23
	1981	262	23.2	1726	74	1.61	7	4.3	19
MP3) S. I.U.	1990	1-	39.9	31.85	80	2.38	6	5.7	14
BOON LAY	1981	194	21.4	15.88	74	1.18	6	4.3	20
MP4) APARTMENT	1990	:	33.9	26.50	78	1.73	5	5.7	17
MP5) BUKIT TIMAH	1981	17.5	14.9	9.70	65	0.9.1	6	4.3	29
MP 57 FIRE STATION	1990	—	20.7	1 3.6 1	66	1.42	7	5.7	27
CHANGI	1981	6.7	6.7	1.97	29	0.43	6	• 4.3	64
MP6) AIRPORT	1990		9.5	3.18	33	0.66	7	5.7	60
BEDOK POLICE	1981	8.4	8.1	299	37	0.79	10	4.3	53
MP7) STATION	1990	-	11.5	4.5 8	40	1.26	11	5.7	49

表 V-2-1 顔定局における SOr 浪度の予測結果(年平均値)

:V - 43

次に, S系モンスーン(4月~10月)とN系モンスーン(11月~3月)の平均濃度の予 測結果を表 Y − 2 − 2,表 Y − 2 − 3に示す。S系モンスーンにおける予測濃度についてみる と, 1981 年次では 7.0 ~ 28.9 ppb であったのが, 1990 年次では 10.0 ~ 48.2 ppb ~ と 3.0 ~ 20.3 ppb 増加している。発生源別の寄与率は年平均値の場合とほぼ同様である。

N系モンスーンにおける予測改度についてみると、1981年次では 6.3 ~ 1 6.5 ppb であった のが、1990年次では 8.8 ~ 2 8.2 ppb ~ と 2.5 ~ 1 1.7 ppb 増加している。発生原別の寄与率を みると、S系モンスーンに比較し極めて小さくなっている。これは、第N 編でみたようにS系 モンスーンにおける卓越風向がN E 系であるのに対し、N 系モンスーンの卓越風向は S E 系で あることによっている。N系モンスーンの設度はS 系モンスーンに比較し低くなっているのも この卓越風向の差異によるものである。

4

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**法已**定证明

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朝 定 局 9001 - 101971	対象 年次	実刻 <i>負</i> 度 (ppb)	予期最度 (ppb)	周定発出薬 (工場・ 事業場) (ppb)	省与半 (%)	轮船 (ppb)	寄与率 (%)	パック グランド (ppb)	寄与率 (%)
MP1) N.U.S	1981	13.1	183	11.78	64	223.	12	4.3	24
MP1) N. U. S	1990		24.2	1 5.0 5	62	3.4 3	14	5.7	24
	1981	141	181	11.98	66	1.7 9	10	4.3	24
MP2) J.T.C.HALL	1990		26.6	18.18	68	2.74	10	5.7	21
	1981	28.0	27.9	21.00	75	2.55	9	4.3	15
MP3) S.T.U.	1990	-	482	38.68	80	388	8	5.7	12
MP4) BOON LAY	1981	22.3	28.9	2276	79	189	7	4.3	15
MP4) APARTMENT	1990	-	45.5	37.01	81	2.79	6	5.7	13
BUKIT TIHAH	1981	17.9	15.7	9.8.8	63	1.50	10	4.3	27
MP5) FIRE STATION	1990	·	22.4	1443	64	227	10	5.7	26
CHANGI	1981	6.8	7.0	2.11	30	0.6 1	9	4.3	61
MP6) AIRPORT	1990	<u></u>	10.0	3.42	34	0.93	9	5.7	57
BEDOK PORICE	1981	9.3	8.3	294	36	1.04	13	4.3	52
MP7) STATION	1990		11.8	4.45	38	1.65	14	5.7	48

表 Y = 2 = 2 測定局における SOz 農度の予測結果(S 系モンスーン平均値)

謝定局における SO: 養度の予潮結果(N系モンスーン平均値)

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刻 定 局	対象 年次	実調改度 (ppb)	予夏養度 (ppb)	<b>冯定尧</b> []褒 (工場 事 <b>衆</b> 場 ) (ppb)	寄与事 (%)	轮档 (ppb)	寄与率 (%)	パ ッ ク グランド (ppb)	寄与率 (%)
	1981	15.8	1.2.4	7.7 2	62	0.36	3	4.3	35
MP1) N. U. S.	1990	1 <b>1</b> - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	17.9	11.71	65	0.53	3	5.7	32
	1981	/ 15.0	14.7	10.12	69	023	2	4.3	29
MP2) J.T.C.HALL	1990		221	1 6.0 7	73	0.33	1	5.7	26
	1981	23.7	16.5	1194	72	0.27	2	4.3	26
MP3) S. I. U.	1990	-	282	2216	79	0.37	1	. 5.7	20
BOON LAY	1981	15.0	10.5	6.12	58	0,17	2	43	-51
MP4)	1990		17.5	1159	66	0.24	1	5.7	33
DIRIT TINAH	1981	17.2	13.9	944	68	0.15	1	4.3	31
MP5) FIRE STAITION	1990		18.4	1246	68	0.21	1	5.7	31
CHANG	1981	6.6	6.3	1.78	28	0.18	3	4.3	69
MP6) AIRPORT	1990		8.8	2.84	32	0.28	3	5.7	65
BEDOK POLICE	1981	7.2	7.8	3.07	39	0.43	6	4.3	55
MP7) STATION	1990		112	4.77	43	0.7 2	6	5.7	51

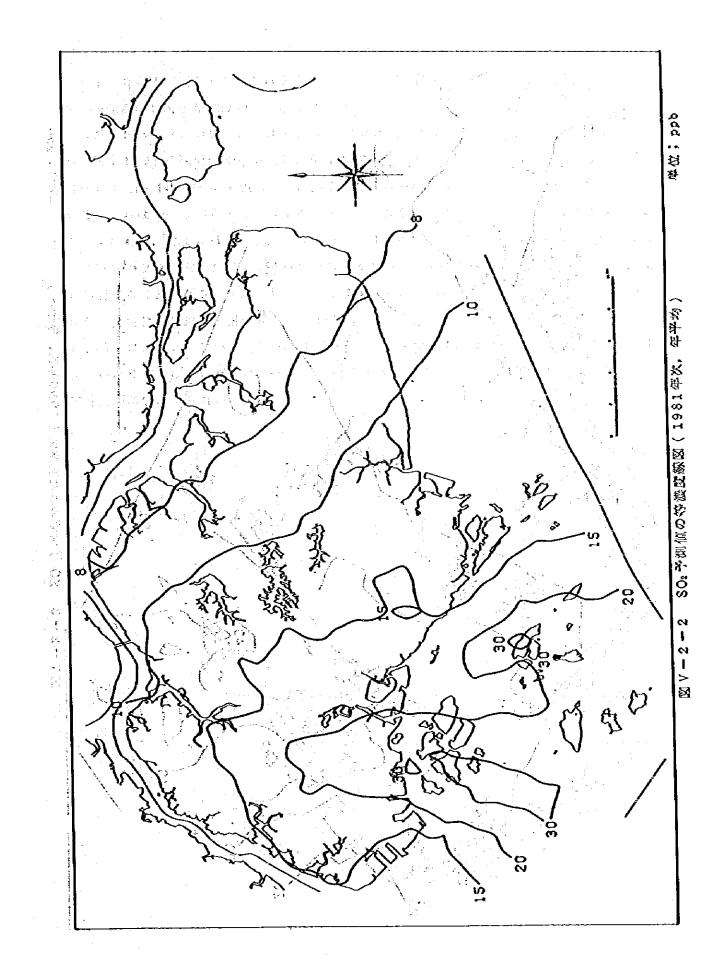
V -- 45

2-2 メッシュ点の予測結果
1981年次及び1990年次における対象地域のSO,環境濃度の年平均値の予測濃度分布を図 Y-2-2, 図Y-2-3に示す。予測濃度にはバックグランド濃度として1981年次で4.3 ppb, 1990年次で5.7 ppbが加算されている。濃度分布のパターンは1981年次, 1990年 次ともほぼ同様であり、Jurong 地区、Suthern Islands 及び Bukum島に高濃度域がみられる。
1981年次において20 ppb以上であった範囲は、1990年次では30 ppb以上となっており、
約10 ppb 程度の増加がみられる。

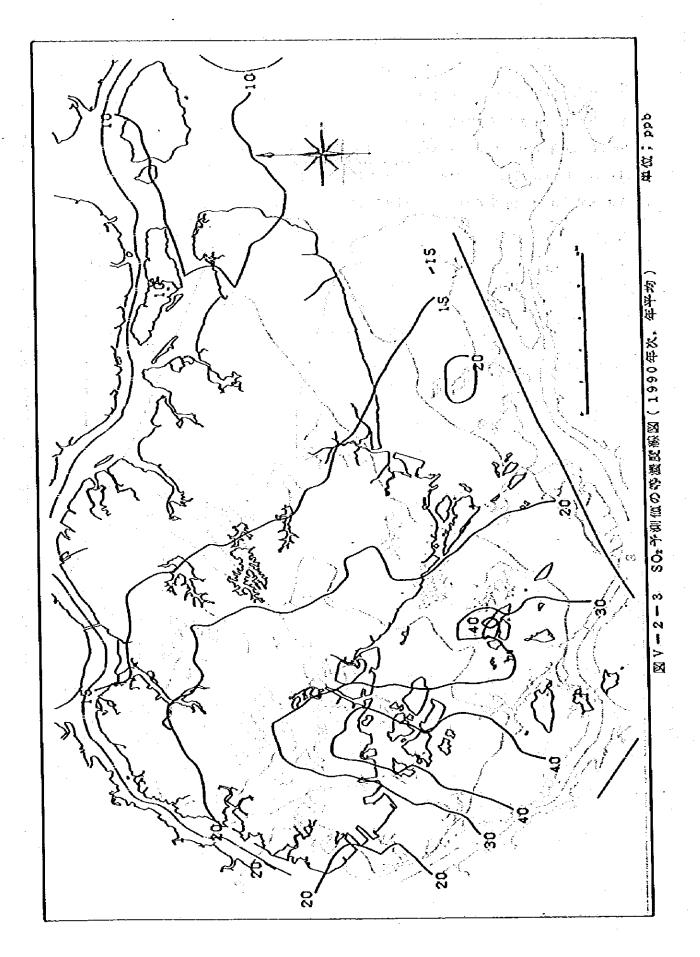
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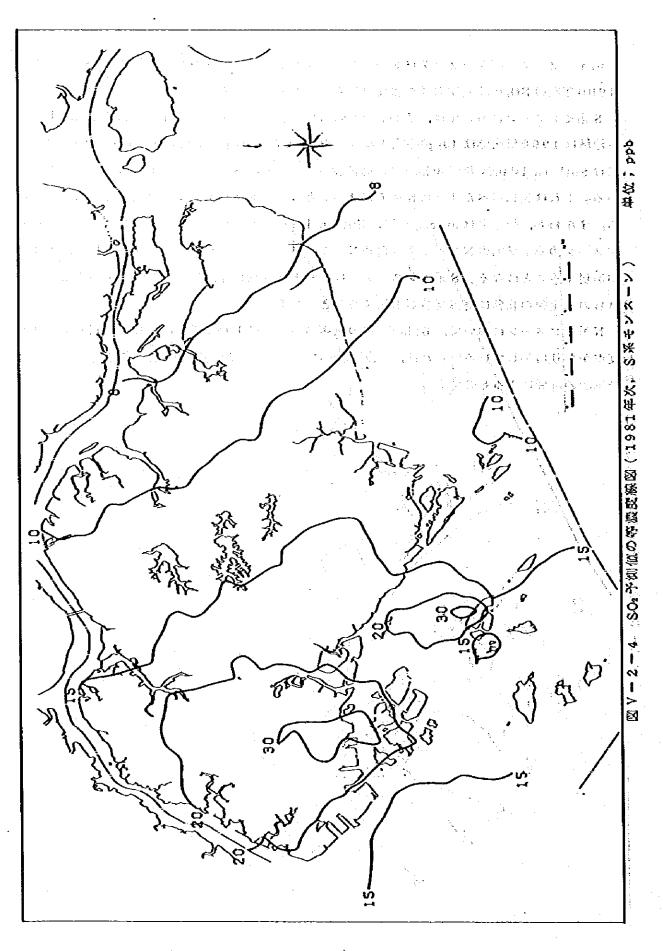


· V - 48

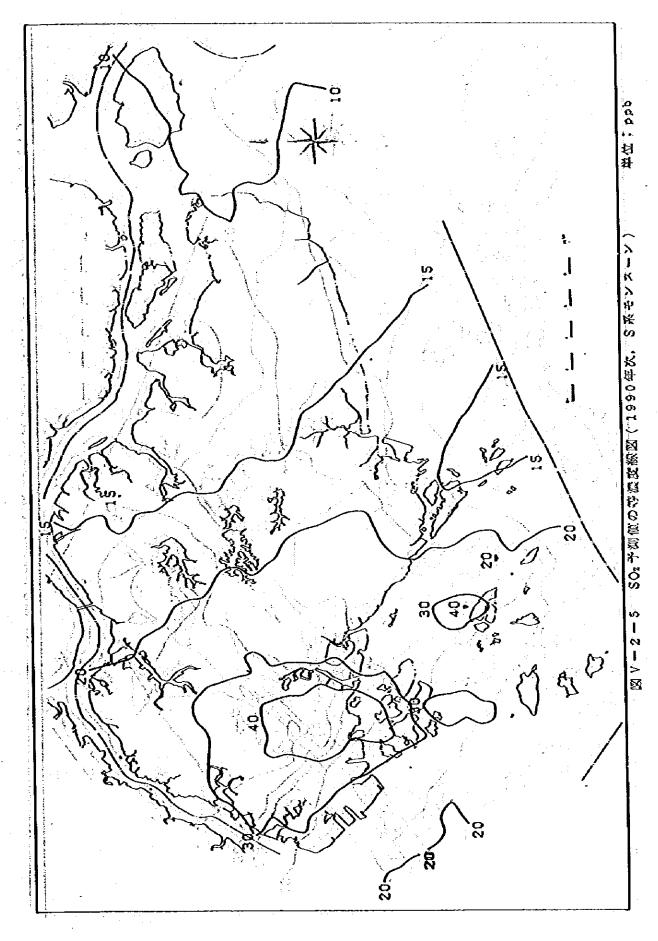
図 Y - 2 - 4 ~ 図 Y - 2 - 7 は S 系モンスーン及び N 系モンスーンにおける 1981 年次と 1990 年次の SO:環境濃度の予測濃度分布を示したものである。

S系モンスーンにおいては、Jurong 地区に高濃度域がみられ、1981年次に 30ppb以上であ る地域は 1990年次では 40ppb以上となっており、その範囲も拡大している。N系モンスーンにおい ては Suthern Islands 及び Bukum 島に高濃度域がみられ、S系モンスーンとは大きく異なって いる。これは先に述べたようにS系モンスーンとN系モンスーンの卓越風向の差異によってい る。すなわち、発生源は Jurong 地区、Suthen Island 及び Bukum 島に集中しており、N系モ ンスーンの卓越風向がNE系であるためN系モンスーンではこれらの発生源の南側に高濃度域 が出現することになる。S系モンスーンではこれとは反対に卓越風向がSE系であるため、こ れらの発生源の北側に高濃度域が出現することになる。

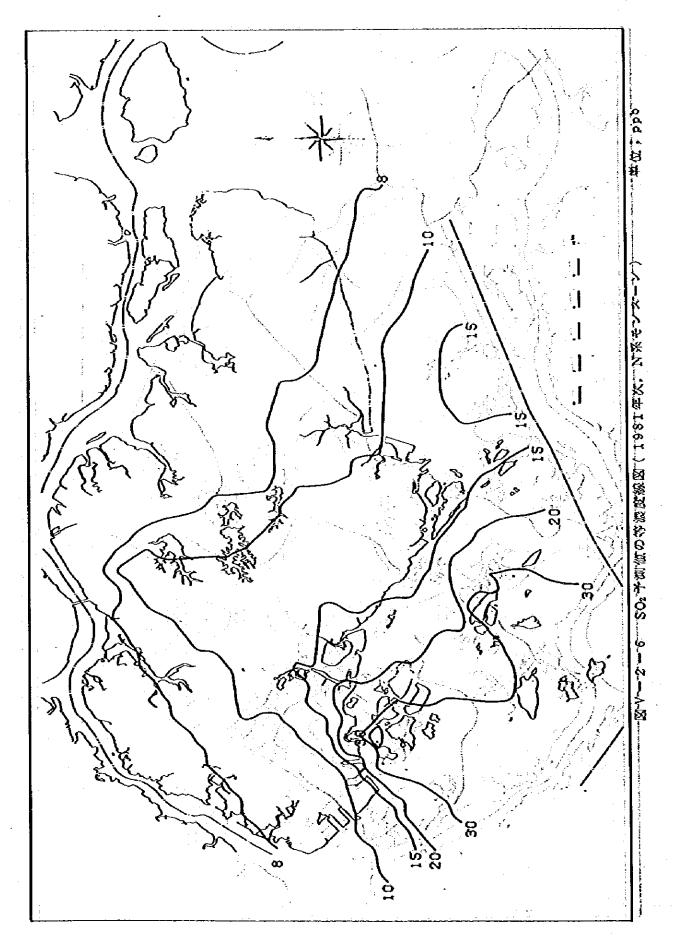
N系キンスーンにおいて, Bedok 地区の東南の海上では1981年次に比較し1990年次は漫 度がかなり増加している。これは, Tekong 島に立境が計画されている一貫刻鉄所及び石炭火力 発電所の影響によるものである。



V-50

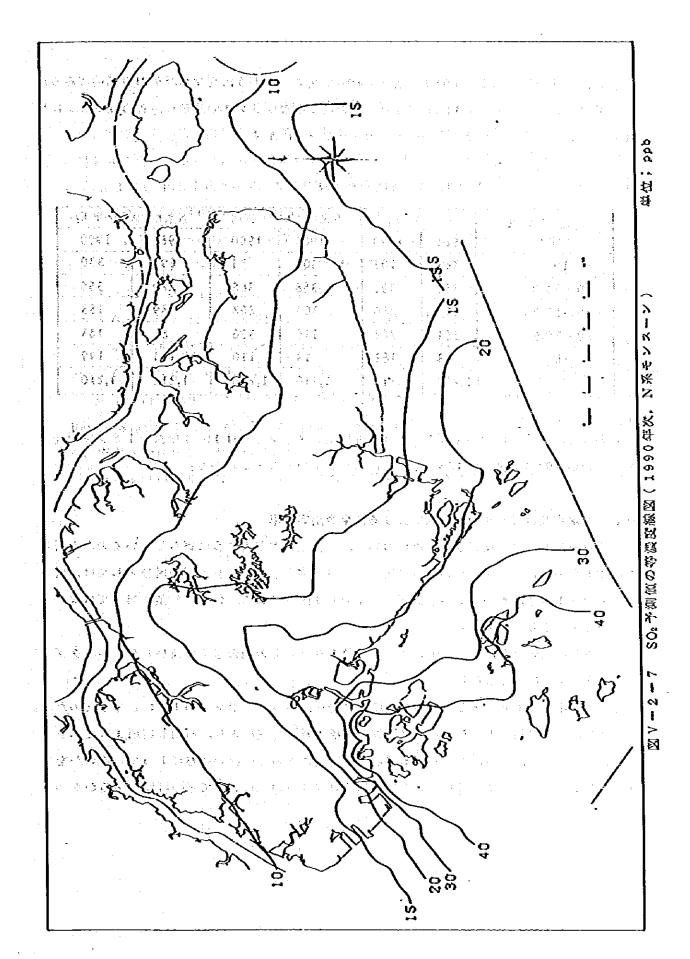


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V -- 53

次に、全体の環境濃度が1981年次と1990年次でどのように変化したがを概括的にみるため、谷メッシュ点(全部で1210メッシュ)の濃度を濃度ランクで分類し、谷濃度ランクに掲 するメッシュの数を求めた。その結果を表 Y-2-4に示す。

遺度ランク	年平	2 均 /	S系モンス・	-ン平均	N系モンス・	シ平均
(ppb)	1981	1990	1981	1990	1981	1990
= 10	467	103	409	84	694	330
10 - 14.9	368	397	368	368	< 229	355
15 - 19.9	196	280	304	262	89	183
20 - 29.9	161	262	116	386	84	143
30	18	168	13	110		199
合計	1,210	1,210	1,210	1,210	1,210	1,210

表 Y-2-4 SO1予測設度ランク別メッシュ数

この表で、年平均についてみると30 ppb 以上のメッシュ数は1981年次で18メラシュ あったのが1990年次では168メッシュに増加していることがおかる。

2-3 測定点及びビーク決度地点における発生源別寄与率

初定点及びビーク濃度メラシュ点において、各発生源がどのように寄与しているのかを明らかにするために、各発生源別の寄与濃度とその寄与素を求めた。発生源の区分としては、各事業所(全61社)、給給及びパックグランドの64区分である。但し、作業に当っては次の2 種類の方法でとりまとめた。

- ① 各事業所のうち,寄与濃度の大きい上位10社とその他の事業所及び給額,パックグラ ンドのように区分した表。
- ② 主要事業所10社とその他の事業所及び給給, パックグランドのようにとりまとめた表。

なお、主要事業所10社の内訳は一貫製鉄所1社,発電所5社,石油製精所4社である。 上記の①の表は、ある地点における環境農度は主にどの発生源の寄与によっているのかを知 るのに役立つ。②の表は着目している発生源の寄与は各地点においてどの程度であるかを知る のに役立つ。

(1) 測定点における寄与率

した。

表 Y - 2 - 5(1)~(4)は,各創定点における各事業所の年平均値の省与濃度のうち上位10 社を選んで,その寄与濃度と寄ち率を示したものである。1990年次において最も濃度の高 い M P 3 についてみると,第1位が Seneko Power Station の 4.544 ppb,第2位が The Chemical Car-Polation of Singapore Pte LTD.の 3.933 ppbとなっている。これらの上位 10社の合計は 23,108 ppb となり全体の58%を占めている。

また、表V-2-6(1)~(4)、表V-2-7(1)~(4)は各々S系モンスーン及びN系モンスー シにおける上位10社の寄与霞度と寄与率を示したものである。

表 V - 2 - 8 H, 主要事業所 1 0 社の年平均値の寄与濃度と寄与率を示したものである。 これをみると Seneko Power Station の寄与濃度H いずれの刻定局においても大きな値を占 めていることがわかる。 Tekon Integrated Steel Mill の寄与濃度についてみると、約0.2 ppb ~ 0.3 ppb となっており、その立地計画地点の関係でMP6、MP7で高くなっている。 Tekon Power Station の寄与濃度H 約 0.0 5 ppb ~ 0.1 ppb となっている。また、Seraya Power Station の寄与濃度H 約 0.3 ppb ~ 2.3 ppb となっており MP4に対する寄与が最も高 く、寄与本でit 6.7 %を占めている。

S系モンスーン及びN系モンスーンにおける寄与率は表 Y−2−9,表 Y−2−10に示

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<b>FE</b>	年次		
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F位10社の名句徴の、NKhシス Police Station	entropy of the second sec	*	SENOKO POWER STATION SERAYA POWER STATION SERAYA POWER STATION FECONG INTEGRATED STEEL MILL ESSO STNGAPORE PTE LTD PASTR PANJANG POWER STATION STATION TEKUNON POWER STATION VESSELS TATION TEKUNG POWER STATION VESSELS TATION TERUNG POWER STATION TERUNG POWER STATION
		т (ф	SENOKO POWER STATION SERAYA POWER STATION SERAYA POWER STATION FEXCONG INTEGRATED STATION PASIR PANJER PUWER STATION SHELL COMPANIES THE L SHELL COMPANIES
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		<b>\$</b> <b>1</b> <b>1</b>	KO POWER STATIO NG POWER STATIO SINGAPORE STATIO SINGAPORE STATIO SUCOMPANTES IN APORE REFINING APORE REFINING SUNDESTRY OF STE ONAL TRONK STE CONFILMING STE ONAL TRONK STE ONAL ST

······································	(i) N.U.S		N.U.S.	J.S.		(2) J.T.C. HALL				
事業所名	198	<b>(年次</b> )	1990	年次	1981	年次	1990	)年次		
爭 耒 内 石	寄与读度 (ppb)	寄与年 (8)	寄与渡度 (ppb)	(1)	(ppb)	(1)	(opb)	(*)		
TEXCAS INTEGRATED STEEL MILL SENOKO POLER STATION	1.826	11.52	0.204	0.45	1	18.57 5.30 10.75	0.192	0.1		
JURONS POLER STATION	1.502	9.51	1.506	6.98	6.63-	ş.¥c	0.684	3.		
PASIR PRIJANG POWER STATION	1,530	9.90	1.550 0.341	7.31	1.755	10.78	1.775	2		
serata pover station tekong pover station		_	0.053	0.25	- 1		30.05	0.		
SHELL COMPANIES IN SINGRPORE	2.795			12.96		10.25		6.		
ésső sinjápore pte LTD Singápore refining có pte LTO	0.350	2.40	0.360	1.76	0.744	4.4	0.744	ં ૩.		
neath all strappere ate ltq .	0.300	1.89		14.13	0.277	1.47	4.804			
REPAINING FACTORIES	1.440		2.232	10.33	1.144		1 - 1 - 742	1.7.		
BACK 650040		27.12		26.38	4.300	25.5	24.74	<u>123.</u>		
10TAL	1 13.03/	100.00	1 .1. 377	<u></u>	1 10.32	<u>200.V</u>	4	<u></u>		

表 Y - 2 - 8 測定点における主要事業所の寄与費度(年平为)

	(3)	\$.I.U.	(4) BOON LA	Y APARTMENT
唐 平 之 力		1990年次	1981年次	1990年次
事 枽 所 名	青与浅度寄与毒 (ppb), (3)	寄与渎度寄与非 (ppb)(3)	(ppb) (t)	奇与 <b>通度</b> 寄与3 (ppb) (3)
TEXANS INTEGRATED STEEL MILL		0.177 0.44		0.233 0.4
senero poser station	3.063 15.96			3.34 9.0
JARENS POLER STATION	0.104 0.4	s 0.104 0.24	9 4.45370.3	
PASIR PANJANG POZER STATION	1.252 5.4	1 1.252 - 3.14	1.521 7.5	4.
séraya poger station	·	1.243 . 3.11		2.273 6.
TEXENG POWER STATION	1.621 7.0	- 0.054 - 0.14		0.011 0.
SHELL COMPANIES IN SINGAPORE			1.374 6.5	1.394 4.
ESSO SINSAFCRE PIE LIO	2.601 11.2	3 5.601 6.51	1.672 2.4	2 1.692 4.
SINGAPORE REFINING CO PTE LTO	2.341 10.2	8 2.381 5.9	S 1.432 3.7	1 1,432 4.
KEBIL OIL SINGEFORE PIE LID	0.535 2.3	1 0.505 1.2	0.557 2.7	
Revaining factories	5.755 24.0	5 17.364 43.40	1 2.760 13.8	5 9.412 27.
VESSELS	1.510 6.9	5 2.382 5.9	1 1.132 5.5	3 1.734 5.
BACK 6500.00	4.307 15.5	5.200 14.20	4.300 20.1	
ioial	23.162100.0	0 37.928 00.0	21.352100.0	3 23.530100.0

				1 2 3 1 3 3 4
	(S) BUKIT	TIMAĤ FIRE ST.	(6) CHAN	GI AIRPÓRT
事業所名	1981年0	(1990年次)	1981年次	1990年次
尹 未 功 石	寄与浅度寄与	丰寄与法度寄与丰	· 告述 自 清 自 寄 与 赤	寄与海岸 寄与束
	(ppb) (#		Kópb) (i)	(ppb) (%)
TEKONS INTEGRATED STEEL MUL			3 0.508 7.55 1 0.471 7.02	0.309 3.24
SENER PERER STRILEN	3.165 21.		3 0.508 7.55	0.737 0.04
JURING POWER STATION	1.185 7.	93 1.185 5.7	1 0.471 7.02	0.4/1 4.74
Pasir Prever Station	1.872 12.	54 1.872, 9.0	3j 0.303] 4.5≎	SILE CL34.0
SERAYA FORER STATION		1.426 4.0	a - I - I	0.274 2.90
texans power station		- 0.084 0.4		0.165 1.14
SHELL COMPANIES IN SINGAPORE	1.532 10.		9 0.227 3.42	0.228 2.4/
ESSO SINGAPORE PTE LTO		32 0.719 3.4	7 0.160 2.35	0.160 1.67
SINGAPORE REFINING CO PIE LID	0.445 2.	97 0.444 2.1	4 0.091 1.35	0.071 0.95
ROBIL OIL SINGAPORE PIE LTO	0.155 1.	26 0.181 0.3	7 0.065 1.25	2 0.0011.0.65
Revaining factories	0.571 3.	76 1.503 8.7	d 0.127 1.67	i∷0.333°4.02
VESSELS	0.53.5.	26 1.417 6.8		0.353 4.02
EACK 6501ND	4.300 28.	.75 5.700 27.4	fi 4.300/64.05	2 5.700 59.75
TOTAL	1 14.93-100.	.00 20.734700.0	4 6.210100.00	00.00104 <i>5</i> .7

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	(7) BEC	NX N	DLICE ST.	ATION
事業所名	1981	年次	1990	)年次
<b>尹</b> 杰 <b>为</b> 石	寄与演度 ( ppb )。	寄与车 (3)	寄与法度 (ppb)	寄与本 (1)
TEXANS INTEGRATED STEEL MILL SENARD PARER STATION JUNDAR POWER STATION FASTR PANJANG POWER STATION FERATA POWER STATION TEXAN POWER STATION TEXAN POWER STATION SHELL CONFINIES IN SINGAPORE ESSO SINGAPORE PTE LTO SINGAPORE FEELTO SINGAPORE PTE LTO POBIL OIL SINGAPORE PTE LTO TOTALNING FACTORIES	0.459 0.6552 0.556 0.285 0.285 0.178 0.158 0.154 0.154 0.759	8.52 10.54 3.54 3.54 3.51 14.57 2.21 14.55 2.21 14.55 2.21 2.23 2.23 2.24 2.23 2.24 2.25 2.25 2.25 2.25 2.25 2.25 2.25		9.07 7.36 3.34 3.56 0.57 0.57 0.57 0.57
FACK GSDLAD	1.300	53.22		49.38

			与虞贯					
1. · · · · · · · · · · · · · · · · · · ·		(1)	N.U.S.		(2)	J.T.	C. HALL	<u> </u>
事業前名	1981	秋	1990	年次			1990	FX
<b>Ψ⊼ηο</b>	寄与遵遵	8414	省与渡度	寄与奉				
and Claim and Clauders Changes	(ppb)	<u>(</u> )	(ppb)	(1)	(ppb)	(3)	(ppb)	(7)
TEXONO INTEGRATED STEEL MILL	0.932	5.07	0.250			1 24	0.235	
JURGHS POWER STATICH	1,274	6.96	1.214	5.21	1.055	5.84	1.055	3.96
ALGONG POSCE STATION PASIR PANJANG POVER STATION SEGATA POVER STATION IEKONG POVER STATION	2.601			1.67		16.41	2.965	6.99
TEXONO POLER STATICH	4,409	24 Ô8	0.075	0.31 18.24	. I : <u></u>	. <del>44</del> 1	0.072	0.27
SHELL COMPANIES IN SINGAPORE ESSO SINGAPORE PTE LTO SINGAPORE REFINING CO PTE LTO	0,620	4 48	0.820	3.35	2.602	8.55	1.545	5.80
HOBIL OIL SINGAPORE PIE LTD	0.448 0.281	2.45	0.274	1.85	1.545 0.997 0.319	5.52	0.997	3.74
	1 1.002	5.46	່ ວ.ບວບ	12.62	1.711	. 7.46	5.450	20.40
VESSELS EACK GJOLED	4.300	23.49	5.700	23.53	4 300	23.80	2.733	
L restantes IUIAL	18.336	100.00	.24 178	100.00	18.058	00.00	26.619	100.00
							1 - 1 8 <u>8 9 - 1</u> - 1	· . · . ·
			S.I.U.	· · ·			Y APART	MENT
· 冷静的影响 《事業房名》	198	<u> 年次</u>	1990	年次	1981	下次	1990	年次
	寄与满度 (ppb)	寄与奉	寄与渡度	寄与率	寄与法度	寄与奉	奇与演度	寄与串
TEXCHS INTEGRATEO STEEL MILL	, ppb)	(%)	(ppb)	(%) 0.45	ppb)	(1)	pbp)	(1)
SENORO POLLA STATION	0.631	2.27	0.960	1.99	0.544	1.88	0.317	
PASIR PANJANG POWER STATION	0.127 2.051	0.45	0.127	0.26	2 2 . 181	24.81	7.101	15 7A
SERATA FORER STATION	2. <b></b> .		2.046	4.25				
PASIR PAULANO POPER STATION SERATA POLER STATION TEXANO POLER STATION SHELL COMPANIES IN SINGAPORE ESSO SINGAPORE PIE LTO SINGAPORE REFINING CO PTE LTO POBIL OIL SINGAPORE PIE LTO POBIL OIL SINGAPORE PIE LTO FRAINING FACTORIES VESSELS	2.649	9.51	2.649	0.14 31.50	2.274 2.571 2.252	7.85	0.056	0.21
ESSO SINGSPORE PTE LTO	3,765	14.24	3.963	8.23	2.571	8.65	2.571	5.65
ROBIL AIL SHARPERE PIE LTO	0.619	2.22	0.608		. U./CU	2.70	0.75	1.65
VESSELS	0.619 7.215 2.555	25.89	22.245	46.17	1.475	15.45	14.427	31.71 4.12
energy Back GROLD	4.300	15.44	5.700	11.83		14.65	5.200	12.53
	1 cr.w.		+0.104	*****	201100	100.00	45.500	100.03
			1					
	(3) - RI	NIT T				<u></u>		
				E ST.	(6)		· · · · · · · · · · · · · · · · · · ·	IRT
事業所名	1981	年次	1990	E ST. 0年次	1981	年次	1990	RT 年次
事業所名	1981 寄与遗疗	年次 次与ま	199( 寄与過度	E ST. )年次 次与ま	1981 寄与 <b>波</b> 耷	年次	1990 次与流途	RT 年次 寄与本
IEXCAG INTECRATED STEEL MILL	1981 寄与遵度 (ppb),	年次 寄与奉 (3)	199( 寄与浅度 (ppb) 0.369	E ST. )年次 寄与毒 (3)	1981 寄与 <b>渔</b> 度 (ppb)	年次 寄与幸 (3)	1990 寄与譲渡 (ppb) 0.374	RT 年次 寄与末 (3) 3.72
LEXANG INTEGRATED STEEL MILL SENANG POWER STATION DEALS PRACE STATION	1981 寄与激度 (ppb), 0.479	年次 寄与本 (3) 3.18	1990 寄与濃度 (ppb) 0.369 0.857 1.408	E ST. )年次 寄与幸 (1) 1.4% 3.6/	1981 寄与速度 (ppb) 0.346 0.576	年次 寄与率 (7) 4.93 8.19	1990 寄与譲渡 (ppb) 0.374 0.527	RT 年次 寄与本 (3) 3.72 5.24
LEXANG INTEGRATED STEEL MILL SENANG POTER STATION JACANG POTER STATION PASIR PANJANG POWER STATION	1981 寄与建度 (ppb), 0.459 1.468 3.071	年次 寄与率 (3) 3.18 8.98 19.55	199( 寄与濃度 (ppb) 0.349 0.837 1.408 3.071	E ST. )年次 寄与本 (3) 1.45 3.87 4.25 13.77	1981 寄与違度 (ppb) 0.348 0.576	年次 寄与寿 (5) 4.93 8.15	1990 寄与譲渡 (ppb) 0.374 0.527 0.576	RT 年次 寄与末 (3) 3.72 5.24 5.23
LEXANG INTEGRATED STEEL MILL SENANG POTER STATION JACANG POTER STATION PASIR PANJANG POWER STATION	1981 寄与建度 (ppb), 0.459 1.468 3.071	年次 寄与率 (3) 3.18 8.98 19.55	199( 寄与濃度 (ppb) 0.349 0.837 1.408 3.071	E ST. )年次 寄与率 (1) 1.4% 3.8% 6.2% 13.2% 13.2% 9.4%	1981 寄与逸度 (ppb) 0.346 0.576 0.372	年次 寄与丰 (3) 4.93 8.15 5.25	1990 寄与通度 (ppb) 0.374 0.527 0.574 0.375 0.329 0.130	RT 年次 寄与年 (3) 3.24 5.24 5.23 3.20 1.25
LEXANG INTEGRATED STEEL MILL SENARG POWER STATION JACOUS POWER STATION PASIR PANJANS POWER STATION SERATA POWER STATION IEXONO POWER STATION IEXONO POWER STATION SERL COMPANIES IN SINGAPORE	1981 寄与通夜 (ppb), 0.499 1.468 3.071 二 2.420	年次 寄(3) 3.188 5.58 19.55 15.43	199( 寄与濃度 (ppb) 0.387 0.837 1.408 3.071 2.168 0.112 2.420	E ST. )年次 寄与率 (3) 1.4% 3.8% 4.2% 13.7% 9.5% 10.5%	1981 寄与違度 (ppb) 0.346 0.576 0.576	年次 寄与本 (3) 4.93 8.19 5.29 4.01	1990 寄与親選 (ppb) 0.374 0.527 0.574 0.374 0.375 0.325 0.130 0.130 0.283	RT 年次 寄与率 (3) 3.72 5.24 5.73 3.707 1.25 2.60
TEXANG INTEGRATED STEEL MILL SEVANG POWER STATION JURCHO POWER STATION PASIR PANJANG POWER STATION SERANG POWER STATION SERANG POWER STATION INCOMPOWER STATION SHELL COMPANIES IN SINGAPORE EASO SINGAPORE PTE LTO SINGAPORE REFINING CO PTE LTO NAME AN INTEGRATION OF THE LTO	1981 寄与通復 (ppb), 1.468 3.071 2.420 0.553 0.567	年次 寄与率 3.18 8.98 19.58 15.43 4.08 3.24	199( 寄与邊定 (ppb) 0.847 1.408 3.071 2.148 0.112 2.450 0.953 0.587	E ST. )库次 寄与非 1.455 3.825 13.771 9.65 13.771 9.65 10.55 10.	1981 寄与速度 (ppb) 0.344 0.576 0.372 0.372 0.282 0.195 0.110	年次 寄与 (7) 4.93 8.19 5.29 4.01 2.83 1.51	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.576 0.372 0.372 0.374 0.374 0.374 0.374 0.374 0.374 0.375 0.150 0.110	來T 年次 寄与本 3.½2 5.24 5.770 3.27 1.25 2.60 1.560 1.50
TEXANG INTEGRATED STEEL MILL SEVANG POWER STATION JURCHO POWER STATION PASIR PANJANG POWER STATION SERANG POWER STATION SERANG POWER STATION INCOMPOWER STATION SHELL COMPANIES IN SINGAPORE EASO SINGAPORE PTE LTO SINGAPORE REFINING CO PTE LTO NAME AN INTEGRATION OF THE LTO	1981 寄与建度 (ppb), 1.468 3.071 2.420 0.553 0.587 0.725	年次 寄与率 3.18 8.98 19.55 15.43 3.24 1.403 4.403	199( 寄与決定 (ppb) 0.349 0.837 1.408 3.071 2.148 0.112 2.420 0.953 0.553 0.545	E ST. )年次 寄(6) 3.871 9.55 10.85 10.85 10.85 10.85 10.85	1981 寄与速度 ppb) 0.346 0.576 0.372 0.576 0.372 0.576 0.372 0.576 0.372 0.197 0.100 0.035 0.143	年次 寄与本 (7) 4.93 8.19 5.29 4.01 2.83 1.51 1.51 2.00	1990 寄与 通度 (ppb) 0.374 0.527 0.576 0.372 0.372 0.372 0.372 0.372 0.372 0.130 0.282 0.139 0.101 0.031	RT 年次 寄与本 3.72 5.24 5.24 5.24 5.24 5.24 5.24 5.24 5.2
LEXANG INTEGRATED STEEL MILL SENANG POSER STATION JURCHO POSER STATION PASIR PANJANO POWER STATION SERANG POWER STATION IEXCAN POWER STATION SHELL COMPANIES IN SINGAPORE EASO STREAMORE PTE LTO SINGAPORE PTE LTO SINGAPORE PTE LTO MOBIL OIL SINGAPORE P. 5 LTO REVAINING FACTORIES EACK GAUND	1981 新年時間 (ppb), 1.468 3.071 2.420 0.553 0.555 0.217 0.725 1.497	年次 年次 5 5 5 5 5 5 5 5 5 5 5 5 5	199( 寄与邊定 (ppb) 0.367 0.857 1.408 3.071 2.168 0.112 2.450 0.9537 0.216 2.262 2.262 2.262	E ST. )年次 省与非 (4) 1.4% 3.8% 4.2% 13.2% 13.2% 9.6% 10.5% 4.2% 2,6% 0.5% 10.6%	1981 寄与速度 (ppb) 0.346 0.576 0.372 0.282 0.197 0.110 0.035 0.110	年次 寄与 (5) 4.93 8.15 5.25 4.01 2.83 1.55 1.55 2.00 8.91	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.574 0.375 0.329 0.130 0.283 0.130 0.283 0.110 0.051 0.040 0.440 0.925	RT 年次 年 3.72 5.24 5.24 5.23 3.727 3.273 3.273 3.273 3.273 3.273 3.273 1.2560 1.150 1.560 4.401 4.401
LEXCAR INTEGRATED STEEL MILL SENARD POWER STATION JACOND POWER STATION PASIR PANJAND POWER STATION SERAND POWER STATION LEXCAN POWER STATION SHELL COMPANIES IN SINGAPORE ESSO SINGLORE PIE LTO SINGAPORE REFINING CO PTE LTO	1981 新年時間 (ppb), 1.468 3.071 2.420 0.553 0.555 0.217 0.725 1.497	年次与本 3.186 19.53 15.438 1.433 1.433 1.433 27.43	199( 寄与邊定 ppb) 0.369 0.837 1.408 3.071 2.168 0.112 2.450 0.112 2.450 0.216 2.262 2.262 2.262 2.262 2.265 700	E ST. )年次 寄与奉 (4) 1.4% 3.6% 4.2% 13.5% 13.5% 10.5% 10.5% 10.0% 10.0% 10.0%	1981 寄与速度 (ppb) 0.348 0.576 0.372 0.282 0.372 0.282 0.197 0.110 0.035 0.110 0.035 0.110 0.035	年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.55 1.25 2.04	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.574 0.375 0.329 0.130 0.283 0.130 0.283 0.110 0.051 0.040 0.440 0.925	RT 年次 寄 (3)、72 5.24 5.23 5.24 5.23 5.20 1.56 1.10 0.64 4.20 5.72
LEXANG INTEGRATED STEEL MILL SENANG POSER STATION JURCHO POSER STATION PASIR PANJANO POWER STATION SERANG POWER STATION IEXCAN POWER STATION SHELL COMPANIES IN SINGAPORE EASO STREAMORE PTE LTO SINGAPORE PTE LTO SINGAPORE PTE LTO MOBIL OIL SINGAPORE P. 5 LTO REVAINING FACTORIES EACK GAUND	1981 寄与通復 (ppb), 1.468 3.071 2.420 0.553 0.215 0.215 0.215 0.215 0.215 1.457 4.300	年次 寄 (1) 3.18 5.55 15.43 5.55 15.43 5.55 15.43 1.40 4.63 5.74 1.40 1.40 1.40 1.40 1.40 1.55 10.00 10	199( 寄与邊定 ppb) 0.847 0.847 1.408 3.071 2.168 0.112 2.450 0.9537 0.216 2.262 2.262 2.262 5.707	E ST. )年次 寄与奉 (4) 1.4% 3.6% 4.2% 13.5% 13.5% 10.5% 10.5% 10.0% 10.0% 10.0%	1981 寄与速度 (ppb) 0.348 0.576 0.372 0.282 0.372 0.282 0.197 0.110 0.035 0.110 0.035 0.110 0.035	年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.55 1.25 2.04	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.574 0.379 0.130 0.283 0.130 0.283 0.110 0.051 0.0110 0.051 0.040 0.925 5.700	RT 年次 寄 (3)、72 5.24 5.23 5.24 5.23 5.20 1.56 1.10 0.64 4.20 5.72
IEXANG INTEGRATED STEEL MILL SENANG POWER STATION JUCANG POWER STATION PASIR PANJANG POWER STATION SECTOR POWER STATION IEXANG POWER STATION SHELL COMPANIES IN SINGAPORE EASO SINGAPORE PTE LTO SINGAPORE REFINING CO PTE LTO POBIL OIL SINGAPORE P. LTO POBIL OIL SINGAPORE P. LTO POBIL OIL SINGAPORE P. LTO PASIES	1981 新与通费 (ppb), 	年次 寄 (3) 3.18 5.98 15.43 5.08 15.43 5.08 3.24 1.403 9.55 27.43 100.00	199( 寄与決定 (ppb) 0.349 0.847 1.408 3.071 2.148 0.112 2.420 0.953 0.587 0.216 2.262 2.275 2.405	E ST. )年次 寄与非 (3) 13.5%	1981 第与速度 (ppb) 0.346 0.576 0.372 0.282 0.199 0.110 0.035 0.110 0.035 0.110 0.035 0.141 0.035	年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.55 1.25 2.04	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.526 0.379 0.130 0.283 0.130 0.283 0.110 0.051 0.010 0.051 0.040 0.925 5.700	RT 年次 寄 (3)、72 5.24 5.23 5.24 5.23 5.20 1.56 1.10 0.64 4.20 5.72
IEXANG INTEGRATED STEEL MILL SENANG POWER STATION JUCANG POWER STATION PASIR PANJANG POWER STATION SECTOR POWER STATION IEXANG POWER STATION SHELL COMPANIES IN SINGAPORE EASO SINGAPORE PTE LTO SINGAPORE REFINING CO PTE LTO POBIL OIL SINGAPORE P. LTO POBIL OIL SINGAPORE P. LTO POBIL OIL SINGAPORE P. LTO PASIES	1981 寄与通復 (ppb), 1.468 3.071 2.420 0.553 0.557 0.217 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725	年次 客 (3) 	1990 寄与決定 (ppb) 0.349 0.837 1.408 3.071 2.148 0.112 2.420 0.953 0.557 0.214 2.2420 2.2420 2.2420 2.2420 2.2420 2.2420 2.2405 2.	E ST. )年次 寄 (5) 1.455 3.85 5.271 9.44 2.45 13.271 9.44 2.45 10.55( 10.5	1981 寄与速度 (ppb) 0.346 0.576 0.376 0.376 0.376 0.376 0.376 0.376 0.376 0.376 0.3466 0.3466 0.3466 0.3466 0.3466 0.3466 0.3466 0.3460	年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.55 1.25 2.04	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.526 0.379 0.130 0.283 0.130 0.283 0.110 0.051 0.010 0.051 0.040 0.925 5.700	RT 年次 寄与3 3.727 5.24 5.73 3.707 1.25 2.600 1.10 0.64 4.40 9.21 5.72
IERONG INTEGRATED STEEL MILL SERVING POWER STATION PASIR PANJANG POWER STATION SERVING POWER STATION IERONG POWER STATION IERONG POWER STATION SHELL COMPANIES IN SINGAPORE ESSO SINGAPORE PIE LTO SINGAPORE REFINING CO PIE LTO MOBIL OIL SINGAPORE P. 5 LTO REVAINING FACTORIES ENCK SCIND	1981 寄与通復 (ppb), 1.468 3.071 - 2.420 0.753 0.217 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.498 0.537 0.217 0.725 1.498 0.537 0.217 0.725 1.498 0.537 0.217 0.755 0.217 0.2570 0.2570 0.2570 0.2570 0.25700000000000000000000000000000000000	年次 客 (3) 	1990 寄与決定 (ppb) 0.349 0.837 1.408 3.071 2.148 0.112 2.420 0.953 0.953 0.557 0.224 2.272 2.272 2.272 2.272 2.274 2.240 2.274 2.240 2.274 2.240 2.2745 2.2747 2.274 2.274 2.2747 2.274 2.274 2.274 2.2747 2.2	E ST. )年次 寄与毒 (3) 13.5%	1981 寄与速度 (ppb) 0.346 0.576 0.376 0.376 0.376 0.376 0.376 0.376 0.376 0.376 0.3466 0.3466 0.3466 0.3466 0.3466 0.3466 0.3466 0.3460	年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.55 1.25 2.04	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.526 0.379 0.130 0.283 0.130 0.283 0.110 0.051 0.010 0.051 0.040 0.925 5.700	RT 年次 寄与3 3.727 5.24 5.73 3.707 1.25 2.600 1.10 0.64 4.40 9.21 5.72
IEROPAG INTEGRATED STEEL MILL SERVED POWER STATION DURCHO POWER STATION PASIR PANJAND POWER STATION SERVED POWER STATION IEROPAY POWER STATION SWELL COMPATIES IN SINGAPORE ESSO SINGAPORE PIE LTD SINGAPORE REFINING CO PIE LTD MOBIL OIL SINGAPORE P. 5 LTD 	1981 寄与通復 (ppb), 0.479 1.468 3.071 2.420 0.553 0.553 0.217 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.497 0.725 1.496 0.725 1.496 0.753 0.217 0.725 1.496 0.753 0.217 0.755 1.496 0.755 0.217 0.755 1.496 0.755 0.217 0.755 1.496 0.755 0.217 0.755 1.496 0.755 0.217 0.755 1.496 0.755 0.217 0.755 1.496 0.755 0.217 0.755 1.496 0.557 1.496 0.557 1.496 0.557 1.496 0.557 1.496 0.557 1.496 0.557 1.496 0.557 1.956 1.5567 1.556 1.556 1.556 1.5567 1.556 1.556 1.556 1.55	年次 客 (3) 	1990 寄与濃淀 (ppb) 0.369 0.637 1.408 3.071 2.168 0.112 2.450 0.953 0.216 2.262 2.272 2.272 2.270 2.262 2.272 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.270 2.265 2.2700 2.2700 2.270 2.2700 2.2700 2.2700 2.2700 2.2700	E ST. )年次 寄 (6) 1.455 13.771 9.45 13.771 9.45 13.771 9.45 10.56 14.25 2,45 10.0 10.5 10.5 (1) 10.5 (1) 10.5 (1) 10.5 (1) 10.5 (1) 10.5 (1) 1.45 10.5 (1) 9.45 10.5 (1) 10.5 10 10 10 10 10 10 10 10 10 10 10 10 10	1981 寄与速度 (ppb) 0.348 0.576 0.576 0.576 0.576 0.576 0.576 0.576 0.110 0.035 0.110 0.035 0.113 0.0413 0.612 4.350	年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.55 1.25 2.04	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.526 0.379 0.130 0.283 0.130 0.283 0.110 0.051 0.010 0.051 0.040 0.925 5.700	RT 年次 寄与3 3.727 5.24 5.73 3.707 1.25 2.600 1.10 0.64 4.40 9.21 5.72
IEXQNG INTEGRATED STEEL MILL SELVING POWER STATION DECKNG POWER STATION PASIR PANJANG POWER STATION SERVIN POWER STATION IEXCANP POWER STATION IEXCANP POWER STATION SHELL COMPANIES IN SINGAPORE EASSO SINGAPORE PIELTO SINGAPORE REFINING CO PTELTO MOBIL OIL SINGAPORE P.SLIQ 	1981 寄与通復 (ppb), 0.499 1.468 3.071 2.420 0.553 0.557 0.217 0.217 0.557 0.217 1.497 4.300 15.477 4.300 15.477 ()) BEI 198 寄与遇度 ()) BEI	午	1990 寄与邊境 (ppb) 0.367 0.847 1.408 3.071 2.168 0.112 2.420 0.953 0.216 2.262 2.262 2.265 2.255 2.0555 2.055 2.055 2.055 2.055 2.055 2.055 2.055 2.055	E ST. 年 有 年 5 5 5 5 5 5 5 5 5 5 5 5 5	1981 第与速度 (ppb) 0.346 0.576 0.372 0.372 0.100 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.143 0.612	年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.55 1.25 2.04	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.526 0.379 0.130 0.283 0.130 0.283 0.110 0.051 0.010 0.051 0.040 0.925 5.700	RT 年次 寄与3 3.727 5.24 5.73 3.707 1.25 2.600 1.10 0.64 4.40 9.21 5.72
IEXANG INTEGRATED STEEL MILL SELVING POWER STATION PASIR PANJANG POWER STATION SERATA POWER STATION SECATO POWER STATION SECLI COMPATIES IN SINGAPORE ESSO SINGAPORE PIELTO SINGAPORE REFINING CO PIELTO MOBIL OIL SINGAPORE 9.5 LTO 	1981 寄与通復 (ppb), 1.468 3.071 2.420 0.553 0.553 0.557 0.217 0.725 1.497 4.300 15.677 ()) BEI 198 寄与浅渡 (ppb), 	年次 春 (3) 	1990 寄与邊選 (ppb) 0.367 0.637 1.408 3.071 2.168 0.112 2.450 0.953 0.216 2.265 2.265 2.265 2.265 2.275 5.707 2.265 2.265 2.265 2.275 5.707 2.265 2.265 2.275 5.707 2.265 2.265 2.275 5.707 2.265 2.265 2.275 5.707 2.265 2.265 2.275 5.707 2.265 2.275 2.275 5.707 2.265 2.275 5.707 5	E ST. 年 5 5 5 5 5 5 5 5 5 5 5 5 5	1981 寄与速度 (ppb) 0.348 0.576 0.372 0.576 0.576 0.576 0.576 0.576 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035	年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.55 1.25 2.04	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.526 0.379 0.130 0.283 0.130 0.283 0.110 0.051 0.010 0.051 0.040 0.925 5.700	RT 年次 寄与3 3.727 5.24 5.73 3.707 1.25 2.600 1.10 0.64 4.40 9.21 5.72
IEXANG INTEGRATED STEEL MILL         SELVING POWER STATION         DECAYS POWER STATION         PASIR PANJANG POWER STATION         SERVIN POWER STATION         SERVIN POWER STATION         SERVIN POWER STATION         SERVIN POWER STATION         SHELL COPPATIES IN SINGAPORE         SHELL COPPATIES INSAPORE         SHELL COPPATIES         SHELL COPPATIES         SHELL COPPATIES         SERVAL         SERVAL <th>1981 寄与通復 (ppb), 0.499 1.468 3.071 2.420 0.553 0.557 0.217 4.300 15.677 4.300 15.677 (1) BEI 198 寄与演渡 ()) bJ</th> <th>年 次 本 3.18 3.18 4.33 5.98 15.43 3.18 4.43 27700.00 14 5.93 10.14 5.93 10.14 5.93 10.14 5.93 10.14 5.93 10.14 10.</th> <th>1990 寄与邊境 (ppb) 0.367 0.837 1.408 0.837 1.408 0.837 1.408 0.112 2.420 0.953 0.557 0.214 2.262 2.272 5.707 22.405 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.205 20.204</th> <th>E ST. 年 5 5 5 5 5 5 5 5 5 5 5 5 5</th> <th>1981 第与通度 (ppb) 0.346 0.576 0.376 0.376 0.376 0.376 0.376 0.376 0.199 0.110 0.035 0.143 0.143 0.143 0.412 4.300 7.028</th> <th>年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.55 1.25 2.04</th> <th>1990 寄与通度 (ppb) 0.374 0.527 0.527 0.526 0.379 0.130 0.283 0.130 0.283 0.110 0.051 0.010 0.051 0.040 0.925 5.700</th> <th>RT 年次 寄与年 3.224 5.24 5.23 3.72 3.27 1.25 1.15 1.10 0.64 4.40 9.27</th>	1981 寄与通復 (ppb), 0.499 1.468 3.071 2.420 0.553 0.557 0.217 4.300 15.677 4.300 15.677 (1) BEI 198 寄与演渡 ()) bJ	年 次 本 3.18 3.18 4.33 5.98 15.43 3.18 4.43 27700.00 14 5.93 10.14 5.93 10.14 5.93 10.14 5.93 10.14 5.93 10.14 10.	1990 寄与邊境 (ppb) 0.367 0.837 1.408 0.837 1.408 0.837 1.408 0.112 2.420 0.953 0.557 0.214 2.262 2.272 5.707 22.405 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.204 20.205 20.204	E ST. 年 5 5 5 5 5 5 5 5 5 5 5 5 5	1981 第与通度 (ppb) 0.346 0.576 0.376 0.376 0.376 0.376 0.376 0.376 0.199 0.110 0.035 0.143 0.143 0.143 0.412 4.300 7.028	年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.55 1.25 2.04	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.526 0.379 0.130 0.283 0.130 0.283 0.110 0.051 0.010 0.051 0.040 0.925 5.700	RT 年次 寄与年 3.224 5.24 5.23 3.72 3.27 1.25 1.15 1.10 0.64 4.40 9.27
IEXAMO INTEGRATED STEEL MILL         SELVING POWER STATION         DEADON POWER STATION         PASIR PANJANG POWER STATION         SERATA POWER STATION         SHELL COMPATIES IN SINGAPORE         EXAMO POWER STATION         SHELL COMPATIES IN SINGAPORE         EXAMO POWER STATION         SHELL COMPATIES IN SINGAPORE         SINGAPORE PIELTO         SINGAPORE PIELTO         SINGAPORE PIELTO         SINGAPORE PIELTO         MERCHANNES FACTORIES	1981 寄与通復 (ppb), 1.468 3.071 2.420 0.553 0.553 0.557 0.217 0.555 1.497 4.300 15.677 ()) BEI 198 寄与演变 (p)b), 	年高。 (1) 15.438 (1) 15.4388 (1) 15.438 (1) 15.438 (1) 15.4388 (1) 15.43888 (1) 15.43888 (1) 15.43888 (1) 15.43888 (1) 15.43888 (1) 15.438888 (1) 15.438888 (1) 15.4388888 (1) 15.43888888888 (1) 15.43888888888888888888888888888888888888	1990 寄与決定 (ppb) 0.367 0.637 1.408 3.071 2.168 0.112 2.450 0.953 0.216 2.265 2.275 2.075 2.275 2.075 2	E ST. 年 5 5 5 5 5 5 5 5 5 5 5 5 5	1981 寄与速度 (ppb) 0.346 0.576 0.372 0.282 0.197 0.110 0.035 0.035 0.100 0.0350 0.0350 0.0350 0.0350000000000	年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.25 2.04 8.75 1.25 2.04 8.75 1.25 2.04 8.75 1.2	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.526 0.379 0.130 0.283 0.130 0.283 0.110 0.051 0.010 0.051 0.040 0.925 5.700	RT 年次 寄与年 3.72 5.24 5.23 3.72 1.25 1.12 2.60 1.10 0.64 4.40 9.21 56.72
IEXANG INTEGRATED STEEL MILL         SENANG POWER STATION         JEAGNO POWER STATION         SERANG POWER STATION         JERONG POWER STATION         SERANG POWER STATION	1981           寄与通復 (ppb),           0.479           1.468           3.071           2.420           0.553           0.557           0.725           1.458           0.725           1.458           0.725           1.459           0.725           1.4300           15.470           0.725           1.98           寄与残费           0.491           0.491           0.491           0.491           0.491           0.491           0.491           0.491           0.491           0.492           0.491           0.491           0.492           0.491           0.492           0.492           0.492           0.310	午 寄 (3) 3.6.53 43.543 15.438.44.555.43 5.543 15.438.44.555.43 15.438.44.555.43 10.14.4 9.554.4 10.14.4 1.224.4 10.14.4 10.14.4 1.224.4 10.14.4 10.14.4 1.224.4 10.14.4 10.14.4 10.14.4 1.224.4 10.14.	1990 寄与邊境 (ppb) 0.367 0.847 1.408 3.071 2.168 0.112 2.420 0.587 0.216 2.262 2.262 2.265 0.216 2.265 2.005 2.265 2.0555 2.0555 2.0555 2.0555 2.0555 2.0555 2.0555 2.0555 2.055	E ST. 年 5 5 5 5 5 5 5 5 5 5 5 5 5	1981 寄与速度 (ppb) 0.346 0.576 0.576 0.576 0.576 0.576 0.576 0.576 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.057 0.110 0.057 0.110 0.057 0.110 0.057 0.110 0.057 0.110 0.057 0.110 0.057 0	年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.25 2.04 8.75 1.25 2.04 8.75 1.25 2.04 8.75 1.2	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.526 0.379 0.130 0.283 0.130 0.283 0.110 0.051 0.010 0.051 0.040 0.925 5.700	RT 年次 寄与3 3.727 5.24 5.73 3.707 1.25 2.600 1.10 0.64 4.40 9.21 5.72
IEXANG INTEGRATED STEEL MILL SELVING POWER STATION PASIR PANJANG POWER STATION SERATA POWER STATION SERATA POWER STATION STELL COMPATIES IN SINGAPORE ESSO STRUCTURES IN SINGAPORE ESSO STRUCTURES IN SINGAPORE ESSO STRUCTURES 	1981 寄与通復 (ppb), 0.479 1.468 3.071 2.420 0.553 0.553 0.217 0.217 0.217 0.217 0.217 0.217 1.498 1.497 1.498 1.498 1.498 1.498 1.498 1.497 1.498 1.498 1.498 1.498 1.498 1.498 1.498 1.498 1.498 1.988 1.498 1.988 1.497 1.000 1.538 1.498 1.988 1.9988 1.998 1.998 1.9988 1.998 1.998 1.998 1.998 1.998 1.9986 1.9986 1.	年寄(1) 15.438 3.4354300 115.438 3.44354300 115.438 1.4354300 115.438 1.4354300 115.438 10.144 10.144 10.144 10.144 10.144 10.144	1990 寄与邊境 (ppb) 0.367 0.847 1.408 3.071 2.168 0.112 2.420 0.587 0.216 2.262 2.262 2.265 0.216 2.265 2.005 2.265 2.0555 2.0555 2.0555 2.0555 2.0555 2.0555 2.0555 2.0555 2.055	E ST. 年 5 5 5 5 5 5 5 5 5 5 5 5 5	1981 寄与速度 (ppb) 0.346 0.576 0.576 0.372 0.576 0.372 0.100 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.035 0.110 0.035 0	年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.25 2.04 8.75 1.25 2.04 8.75 1.25 2.04 8.75 1.2	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.526 0.379 0.130 0.283 0.130 0.283 0.110 0.051 0.010 0.051 0.040 0.925 5.700	RT 年次 寄与3 3.727 5.24 5.73 3.707 1.25 2.600 1.10 0.64 4.40 9.21 5.72
IEXANG INTEGRATED STEEL MILL         SENANG POWER STATION         DECKNO POWER STATION         SERATA POWER STATION         DECOMPATIES IN SINGAPORE         SERATA POWER STATION         MOSIL OLL SINGAPORE P.S. LTQ	1981 寄与通復 (ppb), 0.479 1.468 3.071 2.420 0.553 0.553 0.217 0.217 0.217 0.217 0.217 0.217 1.498 1.497 1.498 1.498 1.498 1.498 1.498 1.497 1.498 1.498 1.498 1.498 1.498 1.498 1.498 1.498 1.498 1.988 1.498 1.988 1.497 1.000 1.538 1.498 1.988 1.9988 1.998 1.998 1.9988 1.998 1.998 1.998 1.998 1.998 1.9986 1.9986 1.	年寄(1) 15.438 3.4354300 115.438 3.44354300 115.438 1.4354300 115.438 1.4354300 115.438 10.144 10.144 10.144 10.144 10.144 10.144	1990 寄与邊境 (ppb) 0.367 0.847 1.408 3.071 2.168 0.112 2.420 0.587 0.216 2.262 2.262 2.265 0.216 2.265 2.005 2.265 2.0555 2.0555 2.0555 2.0555 2.0555 2.0555 2.0555 2.0555 2.055	E ST. 年 5 5 5 5 5 5 5 5 5 5 5 5 5	1981 寄与速度 (ppb) 0.346 0.576 0.576 0.372 0.576 0.372 0.100 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.110 0.035 0.035 0.110 0.035 0	年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.25 2.04 8.75 1.25 2.04 8.75 1.25 2.04 8.75 1.2	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.574 0.379 0.130 0.283 0.130 0.283 0.110 0.051 0.010 0.051 0.040 0.925 5.700	RT 年次 寄 (3)、72 5.24 5.23 5.24 5.23 5.20 1.56 1.10 0.64 4.20 5.72
TEXANG INTEGRATED STEEL MILL SELVING POWER STATION PASIR PANJANG POWER STATION SERATA POWER STATION SERATA POWER STATION SHELL COMPATIES IN SINGAPORE ESSO SINGAPORE PIE LTO SINGAPORE REFINING CO PIE LTO MOBIL OIL SINGAPORE P. 5 LTO 	1981 寄与通復 (ppb), 0.499 1.468 3.071 2.420 0.553 0.557 0.217 0.555 1.497 4.300 15.679 ()) BEI 198 寄与测度 ()) BEI 198 高与测度 ()) BEI 198 ()) BEI 0.542 0.491 0.542 0.491 0.542 0.491 0.542 0.553 ()) BEI 198 ()) () ()) ())	年寄。 3.6.98 3.6.98 3.6.98 3.6.98 3.6.98 3.1.4355 3.1.4355 3.1.4355 3.1.4355 3.1.43555 3.1.43555 3.1.435555 3.1.435555555555555	1990 寄与邊境 (ppb) 0.367 0.847 1.408 3.071 2.168 0.112 2.420 0.587 0.216 2.262 2.262 2.265 0.216 2.262 2.265 2.005 2.265 2.005 2.265 2.005 2.265 2.005 2.005 2.005 2.265 2.005 2	E ST. 年 5 5 5 5 5 5 5 5 5 5 5 5 5	1981 寄与速度 9月6) 0.346 0.576 0.372 0.372 0.372 0.110 0.035 0.035 0.	年次 寄与赤 (2) 4.93 5.25 4.01 2.83 1.55 1.25 2.04 8.75 1.25 2.04 8.75 1.25 2.04 8.75 1.25 2.04 8.75 1.2	1990 寄与通度 (ppb) 0.374 0.527 0.527 0.574 0.379 0.130 0.283 0.130 0.283 0.110 0.051 0.010 0.051 0.040 0.925 5.700	RT 年次 年 (3) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2

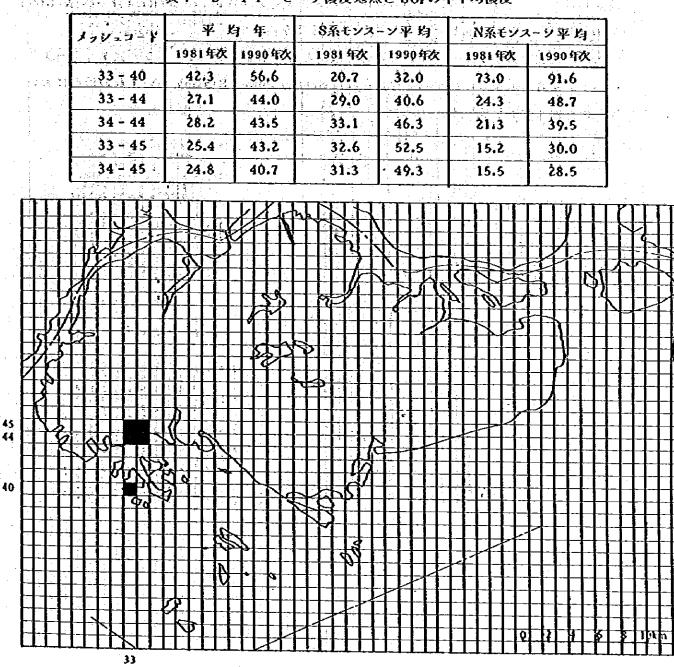
(表¥-2+9) 測定点における主要事業所の寄与濃度(S系モンスーン平均)

表 Y-2-10 創定点における	) 土安 争亲切						
<u></u>		I) N.U.S.		1	) J.T.	C. HALL	<u> </u>
	1981年		0年次			19904	EX
事 業 所 名							
	寄与遗度诗	与非寄与漫剧	日寄与末	奇爭換度	奇与科	奇子後度   /	ፍዓዋ
	(ppb)	(1) (ppb)	(1)	( ppp )	(1)		(3)
TEKONG INTEGRATED STEEL MILL SENCKO POWER STATION			9 0.78	121	45 21	0.130	45.47
I TRANG PAUER STATION	3.073	6.84 1.8	9 26.14 5 10.25	8 848 0 841 0 137	4 37	0.641	2.90
PASIR PANJANG POWER STATION	0.123	0.72 0.14	3 0.69	2 0 137	6.94	6.137	0.62
SERATA POWER STATICH		- 0.24	5 1.37	کستی بر ۲۰ اور در		0.305	
TEXCHS POWER STATION SHELL COMPANIES IN SINGAPORE	0.517	4.17 0.51	2.68	0.173 0.205 0.383 0.216	110	0.173	0.78
ESSO SINGAPORE PIE LTO	1 O 461	3.38 0.46	1 2.68	8.265	3 19	0.605	2.74
SINGAPERE REFINING CO PTE LTO	0.235	2.30 0.28	5 1.57	0.285	2 64	0.385	1.25
- KENAINING FACTORIES	0.328	2.65 0.25	()-1166 a t ba	0.216	1.42	30.196	15 11
	0.364	2.94 0.5	3 2.11	0.232	8.95 1.50	0.329	1.49
PACK GAOLNO	4.300	14.71 5. K	031.77	. 41,300	29.34	5,700	
10īAL	12.357](	22.00 17.94	0100.00	14.853	00.00	22.100	100.00
				in the second			n San ng magina ng mga ng mg
ſ <u> </u>	<u> </u>	(3) S.I.U.		(4) BO	ÓN LA	Y APART	MENT
	19814		0年次			1990	
事業所名	1301	LV 1 133	v+iX	1901	<u>+X</u>	770	<u>, v</u>
	· 寄与漢度	55季寄与後 (i) (ppb) 	其寄与率	帝与强度	寄与奉	奇与误度	寄与率
<u>e a care ferra da la care</u>	Kppb)	(in Kopp)	(3)	(ppb)	(5)	k ppb).	(1)
TEKONG INTEGRATED STEEL MILL		Q.1	0.42			0.114	0.65
Senoko poler station Jukows poler station	6.361	33.54 9.62	2 34.05	A 399	32.06	8.919	3.48
PASIR PANJANG POSER STATION	0.120	0.73 0.12	0 0.43	0.123	i.16	0.123	0.70
SERATA POWER STATION	- I I	- 0.10	0.37		—	0.385	2.20
iency) power station spell companies in sinsapore	0.164 0.665 0.450		18 0.13 14 0.58		1.16	0.037	0.21
ESSO SINGAPORE PTE LTO	0.445	4.03 0.4	\$ 2.36	0.145 0.445 0.27 0.318	4.20	0.445	
SINGAPERE REFINING CO PTE LTO	0.450	2.72 0.4	0 1.57	0.27	2.55	0.20	1.54
I ROBIL OIL SINGAPORE PIE LIQ	0.415	2.51 0.3	51 1.28 14 37.00	9.318	\$ . 55	0.283	
REPAINING FACTORIES	0 220		(A) 1 1	1 1.013	1.07	0.243	1.39
EACK (SOLED	0.270	25.05 5.7	(8 1.31 20.19	0.815 0.175 4.300	40.54	5.700	32.51
TOTAL	18.507	03.00 28.2	26100.00	10.602	100.00	1 :17.534	100.00
			· ·				: <b>*</b>
			IRF ST	6	CHAN	GI AIRPO	RT
		OT TIMAN F		·····			
事業 所 名	1981	年次 199	00年次	1981	年次	1990	年次
事業所名	1981 寄与 <b>漫</b> 度	年次 199 85年春与漢	90年次 夏寄与ま	、1981 寄与 <b></b> )段	年次 寄与ま	1990 寄与 <b>没</b> 度	年次 寄与孝
	1981 寄与 <b>漫</b> 度	年次 199 855丰寄与漫 (s) ( ppb)	90年次 夏寄与寿 (5)	<u>198</u> ] 寄与邊度 (ppb)	年次 寄与本 (5)	19.90 寄与渡度 (ppb)	年次 寄与寿 (9)
TEXCANS INTEGRATED STEEL MILL	1981 寄与遺度 (ppb)	年次 199 855丰寄与漫 (s) ( ppb)	90年次 夏寄与寿 (5)	<u>198</u> ] 寄与邊度 (ppb)	年次 寄与本 (5)	19.90 寄与渡度 (ppb)	年次 寄与幸 (9)
TEXCUS INTEGRATED STEEL MILL SENEXO POLER STATION JUSIONS POLER STATION	1981 寄与 <b>通</b> 度 (ppb)/ 	年次 199 855丰寄与漫 (s) ( ppb)	90年次 夏寄与寿 (5)	<u>198</u> ] 寄与邊度 (ppb)	年次 寄与本 (5)	19.90 寄与渡度 (ppb)	年次 寄与寿 (9)
TEXONS INTEGRATED STEEL MILL SENSKO POLER STATION JAKONS POLER STATION PASIR PRNJEKS POLER STATION	1981 寄与遺度 (ppb)	年次 199 855丰寄与漫 (s) ( ppb)	90年次 夏寄与寿 (5)	<u>198</u> ] 寄与邊度 (ppb)	年次 寄与本 (5)	19.90 寄与渡度 (ppb)	年次 寄与寿 (9)
TEXANS INTEGRATED STEEL MILL SENCKÓ POLER STATION JAXONS POLER STATION PASIR PRNJACK POLER STATION SERRYA POLER STATION SERRYA POLER STATION	1981 寄与遺度 ( ppb )	年次 199 855丰寄与漫 (s) ( ppb)	90年次 夏寄与寿 (5)	<u>198</u> ] 寄与邊度 (ppb)	年次 寄与本 (5)	19.90 寄与渡度 (ppb)	年次 寄与寿 (9)
TEXANS INTEGRATED STEEL MILL SENERG POLER STATION JUCONS POLER STATION FASIR PRNJERS POLER STATION SERATA POLER STATION IEXONS POLER STATION SHELL CORPRISES IN SINSAPORE	1981 寄与遺度 (ppb) 3.944 0.835 0.174	年次 199 855丰寄与漫 (s) ( ppb)	90年次 夏寄与寿 (5)	<u>198</u> ] 寄与邊度 (ppb)	年次 寄与本 (5)	19.90 寄与渡度 (ppb)	年次 寄与寿 (9)
TEXANS INTEGRATED STEEL MILL SENCKÓ POLER STATION JXXINS POLER STATION PASIR PRNJAZÝ PÓLER STATION SERAYA PÓLER STATION TEXANS POLER STATION SKELL CAPARNIES IN SINSAPCRE ESSÓ SINGAFÓRE PIÉ LTO	1981 寄与通度 ( ) jpb )	年次 199 55 年 56 年 50.03 5	90年次 寄 (5) (5) (4) (5) (4) (5) (4) (5) (4) (5) (4) (5) (4) (5) (4) (5) (4) (5) (4) (5) (4) (5) (5) (5) (5) (5) (5) (5) (5	198) 寄与邊度 (ppb) 3,333 3,20 3,20	年次 寿田 11:53	1990 寄与換集 (ppb) 0.21a 0.323 0.323 0.203 0.026 0.026 0.026	年次与7) 2.47
TEXCUS INTEGRATED STEEL MILL SENEKÓ POLEŘ STÁTICN JARONS POLEŘ STÁTICN PASIR PRNJARS POLER STÁTICN SERATA POLER STÁTICN TEXONS POLEŘ STÁTICN SHELL CORPANIES IN SINSAPCRE ESSŐ SINGARCRE PIÉ LTO	1981 寄与遺度 (ppb)) 4.944 0.885 0.174 0.273 0.383 0.242	年次 199 55 年 56 年 50.03 5	90年次 寄 (5) (5) (4) (5) (4) (5) (4) (5) (4) (5) (4) (5) (4) (5) (4) (5) (4) (5) (4) (5) (4) (5) (5) (5) (5) (5) (5) (5) (5	198 寄与邊度 (ppb) 3.23 3.23 3.23 3.23 3.23 3.23 3.23 3.2	年次 与 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	1990 寄与決集 (ppb) 0.218 0.203 0.203 0.203 0.203 0.203 0.203 0.203 0.203	年次 与 (7) (7) (7) (7) (7) (7) (7) (7)
TEXANS INTEGRATED STEEL MILL SENERG PALER STATION JARONS POLER STATION FASIR PROJER STATION SERRYA POWER STATION TEXAND POWER STATION SHELL CORPROJES IN SINGAPORE ESSO SINGAPORE PTE LTD SINGAPORE REFINING CO PTE LTD ROBIL OIL SINGAPORE PTE LTD	1981 寄与遗度 ( ppb ),	年次	90年次 音 寄 与 年 41 0.77 55 47.14 668 4.72 75 2.02 75 2.02 75 2.02 75 2.02 75 2.02 75 2.02 75 2.02 75 1.14 80 2.11 1.3 1.4 80 2.11 1.5 75 2.02 75 3.02 1.4 80 2.02 75 3.02 1.4 80 2.02 1.4 80 2.02 1.4 80 1.4 80 1.4 80 1.4 80 1.4 80 1.4 80 1.4 80	198 寄与邊度 (ppb) 3.23 3.23 3.23 3.23 3.23 3.23 3.23 3.2	年次 与 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	1990 寄与決集 (ppb) 0.218 0.203 0.203 0.203 0.203 0.203 0.203 0.203 0.203	年次 寄与 (3) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4
TEXANS INTEGRATED STEEL MILL SENCKÓ POLER STATION JXXINS POLER STATION PASIR PRNJAVŠ POLER STATION SERAYA POLER STATION IEXONS POLER STATION SKELL CAPARNIES IN SINSAPCRE ESSÓ SINSAPCRE PIÉ LIO SINSAPCRE REFINING CO PIE LIO NOBIL OIL SINSAPCRE PIÉ LIO REFAINING FACIORIES VESSELS	1981 寄与通度 ( ) pb )	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 寄 与 寿 41 0.7 55 47.14 55 47.14 55 47.14 55 47.14 55 47.14 55 47.14 55 47.14 55 47.14 55 47.14 55 1.14 56 1.13 56 1.13 57 5.13 57 5.13 57 5.13 56 1.13 56	198 寄与邊度 (ppb) 3.23 3.23 3.23 3.23 3.23 3.23 3.23 3.2	年次 与 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	1990 寄与決集 (ppb) 0.218 0.203 0.203 0.203 0.203 0.203 0.203 0.203 0.203	年 (7) 2.47 12.3.47 12.3.47 12.3.47 1.3.457 0.47
TEXCANS INTEGRATED STEEL MILL SENERG POLER STATION JARONS POLER STATION FASIR PRIJERS POLER STATION SERATA POWER STATION IEKONS POLER STATION SWELL CORPANIES IN SINGAPORE ESSO SINGAPORE PTE LTO SINGAPORE REFINING CO PTE LTO NOBIL OIL SINGAPORE PTE LTO NOBIL OIL SINGAPORE PTE LTO NOBIL OIL SINGAPORE PTE LTO REFAINING FACTORIES	1981 寄与通度 ( ) pb ),	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 等 与 年 41 0.7 59 47.14 59 47.14 59 47.14 59 47.14 59 47.14 59 47.14 59 47.14 59 47.14 59 47.14 50 75 2.0 50 1.14 50 75 2.0 50 75 50 75 2.0 50 75	198 有与) (ppb) (20,234 (20,244)	年 方 四 11:33 31:40 33 44	1990 与前の2122 第一時の2122 1223 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1235 1255 1255 1255 1255 1255 1255 1255 1255 1255 1255 1255 12555 12555 1255 12555 12555 12555 12555 12555 12555 1	年 次 考 (7) 2.47 12.3 5 2.33 0.47 2.47 12.3 5 2.33 0.5 6 1.1 17 0.5 3 .10 5 4.64
TEXANS INTEGRATED STEEL MILL SENCKÓ POLER STATION JXXINS POLER STATION PASIR PRNJAVŠ POLER STATION SERAYA POLER STATION IEXONS POLER STATION SKELL CAPARNIES IN SINSAPCRE ESSÓ SINSAPCRE PIÉ LIO SINSAPCRE REFINING CO PIE LIO NOBIL OIL SINSAPCRE PIÉ LIO REFAINING FACIORIES VESSELS	1981 寄与通度 ( ) pb )	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 寄 与 寿 41 0.7 55 47.14 55 47.14 55 47.14 55 47.14 55 47.14 55 47.14 55 47.14 55 47.14 55 47.14 55 1.14 55	1981 寄与邊腹 (ppb) 30.323 30.200	年 方 四 11:33 31:40 33 44	1990 与 读 5 ( p · b · 2 · 122) 5 ( p · b · 2 · 122) 6 · 1 · 2 · 3 · 3 · 3 · 3 · 3 · 3 · 3 · 3 · 3	年次 春 (7) 2.47 12.361 2.33 0.47 0.45 1.171 0.45 3.47 5.45 0.
TEXCANS INTEGRATED STEEL MILL SENERG POLER STATION JARONS POLER STATION FASIR PRIJERS POLER STATION SERATA POWER STATION IEKONS POLER STATION SWELL CORPANIES IN SINGAPORE ESSO SINGAPORE PTE LTO SINGAPORE REFINING CO PTE LTO NOBIL OIL SINGAPORE PTE LTO NOBIL OIL SINGAPORE PTE LTO NOBIL OIL SINGAPORE PTE LTO REFAINING FACTORIES	1981 寄与通度 ( ) pb )	年次 199 55 年寄与選 (n) (ppb) - 0.1 50.03 6.6 8.25 0.6 1.26 0.1 - 0.0 1.97 0.2 2.75 0.3 1.76 0.2 2.75 0.3 1.76 0.2 1.04 0.1 2.85 1.1 0.3 5.75 0.3 0.2 0.2 0.2 0.1 0.3 0.3 0.2 0.3 0.2 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	90年次 支 寄与年 (5) 411 0.7 55 47.14 43 0.7 75 2.0 45 0.2 75 2.0 45 0.2 1.3 1.4 45 0.2 1.3 1.4 45 1.3 1.4 45 1.5 1.4 45 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1981 寄与演改 0.233 0.233 0.233 0.233 0.233 0.235 0.235 0.235 0.245 0.165 0.165 0.165 0.064 0.165 0.064 0.165 0.064 0.165 0.064 0.165 0.064 0.165 0.055 0	年 方 四 11:33 31:40 33 44	1990 与前の2122 第一時の2122 1223 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1235 1255 1255 1255 1255 1255 1255 1255 1255 1255 1255 1255 12555 12555 1255 12555 12555 12555 12555 12555 12555 1	年次 春 (7) 2.47 12.361 2.33 0.47 0.45 1.171 0.45 3.47 5.45 0.
TEXCANS INTEGRATED STEEL MILL SENERG POLER STATION JARONS POLER STATION FASIR PRIJERS POLER STATION SERATA POWER STATION IEKONS POLER STATION SWELL CORPANIES IN SINGAPORE ESSO SINGAPORE PTE LTO SINGAPORE REFINING CO PTE LTO NOBIL OIL SINGAPORE PTE LTO NOBIL OIL SINGAPORE PTE LTO NOBIL OIL SINGAPORE PTE LTO REFAINING FACTORIES	1981 寄与通度 ( ) pb )	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 支 寄与年 (5) 411 0.7 55 47.14 43 0.7 75 2.0 45 0.2 75 2.0 45 0.2 1.3 1.4 45 0.2 1.3 1.4 45 1.3 1.4 45 1.5 1.4 45 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1981 寄与演改 0.233 0.233 0.233 0.233 0.233 0.235 0.235 0.235 0.245 0.165 0.165 0.165 0.064 0.165 0.064 0.165 0.064 0.165 0.064 0.165 0.064 0.165 0.055 0	年 方 四 11:33 31:40 33 44	1990 与前の2122 第一時の2122 1223 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1235 1255 1255 1255 1255 1255 1255 1255 1255 1255 1255 1255 12555 12555 1255 12555 12555 12555 12555 12555 12555 1	年次 寄(7) 2.47 12.65 2.33 2.35 2.35 2.35 2.35 2.35 2.35 2.3
TEXCANS INTEGRATED STEEL MILL SENERG POLER STATION JURING POLER STATION FASIR PRUSERS POLER STATION SERATA POWER STATION TEXONG POLE STATION SWELL CORPANIES IN SINGAPORE ESSO SINGAPORE PTE LTO SINGAPORE REFINING CO PTE LTO NOGIL OIL SINGAPORE PTE LTO	1981 寄与通度 ( ) pb )	年次 55年 55年 55年 55年 55年 55年 55年 5	90年次 夏 寄与末 (3) (3) (4) (0.7) (5) (4) (0.7) (5) (4) (4) (5) (7) (4) (5) (7) (4) (5) (7) (4) (5) (7) (4) (5) (7) (7) (7) (7) (7) (7) (7) (7	198 有与決決 (ppb) (20,733 (2	年 方 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	1990 与前の2122 第一時の2122 1223 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1235 1255 1255 1255 1255 1255 1255 1255 1255 1255 1255 1255 12555 12555 1255 12555 12555 12555 12555 12555 12555 1	年次 寄(7) 2.47 12.65 2.33 2.35 2.35 2.35 2.35 2.35 2.35 2.3
TEXCANS INTEGRATED STEEL MILL SENERG POLER STATION JARONS POLER STATION FASIR PRIJERS POLER STATION SERATA POWER STATION IEKONS POLER STATION SWELL CORPANIES IN SINGAPORE ESSO SINGAPORE PTE LTO SINGAPORE REFINING CO PTE LTO NOBIL OIL SINGAPORE PTE LTO NOBIL OIL SINGAPORE PTE LTO NOBIL OIL SINGAPORE PTE LTO REFAINING FACTORIES	1981 寄与遺度 ( pbb),	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 支 寄与末 (1) 0.7 59 47.14 68 4.1 0.7 59 47.14 68 4.2 75 2.0 44 50 2.1 1.4 80 2.1 1.4 80 2.1 1.4 80 2.1 1.4 80 2.1 1.4 80 2.1 1.4 80 2.1 1.4 80 2.1 80 2.	198 有与決決 (Ppb) (20,323 (2	年 方 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	1990 与前の2122 第一時の2122 1223 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1235 1255 1255 1255 1255 1255 1255 1255 1255 1255	年次 寄(7) 2.47 12.65 2.33 2.35 0.76 3.47 0.65 1.17 0.65 3.47 5.45 5.45 6.4.64
TEXCANS INTEGRATED STEEL MILL SENERG POLER STATION JURING POLER STATION FASIR PRUSERS POLER STATION SERATA POWER STATION TEXONG POLER STATION SWELL CORPANIES IN SINGAPORE ESSO SINGAPORE PTE LTO SINGAPORE REFINING CO PTE LTO NOGIL OIL SINGAPORE PTE LTO	1981       寄与遺度       (pbb)       -       0.848       0.174       -       0.242       0.144       0.359       0.147       4.309       13.5771       1981       寄与遺度	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 第55 年 411 0.7 55 47.14 47.14 10.7 55 47.14 47.14 10.7 55 47.14 47.14 1.3 1.4 1.3 1.4 1.3 1.4 1.1 1.4 1.4	1981 有与读度 5,533 6,255 6,255 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,5577 7,5577 7,5577 7,55777 7,557777 7,5577777777	年 寄 (11) 11 11 11 11 11 11 11 11 11 11 11 11	1990 与前の2122 第一時の2122 1223 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1235 1255 1255 1255 1255 1255 1255 1255 1255 1255	年次 年(1) 2.61 2.61 12.65 2.33 2.33 2.55 1.17 0.54 1.17 64.6 54.6
TENCING INTEGRATEO STEEL MILL SENERG POLER STATION JARONG POLER STATION FASIR FRANCES POLER STATION SERRYA POWER STATION IEKONG POLER STATION SHELL CONFRANCE NI SINGSPORE ESSO SINGAPCRE PTE LTO SINGAPCRE REFINING CO PTE LTO POSIL OIL SINGAPCRE PTE LTO POSIC SOURD TOTAL	1981 寄与遺度 ( pbb),	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 第55 年 411 0.7 55 47.14 47.14 10.7 55 47.14 47.14 10.7 55 47.14 47.14 1.3 1.4 1.3 1.4 1.3 1.4 1.1 1.4 1.4	1981 有与读度 5,533 6,255 6,255 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,5577 7,5577 7,5577 7,55777 7,557777 7,5577777777	年 寄 (11) 11 11 11 11 11 11 11 11 11 11 11 11	1990 与前の2122 第一時の2122 1223 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1235 1255 1255 1255 1255 1255 1255 1255 1255 1255	年次 年(1) 2.61 2.61 12.65 2.33 2.33 2.55 1.17 0.54 1.17 64.6 54.6
TEXCANS INTEGRATED STEEL MILL SENERG POLEA STATION JACONS POLEA STATION FASIR PRAJACKS POLEA STATION SERRYA POLEA STATION SERRYA POLEA STATION SHELL CONFAMILES IN SINGSPORE ESSO SINGRYCRE PIE LID SINGRYCRE REFINING CO PIE LID ROBIL OIL SINGRYCRE PIE LID ROBIL S	1981       寄与遺度       (ppb),       6,273       0,383       0,174	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 第55 年 411 0.7 55 47.14 47.14 10.7 55 47.14 47.14 10.7 55 47.14 47.14 1.3 1.4 1.3 1.4 1.3 1.4 1.1 1.4 1.4	1981 有与读度 5,533 6,255 6,255 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,556 7,5577 7,5577 7,5577 7,55777 7,557777 7,5577777777	年 寄 (11) 11 11 11 11 11 11 11 11 11 11 11 11	1990 与前の2122 第一時の2122 1223 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1233 1235 1255 1255 1255 1255 1255 1255 1255 1255 1255	年 (5) 2.61 2.61 12.64 12.65 2.33 2.33 2.65 1.1.76 4.6 54.6
TEXCANS INTEGRATED STEEL MILL SENERG POLER STATION JAKING POLER STATION FASIR FRANCES POLER STATION SERATA POWER STATION IEKONG POLER STATION SWELL CORPANIES IN SINGAPORE ESSO SINGAPORE PTE LTO SINGAPORE REFINING CO PTE LTO NOBIL OIL SINGAPORE PTE LTO SINGAPORE ASSAULTS 	1981         寄与遺度         (µpb),         4.944         0.855         0.174	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 第5年 41 0.7 55 47.14 41 0.7 55 47.14 40.9 57 47.14 45 0.2 45 0.2 45 0.2 45 0.2 45 0.2 51 47.14 40.9 51 1.3 50 50 47.14 40.9 51 1.3 51 1.0 51 1.0	1981 寄与设 (PPb) (20325 (20325) (20355)	年 方 () 11:53 () 11:5	1990 寄中約 0.218 0.208 0.112 0.208 0.100 0.208 0.100 0.208 0.100 0.208 0.100 0.208 0.008 0.208 0.008 0.	年 (5) 2.61 2.61 12.64 12.65 2.33 2.33 2.65 1.1.76 4.6 54.6
TEXENS INTEGRATED STEEL MILL SENSIG POLER STATION JUSIONS POLER STATION FASIR PRIJERS POLER STATION SERATA POLER STATION IEXONS POLER STATION SHELL COPRIMES IN SINGEPORE ESSO SINGRFORE PTE LTO SINGRFORE REFINING CO PTE LTO POSIL OIL SINGRFORE PTE LTO POSIL OF POSICE STATION PASIR PONICS POSER STATION PASIR PONICS POSER STATION PASIR PONICS POSER STATION	1981         寄与遺度         (ppb),         6.944         0.838         0.174         0.243         0.174         0.243         0.144         0.359         0.144         0.359         0.147         4.300         13.5771         7) BED         1981         寄与邊度         (ppb),         0.768         0.8645         0.2645	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 第5年 41 0.7 55 47.14 41 0.7 55 47.14 40.9 57 47.14 45 0.2 45 0.2 45 0.2 45 0.2 45 0.2 51 47.14 40.9 51 1.3 50 50 47.14 40.9 51 1.3 51 1.0 51 1.0	1981 寄与设 (PPb) (20325 (20325) (20355)	年 方 () 11:53 () 11:5	1990 寄中約 0.218 0.208 0.112 0.208 0.100 0.208 0.100 0.208 0.100 0.208 0.008 0.208 0.008 0.	年 (F) 2.61 2.61 12.32 2.33 2.33 2.65 1.17 64.6 3.16 54.6
TEXCANS INTEGRATED STEEL MILL SENERG POLER STATION JAKONS POLER STATION FASIR PRAJEKS POKER STATION SERATA POWER STATION IEKONS POLE STATION SWELL CORPANIES IN SINGSPORE ESSO SINGRFORE PTE LTO SINGSPORE REFINING CO PTE LTO NOSIL OIL SINGRFORE PTE LTO NOSIL SINGRFORE PTE LTO N	1981 寄与通度 (ppb), 4.944 0.855 0.174 	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 第5年 41 0.7 55 47.14 41 0.7 55 47.14 40.9 57 47.14 45 0.2 45 0.2 45 0.2 45 0.2 45 0.2 51 47.14 40.9 51 1.3 50 50 47.14 40.9 51 1.3 51 1.0 51 1.0	1981 寄与) 35 50 50 50 50 50 50 50 50 50 5	年 方 () 11:53 () 11:5	1990 寄中約 0.218 0.208 0.112 0.208 0.100 0.208 0.100 0.208 0.100 0.208 0.008 0.208 0.008 0.	年 高 (1) 2.6633(67)1766(1) 64.6633(64) 64.664
TEXENS INTEGRATED STEEL MILL         SENERG PEALER STATION         JXENS POLER STATION         PASIR PRIVIES POLER STATION         FASIR PRIVIES POLER STATION         SERATA POWER STATION         IEKONS POLER STATION         SHELL CORPRISES IN SINGSPORE         ESSO SINGSPORE PTE LTO         SINGSPORE REFINING CO PTE LTO         POSIL OIL SINGSPORE PTE LTO         PASH OIL SINGSPORE PTE LTO         SINGSPORE REFINING CO PTE LTO         POSIL OIL SINGSPORE PTE LTO         SINGSPORE REFINING CO PTE LTO         POSIL OIL SINGSPORE PTE LTO         POSIL OIL SINGSPORE PTE LTO         POSELS         VESSELS         BACK GOUND         TOTAL         TOTAL	1981 寄与通度 (ppb), 4.944 0.855 0.174 	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 第5年 41 0.7 55 47.14 41 0.7 55 47.14 40.9 57 47.14 45 0.2 45 0.2 45 0.2 45 0.2 45 0.2 51 47.14 40.9 51 1.3 50 50 47.14 40.9 51 1.3 51 1.0 51 1.0	1981 寄与) 35 50 50 50 50 50 50 50 50 50 5	年 方 () 11:53 () 11:5	1990 寄中約 0.218 0.208 0.112 0.208 0.100 0.208 0.100 0.208 0.100 0.208 0.008 0.208 0.008 0.	年 (F) 2.61 2.61 12.32 2.33 2.33 2.65 1.17 64.6 3.16 54.6
TEXCANS INTEGRATED STEEL MILL         SENERG POLER STATION         JXCONS POLER STATION         FASIR PRUJERS POLER STATION         SERATA POWER STATION         IEKONS POLER STATION         SEELL CONFRIES IN SINGAPORE         ESSO SINGAPORE PIE LTD         SINGAPORE FEFINING CO PIE LTD         POSIL OIL SINGAPORE PIE LTD         POSIL POLICAL         TOIA         TOIA         TOIA         TOIA         POSIL PONJANG POWER SIATION         PASIR PONJANG POWER SIATION         SERATA POWER SIATION         SERATA POWER SIATION         SERATA POWER SIATION	1981 寄与通度 (ppb), 4.944 0.855 0.174 	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 第5年 41 0.7 55 47.14 41 0.7 55 47.14 40.9 57 47.14 45 0.2 45 0.2 45 0.2 45 0.2 45 0.2 51 47.14 40.9 51 1.3 50 50 47.14 40.9 51 1.3 51 1.0 51 1.0	1981 寄与) 35 50 50 50 50 50 50 50 50 50 5	年 方 () 11:53 () 11:5	1990 寄中約 0.218 0.208 0.112 0.208 0.100 0.208 0.100 0.208 0.100 0.208 0.008 0.208 0.008 0.	年 (5) 2.61 2.61 12.64 12.65 2.33 2.33 2.65 1.1.76 4.6 54.6
TEXCANS INTEGRATED STEEL MILL SENERG PRALE STATION JACONS POLEA STATION PASIR PRAJACKS POKER STATION FASIR PRAJACKS POKER STATION SERATA POWER STATION IEXONS POLEA STATION SHELL CORPANIES IN SINGSPORE ESSO SINGRFORE PIE LID SINGSPORE STEINING CO PIE LID NOSIL OIL SINGRFORE STATION FASIR POWER STATION FASIR PRAJANS POWER STATION FASIR PRAJANS POWER STATION FASIR PRAJANS POWER STATION SEATA POWER STATION SEATA POWER STATION SELL COMPANIES IN SINGRFORE ESSO SINGRFORE PIE LID SINGRFORE FIE LID SINGRFORE FIE LID	1981 寄与通度 (ppb), 4.944 0.855 0.174 	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 第5年 41 0.7 55 47.14 41 0.7 55 47.14 40.9 57 47.14 45 0.2 45 0.2 45 0.2 45 0.2 45 0.2 51 47.14 40.9 51 1.3 50 50 47.14 40.9 51 1.3 51 1.0 51 1.0	1981 寄与) 35 50 50 50 50 50 50 50 50 50 5	年 方 () 11:53 () 11:5	1990 寄中約 0.218 0.208 0.112 0.208 0.100 0.208 0.100 0.208 0.100 0.208 0.008 0.208 0.008 0.	年 (5) 2.61 2.61 12.64 12.65 2.33 2.33 2.65 1.1.76 4.6 54.6
TENCING INTEGRATED STEEL MILL         SENERG POLER STATION         JXCNG POLER STATION         PASIR PRIVIENT POWER STATION         FASIR PRIVIENT POWER STATION         SERRYA POWER STATION         IEKONG POWER STATION         IEKONG POWER STATION         SHELL CONFRIES IN SINGAPORE         ESSO SINGAPORE PTE LTO         SINGAPORE REFINING CO PTE LTO         POBLE OIL SINGAPORE PTE LTO         POBLE OIL SINGAPORE PTE LTO         POBLE OIL SINGAPORE PTE LTO         POBLE OSUBO         BROK GOURD         TOTAL         PASIR PRIVING POWER STATION         SERGAR POWER STATION	1981 寄与通度 (ppb), (ppb), (ppb), (vpb), (vpb), (v), (v), (v), (v), (v), (v), (v), (	年次 5 5 5 5 5 5 5 5 5 5 5 5 5	90年次 第5年 41 0.7 55 47.14 41 0.7 55 47.14 40.9 57 47.14 45 0.2 45 0.2 45 0.2 45 0.2 45 0.2 51 47.14 40.9 51 1.3 50 50 47.14 40.9 51 1.3 51 1.0 51 1.0	1981 寄与) 35 50 50 50 50 50 50 50 50 50 5	年 方 () 11:53 () 11:5	1990 寄中約 0.218 0.208 0.112 0.208 0.100 0.208 0.100 0.208 0.100 0.208 0.008 0.208 0.	年次 年(1) 2.61 2.61 12.65 2.33 2.33 2.55 1.17 0.54 1.17 64.6 54.6
TEXCANS INTEGRATEO STEEL MILL           SENERG PRAVIEWS POWER STATION           JACONS POWER STATION           FASIR PRAVIEWS POWER STATION           SERRYA POWER STATION           SHELL COMPANIES IN SINGSPORE           ESSO SINGSPORE PIÈ LIO           SINGSPORE REFINING CO PIÈ LIO           NOBIL OIL SINGSPORE PIÈ LIO           VESSELS           VESSELS           VESSELS           TOTAL           PACK GLORES           TOTAL	1981 寄与通度 《 ppb》 《 ppb》 《 4.944 0.845 0.174 0.273 0.353 0.242 0.144 0.359 0.147 4.300 13.579 0.147 4.300 13.579 0.147 4.300 13.579 0.147 4.300 13.579 0.147 6.255 0.245 0.255 0.245 0.255	年次 199 年次 199 55 年春 55 年春 50 03 50 000	10年次 年次 年次 年次 年 (10,775 563 47,14 556 47,14 556 47,14 556 47,14 556 47,15 567 47,14 55 57,47,14 55,07 55 50,07 55 50,07 50,0	1981 与 pp) 35 35 35 35 35 35 35 35 35 35 35 35 35	年 方 () 11:53 () 11:5	1990 寄中約 0.218 0.208 0.112 0.208 0.100 0.208 0.100 0.208 0.100 0.208 0.008 0.208 0.	年次 年(1) 2.61 2.61 12.65 2.33 2.33 2.55 1.17 0.54 1.17 64.6 54.6
TEXCANS INTEGRATEO STEEL MILL           SENERG PRAVIEWS POWER STATION           JACONS POWER STATION           FASIR PRAVIEWS POWER STATION           SERRYA POWER STATION           SHELL COMPANIES IN SINGSPORE           ESSO SINGSPORE PIÈ LIO           SINGSPORE REFINING CO PIÈ LIO           NOBIL OIL SINGSPORE PIÈ LIO           VESSELS           VESSELS           VESSELS           TOTAL           PACK GLORES           TOTAL	1981         寄与遺度         (µpb)         &.944         0.855         0.174         0.242         0.174         0.253         0.242         0.144         0.359         0.144         0.357         13.3771         13.3771         1981         寄与邊度         (pb)         0.445         0.359         0.444         0.359         0.147         4.302         13.3771         855         0.196         0.7889         0.845         0.263         0.196         0.196         0.196         0.196         0.196         0.109         0.109         0.109         0.109         0.109         0.109         0.109	年次 与年 (1) 50.03 50	0年次 年次 年次 年 5 5 5 5 5 5 5 5 5 5 5 5 5	1980 与 中 5,335 5,355 5,5555 5,5555 5,5555 5,5555 5,5555 5,5555 5,5555 5,5555 5,5555 5,5555 5,55555 5,55555 5,55555 5,555555	年 方 () 11:53 () 11:5	1990 寄中約 0.218 0.208 0.112 0.208 0.100 0.208 0.100 0.208 0.100 0.208 0.008 0.208 0.	年 次 年 (2.471 12.65 2.33 2.35 2.35 2.35 2.35 2.35 2.35 2.3
TENCING INTEGRATED STEEL MILL         SENERG POLER STATION         JXCNG POLER STATION         PASIR PRIVIENT POWER STATION         FASIR PRIVIENT POWER STATION         SERRYA POWER STATION         IEKONG POWER STATION         IEKONG POWER STATION         SHELL CONFRIES IN SINGAPORE         ESSO SINGAPORE PTE LTO         SINGAPORE REFINING CO PTE LTO         POBLE OIL SINGAPORE PTE LTO         POBLE OIL SINGAPORE PTE LTO         POBLE OIL SINGAPORE PTE LTO         POBLE OSUBO         BROK GOURD         TOTAL         PASIR PRIVING POWER STATION         SERGAR POWER STATION	1981         寄与遺度         (µpb)         &.944         0.855         0.174         0.242         0.174         0.253         0.242         0.144         0.359         0.144         0.357         13.3771         13.3771         1981         寄与邊度         (pb)         0.445         0.359         0.444         0.359         0.147         4.302         13.3771         855         0.196         0.7889         0.845         0.263         0.196         0.196         0.196         0.196         0.196         0.109         0.109         0.109         0.109         0.109         0.109         0.109	年次 与中 (1) - 0.1 50.03 5.74 5.7	10年次 年次 年次 年次 年 (10,775 563 47,14 556 47,14 556 47,14 556 47,14 556 47,15 567 47,14 55 57,47,14 55,07 55 50,07 55 50,07 50,0	1980 与 中 5,335 5,355 5,5555 5,5555 5,5555 5,5555 5,5555 5,5555 5,5555 5,5555 5,5555 5,5555 5,55555 5,55555 5,55555 5,555555	年 方 () 11:53 () 11:5	1990 寄中約 0.218 0.208 0.112 0.208 0.100 0.208 0.100 0.208 0.100 0.208 0.008 0.208 0.	年次 年(1) 2.61 2.61 12.65 2.33 2.33 2.55 1.17 0.54 1.17 64.6 54.6

表 ¥-2-10 創定点における主要事業所の寄与農度(N系モンスーン平均)

(2) ビーク濃度地点における寄与率

ビーク農度地点として、計算メラシュ点のうち、年平均農度の最も高い地点を、シンガボ ール本島より4地点、その他の島より1地点選び、その地点における寄与率を求めた。選出 した5地点は表¥=2-11及び図¥=2-8に示すとおりである。



化氟化氨基苯酚乙基 化 →→ 素 Y→2-11 ビーク濃度地点と \$0,の年平均濃度

図¥-2-8 寄与率を求めたビーク濃度地点

Y -- 71

表 Y - 2 - 1 2 ~ 表 Y - 2 - 1 4 は, 年間及び S 系モシスーン・N 系モンスーンにおける 寄与費度と寄与率を示したものであり, 各事業所のうち, 寄与費度の高い上位 1 0 社が記載 されている。 1990年の年平均値が最も高い 3 3 - 4 0 のメッシュでは ESSO Singapore Private Limited の寄与がとびぬけて大きく 15.749 ppb; 27.8 %の寄与率を占めている。 こ れは, 同社の低い煙突の影響によるものと考えられる。シンガポール本島におけるビーク 農 度 塩点 は 3 3 - 4 4 であり, この 地点に対する寄与費度の第 1 位 it National IRON & Steel Mills LTD. の 7.1 6 7 ppb であり寄与率は 1 6.3 %を占めている。

次に,主要事業所10社についての寄与濃度と寄与率を表 V-2-15~表 V-2−17 に示す。これによると、 顔定点の場合と同様 Seneko Power Station がいずれの地点におい ても高い濃度を示している。

表 Y - 2 - 15	高濃度地点における	る主要事業所の寄り	; 覆度(年半均)	

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	1112=	<b>7</b> ∰	33 - 40		ノッショ	コード	33 - 44	
事業所名	1981	FX	19904	X	1981	年次	1990	华众
	省与演度者	HAR	与黄度	858	寄与溃度	寄与春	寄与遗度	854
	(ppb)	(a)   (a)	ppb)	(B)	(ppb)	(*)	(ppb)	(1)
TEXANS INTEGRATED STEEL MILL SENCIÓ PONER STATION JURCHIS PONER STATION			0.166	9.25	1.00		0.170	
JURONS POWER STATION	2.816	6.66	5.935	10.45	0.135	8.04 0.50	3.652 0.135	
PASIR PONUMIC POVER STATICH	Q.587	1.39	0.554	ા.૦ય	1.235	4.56		2.81
ASIR PRAURAG POWER STATION SERAYA POWER STATION TEXONG POWER STATION SHELL COMPANIES IN SINGAPORE ESSA SINGAPORE PIE LTO SINGAPORE REFINING CO PIE LTO MORIL OLL SINGAPORE PIE LTO	- <u>-</u>		- 0.051	0.14			0.330	0.77
SHELL COMPANIES IN SINSAPORE	1.286	3,04	1.286	2.27	1.662	5.13	0.052	3.78
SINGAPORE REFINING CO PIE LID	2.272	5.37	2.272	4.01	2,405	20,17	2.405	12.43
MOBIL OIL SINGAPORE PIE LIQ,	· 0.654	1.55	0.571	1.01	- 2.405 0.633 6.927 2.156	2.34	0.501	1.14
REARINING FACTORIES VESSELS	4.782	9.30	4.915	8.68 10.07	2.156	7.96	2.640	44.96
EACK GROUND	4.3000	10.18		10.04			3.700	12.96
	42.3171	<u>w.u</u>	56.627	<u></u>	21.075	100.00	43.760	103.00
<b></b>			· · · · · · · · · · · · · · · · · · ·		i	_ <u>_</u>		
			34 - 4				33 - 4	5
A DITOL 事業所名 Breaker 1	19814		1990	年次	1981		1990	
	寄与改变 (ppb)	<b>客与</b> 本	寄与决议	寄与奉	寄与设度	寄与率	寄与漫度	寄与军
and the second	(ppb)	(%)	(opb)	(1)	(ppb)	(3)	(ppb)	(%)
I - IEKOW INIESCHIED SIEEL HILL	2.945		0.173	0.44	1.621	6.35	0.17	K 0.351
SEVERO POLER STATION JULION POLER STATION	0.104	0.37	0.104	0.24	6 6 6 1 1 2	0.46	- 0.117	1 0.2
PASIR PANJANO POJER STATION	1.254	4.44	1.254 0.253	2.65	1.227	4.84	0.43	2.64
seraya power station Texové power station		<u> </u>	0.653	0.12			0.653	1 0.12
SHELL COMPANIES IN SINGAPORE	1.727	6.12	1.727	3.97	1.575	6.27	1.595	3.65
SHELL COMPANIES IN SINGAPORE ESSO SINGAPORE PIE LTD SINGAPORE REFINING CO PIE LTD	5.672 4.146 0.550	14,66	4.145	).53  .03	1.91	2.55	1.91	4.4.4
ROBIL OIL SINGSPORE FIE LID.	0.550 5.350	1.95	0.471	50.1	1.11	28.55	1.1.0%	2.33
LAND VESSES AND	2.11.2	2.14	2.995	6.87	1.81	7.16	2.47	\$ 77
BACK CAQUED	23.2411	15.23	5.700	13.11		N 16.95		<u>) 13,19</u> \$100.00
							<u>1</u>	
f					1			
		-	34 - 4					
事象所名	1981		1990					:
	寄与遗废	寄与末	省与决策	寄与奉				-
1	(ppb)	(1)	(opb)	(7)				
texençîntegrated steel mill Senokê pêrêr statiên Jurêng pêrêr statiên	2.213	8.94	0.174	0.43		1.1	. · · · ·	
JURONG POWER STATION	2.213 0.101	0.41	0.101	1 0.25		1	Na sa sa sa sa Na	
FRAIN PRUSING POPER STREED	1.247	5.04	1,247		1			
SERAYA POWER STATION TEXANG POWER STATION		÷	0.054	0.13	5			
SHELL COMPANIES IN SINGAPORE ESSO SINGAPORE PIE LTD	3 1.651 4.431	6,67 12.90	1.651	1 10.33		•		
I SINGAPORE REFINING CO PTE LTD	2.394	11.70	i 2.376	8.7.12	1			
I WALLALL SINCOADE OTE ITA	0.625	2.52	6 0.544	9 - 1.444	<b>4</b>		÷	
++ REFAILING FACTORIES +4	1.734	7.00	2.50	49.58 4.14	<b>1</b> : .	:		
BACK 6KOLAD	a a b b b b			ملد مد ال				
**************************************	24.53	12.37		<u>) 14.01</u> 7200.00				

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		17423-133-40			170 3 - 1 33 - 44			4	
事業所名		1981			年次	- 1981		1990	
9 未 73 名		寄与漢度 (ppb)	寄与年 (2)	寄与 <u>過</u> 度 (ppb)	寄与本 (1)	寄与演变 (ppb)	寄与率 (5)	寄与 <b>溃</b> 度 (ppb)	寄与丰 (3)
TEXANG INTEGRATED STEEL MILL SENARA POWER STATION JURAND POWER STATION PASIR PANJANG POWER STATION SERATA POWER STATION TEXAND POWER STATION TEXAND POWER STATION SHELL COMPANIES IN SINGAPORE ESSO SINGAPORE FTE LTO SINGAPORE REFINING CO PTE LTO MOBIL OIL SINGAPORE PTE LTO - REMAINING FACTORIES			4.09 10,10 18.89 4.34 2.06 15.18	0.427 0.844 0.092 0.062 2.066 3.900 0.897 0.376 11.254	3.47 1.34 2.64 0.19 6.53 12.20 1.18 35.20	0.836 0.133 2.024 2.741 8.738 3.916 0.285 2.896	0.44 8.97 9.44 30.07 13.49 9.55	0,133 2,024 0,540 0,043 2,741 8,738 3,914 0,249 10,824	0.51 2.44 0.33 4.99 1.33 0.16 6.76 21.55 9.61 26.67 26.61 26.61
VESSELS	ء : <del>ارب :</del>		18.93	5.700	15.69	4:300	14.81	5.200	14.0

表 Y - 2 - 16 高濃度地点における主要事業所の寄与濃度(S 系モンスーン平均)

	190	<u>, -  </u> -	* 34 - 44		191	1-1-1	33 - 4	5
<b>唐 • 元</b> 夕	1981	介衣	19905	Ŧ次	1981	年次	1990	年次
事業所名	寄与演变 (ppb)	寄与本 (4)	寄与读度; (ppb)	寄与率 (3)	寄与 <b>没</b> 致 ( pob)		寄与渡疫 5×16(194)	寄与率 (1)
TEXXXX INTEGRATED STEEL MILL SENCKO POLER STATION	0.655	2.01	0.213	0.46		<pre>{1.7</pre>	0.209	
jurgas poler station Pastr Panjans poler station	0.122	0.37	0.122	0.25	0.136	0.42	0.135	0.26
SERAYA POVER STATION TEXONG POVER STATION		-	0.395	0.85			Ò. 671	1.31
sizll coppanies in singapore esso singapore pie lio		27:17	9.000	17.42	5.987	21.4	6.937	5.01 13.30
Singaporé refining co piè lio nosil oil singrore pie lio	0.338	17.75	0.314	0.50	1:345	4.14	1.250	2.38
REFAINING FACTORIES	3 377	11.69	4.639	10.12	2.3.0	3.6		2.57
EACK GAOLAN	4.300	12.98				13.2		10.65

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	1,1	コード	34 - 4	5	
事業所名	198	1年次	1990	)年次	
ም ኤ ጣ ብ	寄与渡度 (ppb)。	寄与率 (4)	寄与没变 ( ppb)	寄与率	
TEXENS INTEGRATED STEEL MILL		÷	0.214	0.43	
SENCKO POWER STATION	0.61				
JURGER POVER STATION	0.12				
PASIR PANJANG POSER STATION	2.04	3 6.53			1917 212 41
SERAYA POVER STATION			1.879		
TEXONG POLER STATION		5.71	0.065		
SHELL COMPANIES IN SINGAPORE	2.72				
ESSO SINGRE PIE LTO	7.00			114.50	
SINGAPORE REFINING CO PIE LID	4.55	9 14,57	1 4.55	{ Ý.2:	
hebil oil singepere pie lid	0.704	2 2.24	0.621	11.2	
REFAINING FACTORIES	8.47	8 20 70	1 18.341	35.4	
VESSELS	2.74	1 8128	3.9	1 3.0	1
BACK 6501AD	4.300	0 13.74			
101AL	31.28	91W.X		200.00	

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	1.70	17-1	33 - 4	0	190	17-1	33 - 4	4
事亲所名	1981	年次	1990	年次	1981	年次	1990	年次
T X 01 13	寄与满度	寄与奉	寄与遗度	寄与赛	寄与遗度	寄ち書	寄与波度	寄与本
	(ppb)	(¥)	(ppb)	(3)	(opb)	(3)	(ppb)	(3)
TEXANS INTEGRATED STEEL MILL		سنة	0.112			· • • •	0.115	0.23
sénokó pojer strtion Jurons pojer strtion	5.774					17.92		
PASIR PANJANG POJER STATION	0.223							
serava power station		—	0.050	0.07			0.651	0.10
texand power station Shell companies in singapore	0.153		0.035				0.035	
ESSO SINGAPORE PIE LTD	32.542							
SINGAPORE REFINING CO PTE LTD	4.222	5,78	4.222	4.61	0.263			
HOBIL OIL SINGAPORE PTE LIQ REMAINING FACTORIES	2.117							
	3.975					51.94		
BACK 650120	4,300	5.89	3.700	6.22	4.300	17.65	5.70	11.65
101AL	73.022	100.00	91.567	100.00	24.345	100.00	48.774	100.0

表 ¥-2-17 高温度地点における主要事業所の寄与濃度(N系モンスーン平均)

	1.14	1-1-	¥ 34 - 4	4	メッシュ	コード	33 - 4	5
事業所名	1981	年次	1990	年次	1981	年次	1990	年次
	寄与過度 (ppb)	寄与非 (5)	寄与決定 (ppb)		寄与 <b>进</b> 度 (ppb)	寄与率 (3)	寄与 <u>決</u> 度 (ppb).	寄与幸 (3)
IEKONG INTEGRATED STEEL MILL SENGKO POLER STATION JARONG POLER STATION PASIR POLICIC POLER STATION SERATA POLER STATION IEKONG POLER STATION IEKONG POLER STATION SIELL COMPANIES IN SINGAPORE ESSO SINGAPORE PTE LTO SINGAPORE REFINING CO PTE LTO NOBIL OIL SINGAPORE PTE LTO NOBIL OIL SINGAPORE PTE LTO REPAINING FACTORIES VESSELS PACK SKIEND	0.079 0.121 0.137 0.957 0.749 0.850 7.850 0.437 4.300	0.57 	0.079 0.121 0.048 0.057 0.137 0.137 0.957 0.393 0.393 20.894 0.594	23.67 0.20 0.31 0.12 0.35 2.42 1.90 1.76 52.93 1.51 14.44	3.130 0.670 0.117 	0.77 	0.115 6.312 0.092 0.117 0.057 0.057 0.057 0.757 0.737 0.737 0.211 0.4553 15.415 0.371	21.02 0.30 0.37 0.17 0.12 0.42 2.52 0.70

•	1,10	1-1-1	34 - 4	5		
事業所名	1981	年次	1990年次			
	寄与法度 (ppb)		寄与浅度 (ppb),	寄与 <b>孝</b> (3)		
TEKONG INTEGRATED STEEL HILL SENOKO POWER STATION JURONG POWER STATION PASIR PANJANG POWER STATION SERATA POWER STATION TEKONG POWER STATION SHELL COMPANIES IN SINGAPORE ESSO, SINGAPORE PTE LTD SINGAPORE REFINING CO PTE LTD MOBIL OIL SINGAPORE PTE LTD	0.305	0.46 0.77 0.85 5.09 3.43 3.33 27.42	0.971 0.120 0.655 0.037 0.131 0.759 0.537 0.437 12.347 0.10	28.76 0.25 0.30 0.30 0.45 2.77 1.54 43.37		
TOTAL		100.00				

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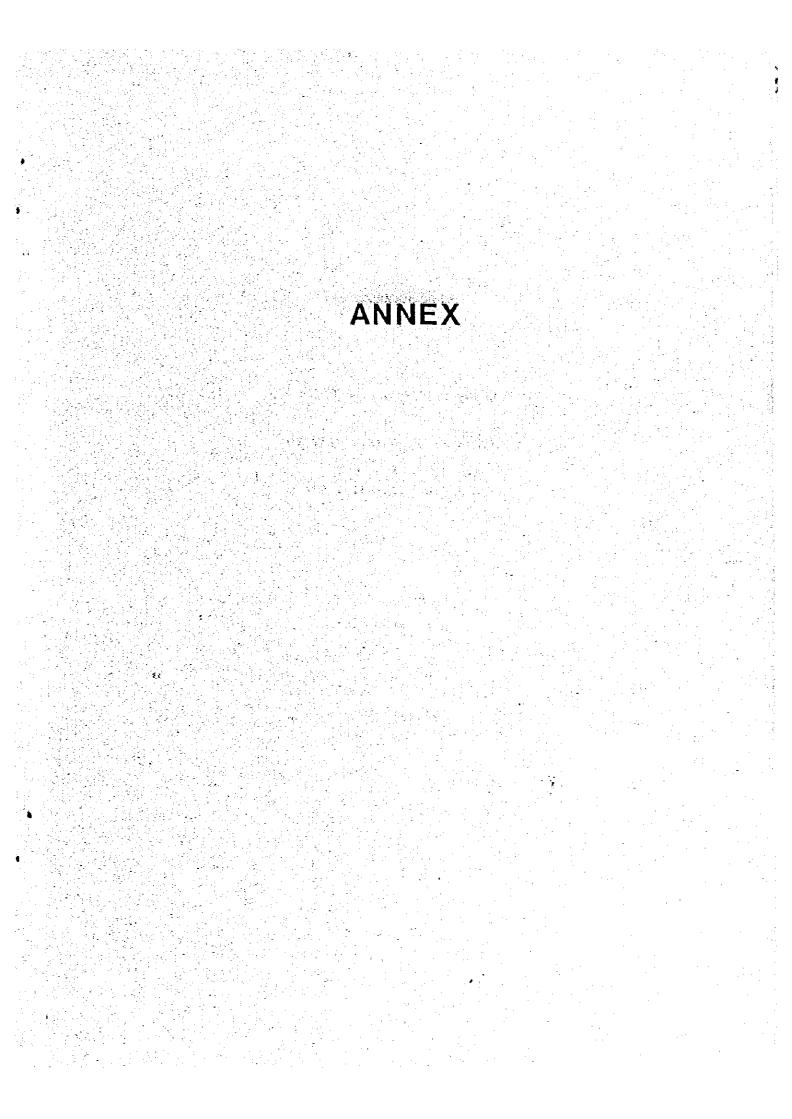
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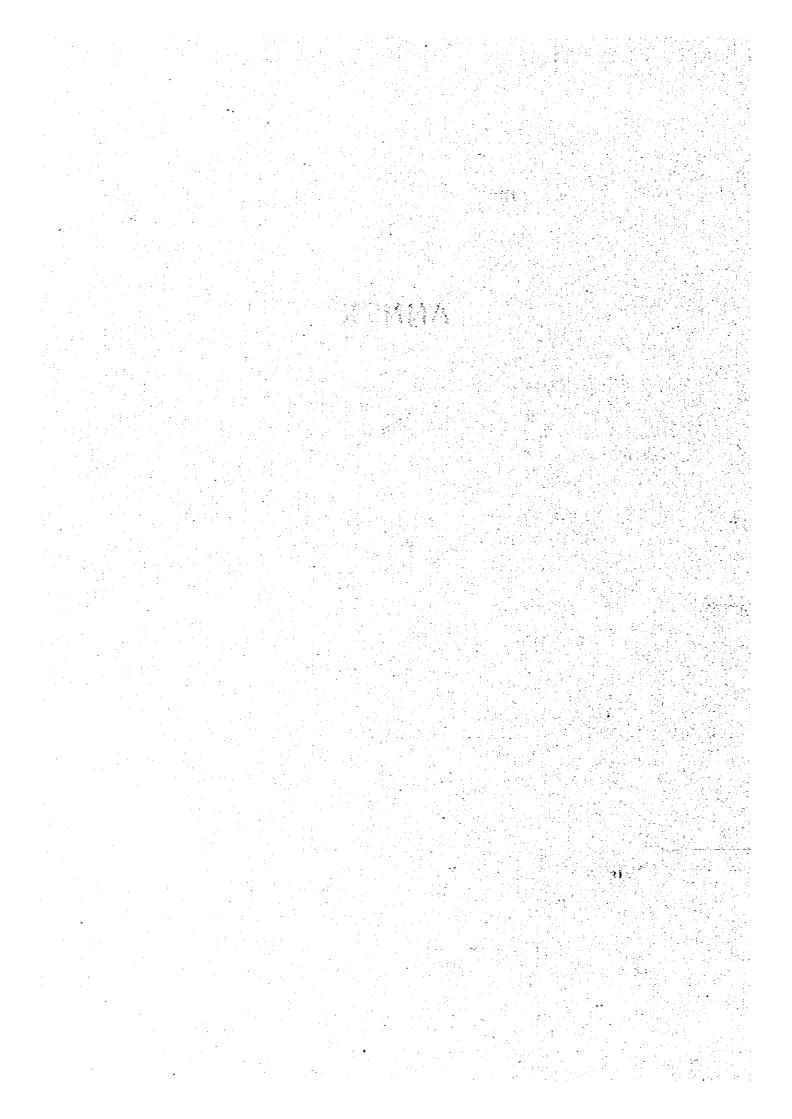
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THE STUDY OF ENVIRONMENTAL EFFECTS

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This Scope of Work is agreed by the following two authorities concerned: 李浩 化建苯基磺酸基 法结果 薄膜 网络加口的小原子 化建筑 医子宫上的小原子的 计自己分析 化分析法 The Jurong Town Corporation, Contractive Covernment of the Republic of Singapore Parallel Comparison sai lo and Japan International Cooperation Agency, the Official Agency responsible for the implementation of technical cooperation programes of is the set of the Government of Japan result for any set of the set of and the state of the To confirm the aforementioned withe Scope of Work is herewith attached and signed by the responsible personnel of the said authorities Concerned the description of the second state of the second state of the second 28-23555 Constant €ereizer Date: 19th December 1980 Issued at: Singapore an in san A<del>r</del> For the Jurong Town Corporation, For Japan International Government of the Republic of Cooperation Agency, Singapore, the Analysis and the Covernment of Japan. and shifts the state the water of a state M. H. M. Handel YING YOX HANG ICHIRO KIKUSHIMA PRINCIDAL DIRECTOR (TECHNICAL) LEADER OF THE JAPANESE JURONG TOWN CORPORATION PRELININARY SURVEY TEAH GOVERNMENT OF THE REPUBLIC OF DEPUTY DIRECTOR ENVIRONMENTAL PROTECTION GUIDANCE SINGAPORE : s : i : DIVISION 3.7. INDUSTRIAL LOCATION & ENVIRONMENTAL PROTECTION BUREAU HINISTRY OF INTERNATIONAL TRADE AND INDUSTRY IN THE PRESENCE OF :-LIH SAK LAN AKIHIR MITARI SENIOR DIRECTOR, ENGINEERING HEAD, INDUSTRY DIVISION MINING & INDUSTRIAL PLANNING JURONG TOWN CORPORATION AND SURVEY DEPARTMENT JAPAN INTERNATIONAL COOPERATION AGENCY

In response to the request of the Government of the Republic of Singapore, the Government of Japan has agreed to extend the technical assistance to conduct the study on the environmental effects of coal firing power stations and the integrated steel mill which will be sited in the new industrial estates of the Republic of Singapore, which assistance is given in accordance with the laws and regulations in force in Japan. The study will be carried out through The Japan International Cooperation Agency (hereinafter referred to as JICA), which is the official agency responsible for the implementation of technical cooperation programmes of the Government of Japan, in close cooperation with the Government of the Republic of Singapore and authorities concerned.

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2. Objectivės

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The objectives of the study are:-(1) To conduct the field survey in terms of air and water qualities within and at surrounding areas of Pulau Seraya, Jurong, Pulau Tekong, where the proposed coal firing power stations and the integrated steel mill are to be sited.

(2) To conduct the simulation study by computers based on the data obtained from the above said field survey and to assess the estimated pollution loads when these plants are in

#### 3-1 Survey Areas

(A) Fulau Seraya, the proposed site of the coal firing power station and its surrounding areas.

(B) Pulau Tekong, the proposed site of the coal firing power station and the integrated steel mill, and its surrounding areas.

(C) Other areas mutually agreed to be surveyed.

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(A) Air Quality Survey

1) Long Term Measurement

a) Sulphur dioxide (SO<sub>2</sub>) concentration
b) Wind directions and velocity at ground surface
c) Net radiation

d) Tempéráture ii. Notes: Périod of measurement - 1 yéar ii.) Short Term Measurement

a) Vertical profile of wind directions and velocity Notes: Period of measurement - two days each at two

stations.

iii) Simulation - Simulation of sulfur dioxide  $(SO_2)$ 

(B) Water Quality Survey

i) Heasurement

this that alb) Chemical Oxygen Demand (COD)

c) Water temperature and salinity

Notes: Period of measurement - 2 weeks per measuring point for the above (a), once per measuring point for the above (b) and (c), and 1.5 months in total including preparation works.

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ii) Simulation - Simulation of COD and temperature

4. Time Schedule

As shown in ANNEX 1 (Subject to change)

5. Report

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5-1 Interim Report
30 copies

ii) The interim report will be submitted in English to the Government of the Republic of Singapore within 5 wonths after the completion of the simulation for water quality survey.

- iii) The interim report will contain the results of the water quality survey and refer to the progress of air quality survey.
  - iv) The Government of the Republic of Singapore will provide the comments to JICA through the Embassy of Japan within 1 month after receipt of the interim report.

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(2010) # Exception (2010) 24 Draft Final Report 5-2 A. (36) 28.83 alagenet ev anto 1 🕻 s 30 copies **i**)

- The draft final report will be submitted in English within
   4 months after the completion of the simulation for air
   quality survey.
- iii) The Government of the Republic of Singapore will provide the comments to JICA through the Embassy of Japan within 1 wonth after receipt of the draft final report.
  - 5-3 Final Report (3)
  - i) 50 copies together with 50 copies of abstracts.
  - ii) The final report will be submitted in English within ? months after receipt of the comments of the draft final report.

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## 6. Contribution of the Government of the Republic of Singapore

1. The Government of the Republic of Singapore will assign a bus Vov qualified counterpart to be responsible for liaison and

cooperation with the team conducting the survey. (hereinafter referred to as Survey Team)

and 2:11 The Covernment of the Republic of Singapore vill provide the Survey Team with the necessary and available source information and data. Show had and so we will be

. (9.3? The Covernment of the Republic of Singapore vill make arrangements for the Survey Team to visit the authorities concerned

> The Government of the Republic of Singapore will provide the Survey Team with an office, sites for monitoring stations, laboratory testing facilities; storage space, temporary site office, transportation and boats as are necessary for the survey (ANNEX II)

> The Government of the Republic of Singapore will exempt the Survey Team from taxes and duties on machinery, equipments and materials brought in Singapore by the Survey Team.

The Government of the Republic of Singapore will exempt the members of the Survey Team from any tax, including import and export duties imposed on the members' personal effects. The Government of the Republic of Singapore will make an effort to ensure the securities of machinery, equipments and materials brought in Singapore by the Survey Team.

*I*K

## 7. Contribution of the Covernment of Japan and edd to relay discuss. . 8

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The Government of Japan, through JICA, will provide a Survey Team who will conduct the field, survey and simulation according to the Time Schedule (ANNEX I)

The Government of Japan will conduct during the stay of the Survey Team in the Republic of Singapore the training course for the Singapore counterparts to further their skills in operating and maintaining the necessary measuring machinery and equipments for the period of the field survey,

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The Detailed Information on Provision of Facilities by the Government of The Republic of Singapore

#### [1] Air Quality Survey

Monitoring Stations About 7 monitoring stations are to be established in the surrounding areas of the proposed sites. The land or places for these monitoring stations should be provided. Electricity Supply

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- The electricity connection and supply for monitoring stations at mutually agreed sites should be provided by the Government of the Republic of Singapore. The Facilities to Accomodate the Chemical Reagents
- 3. The Facilities to Accomodate the Chemical Reagents The facilities for storage, preparation of chemical reagents and distilled water should be provided at Jurong Town Corporation's Laboratory or National University of Singapore's Laboratory.
- 4. The Government of the Republic of Singapore will provide necessary personnel for the daily operation and maintenance of the monitoring stations.

#### [2] Water Quality Survey

- The Laboratory Testing Facilities for Chemical Analysis The laboratory testing facilities for chemical analysis of aqueous samples shall be provided at Jurong Town Corporation's Laboratory or National University of Singapore's Laboratory.
- 2. The Storage Space for the Heasuring Equipments and Haterials The storage space to be provided for the measuring equipments and materials shall be big enough for opening of the packages and adjusting the equipments.
- 3. The Small Boats for Survey The Survey Team will require 3 small boats for about 20 days in total. The Government of the Republic of Singapore will provide the Survey Team with such number of boats as are necessary for the survey.

IK V

(3) Handling of Measuring Equipments

All the measuring equipments necessary to conduct the field survey will be, in principle, brought in and out by the Survey Team. The Covernment of the Republic of Singapore is requested to provide facilities and arrangement on the followings:-

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(a) Custom clearance including loading and unloading

(b) Inland transportation

(c) Packing and unpacking

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#### THE STUDY OF ENVIRONMENTAL EFFECTS

#### OF COAL FIRING POWER STATIONS

AND INTEGRATED STEEL HILL

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DECEMBER 1980

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LEADER OF THE JAPANESE DEPUTY DIRECTOR ENVIRONMENTAL PROTECTION **GUIDANCE DIVISION** MINISTRY OF INTERNATIONAL TRADE AND

INDUSTRY

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#### MINUTES OF MEETINGS

The Japanese Preliminary Survey Team and the Singapore Counterpart had discussion on the Environment Effects of the Coal Firing Power Stations and Integrated Steel Kill and the following were mutually agreed upon.

Data of the Proposed Coal Firing Power Stations and the Integrated Steel Mill

- (A) Coal Firing Power Station
  - i) The Japanese side requested for information on the proposed coal firing power station in the
  - ii) After discussion with the Singapore side which included P.U.B., the assumptions given in Appendix A were agreed upon 23301 041415 1300 80
  - iii) It was indicated that one coal firing power station will be on Pulau Seraya and one on Pulau Tekong.
     (See Appendix D) Define there because 400A

#### (B) Integrated Steel Xill

- i) The Singapore side indicated that the proposed steel mill will use about eight million tons of iron ore per year and producing about one million tons of steel product by the direct reduction process using coal.
- ii) The Japanese side requested for technical information similar to those in Appendix A.
- iii) The Singapore side replied that it is not in a position to provide, except that the location will be in Pulau Tekong (See Appendix D). However, site of will try to obtain the information requested by the Japanese side at the earliest possible date.
- iv) It was mutually agreed that this matter will be further discussed and resolved when the next water quality survey team visits Singapore.

(C) Data on Emission Sources (Present & Future) 1990) 1300 MSDAGOBERS BLANDE 200183 40 DE180121 201 30 IN EMANY (a) Air Quality CLOSES 40 DE180121 201 30 IN EMANY BLOSES 40 DE180121 201 30 IN EMANY

- i) The Japanese side requested for emission data both present and future and suggested that if such data is not available then a survey be carried out to obtain the same.
- ii) The Singapore side agreed to carry out such survey.
- iii) The Japanese side indicated that these data should be made available by June 1982.

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iv) The Singapore side agreed to the above.

#### (b) Water Quality

(appli) The Japanese side requested for effluent data and betand present and future including industries located on the southern islands and suggested if such data is not available then a survey be carried out to obtain the same. nstan13 en -3832 - 88 June -

(2)

(in Califation and Caleford and Anti-ii) The Singapore side egreed to carry out such survey.

(ii) The Japanese side indicated that these data should be made available by May 1981.

iv) The Singapore side agreed to the above. september 200 AB (c) Malaysian Development Plan (North of Straits of Johoré)

(1). The Japanese side requested information regarding industrial development plan immediately north of the Straits of Johore.

ii) in the Singapore side replied that it is not in a position to do so. The second data and a

id iii) it Was mutually agreed that effects of the Malaysian developments shall not be considered.

Monitoring Points and a submit of the states of

Based on survey carried out by Japanese Preliminary starting Survey Team, the following monitoring points were agreed upon. Refiner werd versione bet the Basi

sauge (a) AirsQuality, by the state and a state and a state for

SO<sub>2</sub>, wind direction, wind velocity - 7 points i)

Net radiation - 1 point ii)

es obta stategate and harrows, obta sector a point and the point of temperature - 1 point iv) Pilot balloon observation as the 2 points

l (gand**b), <u>Mater Quality</u>, j sad berige audit or jegiter (1)** 

i) Current direction, current velocity - 10 points (around the tvo proposed sites

(1)

yest virtualise self useful to planes usin us 1 HER HOLSEFEDAR SCHELL CONFILM ು ್ೆ Water temperature, salinity, COD ii)

- 30 points (around observátion. the two 그 글에요 흔 이 물 여름 이 물 것을 알 것 같아. 이 것 이 아니는 것 것 proposed sites

#### (c) Clearance from Competent Authorities

The Singapore side will arrange and obtain necessary clearance from the competent authorities to conduct the above surveys.

(D)

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(E)

Simulation Methods

- The Japanese side stated that for SO2 diffusion i) calculation, Plume Puff model will be adopted and predict a yearly concentration of SO2 and
- As for vater temperature and (COD) diffusion ii) calculation, FEB (Finite Element Method) will be 化中间成分子的 自然手行 的复数人名 医鼻子聋 计问题分析 素量素 adopted.

iii) The Singapore side agreed to the above methods 人名马克曼 网络美国美国 化集团化集团制造法 网络外外的人

#### Evaluation on the Environmental Effects and Impacts (F) -

- The Japanese side enquired about the environmental i) 🚬 ambient standards of SO2 and COD se access (at (a)
- The Singapore side replied that it has only the ii) emission standard but not the ambient standard. 19.000 30 89781133
- The Japanese side stated that it will predict the. iii) levels of SO2 and COD from the coal firing power stations and integrated steel million integrated
- The Japanese side stated that it will also be able iv) to predict the total levels of SO2 and COD in the year 1990 if adequate datas on the emission are collected from the survey referred in para Collection (1)
  - a Norsele (Charles Constants) et a It was putually agreed that if no ambient standard ÷γ)is indicated by the Singapore side, the Japanese side will not be in a position to comment on the levels of SO2 and COD and in any case further. evaluation will have to be carried by the Singapore side. na teran ing at part the part of the second s

#### (G) Maintenance of conitoring stations

- The Japanese side requested the Singapore side to i) provide the necessary personnel for the daily operation and maintenance of the monitoring stations as indicated in Appendix 'B':
- Singapore side agreed to provide the personnel ii) required. international inclusive the second of the second second second second second second second second second second

**(H)** Survey Schedule

- The Japanese side mentioned that the schedule may i) need to be altered. Such alteration will be mutually discussed and agreed upon a state (11 and regerageeder betre wat te
- The Singapore side agreed to the above. ii)

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#### 5(1) Contributions

ii) The Singapore side agreed to provide the same.

- iii) At the commencement of the survey, the Japanese side will arrange for all the equipments to be delivered to Jurong Town Hall: The Singapore side will
  - arrange for the transportation of the equipments from the Juroug Town Hall to the various monitoring stations and will be responsible for the setting up
    - of the stations.

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iv) On completion of survey, the Singapore side will arrange for transportation of all equipments from the monitoring stations back to Jurong Town Hall and the Japanese side will arrange to collect the same from Jurong Town Hall.

# Datas/Reports

(J)

i) The Singapore side requested that information supplied to the Japanese side shall be treated as confidential materials. Similarly the results and report of the study are to be treated also as confidential.

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ii) The Japanese side agreed to the above.

#### APPENDIX A - 2. (i)

Assi	umption on Coal Firing Pover Station and the parts of the second Pover Station and the parts of the second Pover Station and the second sec
Generated Output	350 HH X 2
	Calorific Value 7,000 Kcal/kg Sulphur 1X (vt2) Consumption 154 x 104 t/year (operation rate 702)
Stack	Gas Volume 182 x 10 <sup>4</sup> Nm <sup>3</sup> /h Gas Temperature (without desulfurization of flue gas) Gas Discharge Velocity 30 m/s
	Reight 200m (L)
Cooling Sea Water	Amount Temperature difference 790
Effulent	Yolume 1;200 m <sup>3</sup> /d COD 160 mg/1

NOTE:

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The sites of stacks and outlets are as shown in Appendix D \_

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# ON THE MAINTENANCE OF MONITORING STATIONS

	Qualified Persons	Regular Persons
1 SO <sub>2</sub> Monitor	Once every 20 days:- a Absorption solution and chart sheet, ink should be refilled or replaced	Once per everyday he should check the moni- toring station whether it is operating properly without any trouble or
	<ul> <li>b Calibration of monitor should be conducted</li> <li>c Chart data for last 20 days should be</li> </ul>	not
	sent to Japan through JICA, Singapore	
2 Wind Speed Veter	Same as above but no calibration required	Same às above
3 Net Solar Radiation Flux Veter and Air Thermometer	Same as No (2) ábóve	Same as No (1) and (2) above

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#### MINUTES OF MEETINGS

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# THE STUDY OF ENVIRONMENTAL EFFECTS

#### OF COAL FIRING POWER STATIONS

AND INTEGRATED STEEL MILL

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### FEBRUARY 1981

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YING YOK HANG

PRINCIPAL DIRECTOR (TECHNICAL) JURONG TOWN CORPORATION GOVERNMENT OF THE REPULIC OF SINGAPORE

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- ENVIRONMENTAL PROTECTION GUIDANCE DIVISION
- INDÚSTRIAL LOCATION & ENVIRONMENTAL. PROTECTION BUREAU
- KINISTRY OF INTERNATIONAL TRADE AND INDUSTRY
- FOR JAPAN INTERNATIONAL COOPERATION AGENCY

#### Minutes of Heeting

The Japanese Survey Team and the Singapore Counterpart had discussion on the Environmental Effect of the Coal Firing Power Stations and Integrated Steel Hill and the following were mutually agreed upon.

#### Dats of the Proposed Cosl Firing Power Stations and the Integrated Steel Hill

- (A) Coal Firing Power Station
  - (i) The Japanese Side worked out a revised set of assumptions on the proposed coal firing power stations.
  - (ii) After discussion with the Singspore Side which included the P.U.B., the assumptions given in Appendix 'A' were spreed upon.
  - (iii) These assumptions vill supercede those contained in Appendix 'A' of Minutes of Meetings dated 19th December 1980.

#### (B) Intergrated Steel Hill

- (i) The Japanese Side showed a set of draft assumptions on the proposed integrated steel mill, studied and calculated based on the data provided by the Singapore side.
- (ii) After discussion with the Singapore Side, which included E.D.B., the assumptions given in Appendix 'B' were agreed upon.
- (iii) These assumptions will be adopted for the purpose of the study.
- (iv) The location of the stacks and effluent points are as indicated on the plan (Appendix 'C') attached, hourighter)

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Appendix A

# Assumption on Coal Firing Pover Stations

Location	P. Séráyá al alb	P. Tekong
Capacity	750 HH (250 HH x 3)	700 HH (350 HH x 2)
Fuel Calorific Value Sulfur Consumption	Čoal 27 HJ/kg 1% (vć) 1.7 Ht/year	Coal 27 HJ/kg 12 (vt) 1.6 Ht/year
Stack (1) (1) (2) (2) Height Gas Temperature Gas Volume Gas Discharge Velocity	183 m 150°c 2,650,000 Nm <sup>3</sup> /h 25 p/s (without flue gas desulfurization)	183 m 150 °c 2,470,000 Nm <sup>3</sup> /h 25 m/s (without flue gas desulfurization)
Cooling Sea Water Volume Temperature Difference	01 + 2 110,000 m <sup>3</sup> /h <sup>11</sup> 13,000 m <sup>3</sup> /h <sup>11</sup> 8,3 <sup>o</sup> c.oc. 8,3 <sup>o</sup> c.oc. 10,000 m <sup>3</sup> /h <sup>11</sup> 10,000 m <sup>3</sup> /h <sup>11</sup>	100,000 m <sup>3</sup> /h 8.3 <sup>0</sup> c
Effluent Yolume (COD) Xn (X <sup>1</sup> -31-05)	1,500 m <sup>3</sup> /d 50 mg/l	1,500 m <sup>3</sup> /d 50 mg/1
SU als SU als 10 a 10% of cotal used	(Boiler air heater washin neutralisation & mixing plant effluent)	g effluent, after
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# Appendix B

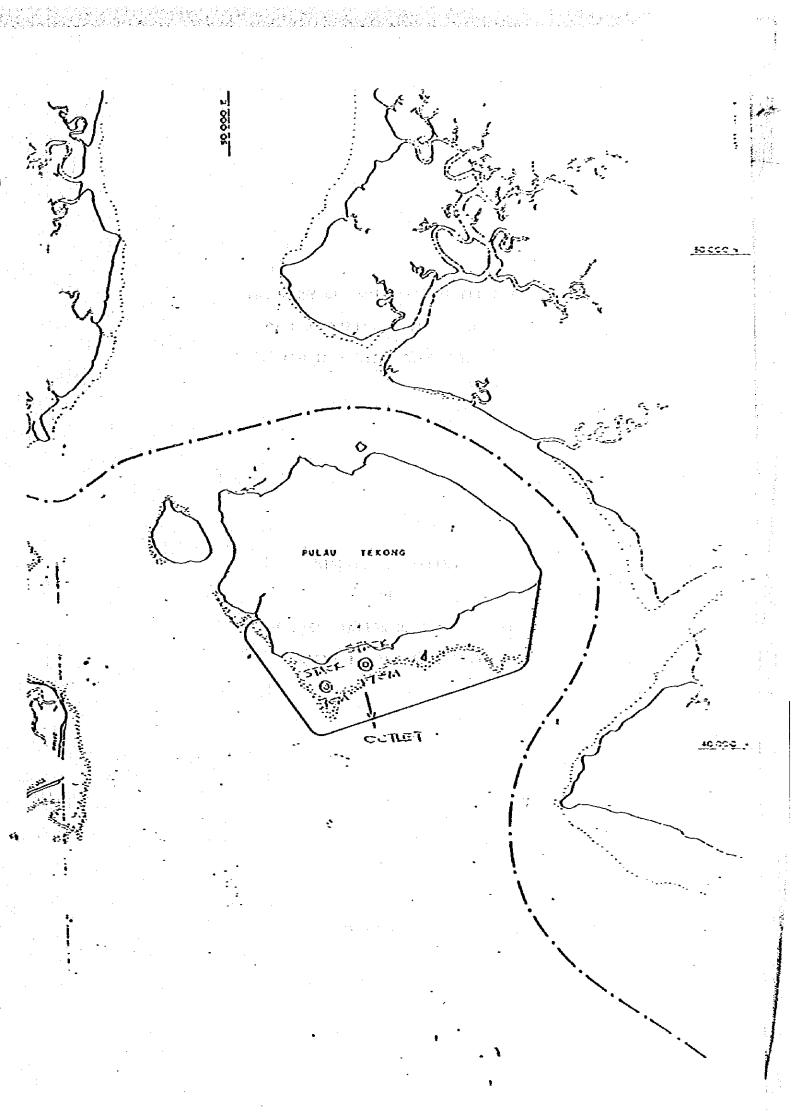
# Assumption on Integrated Steel Hill

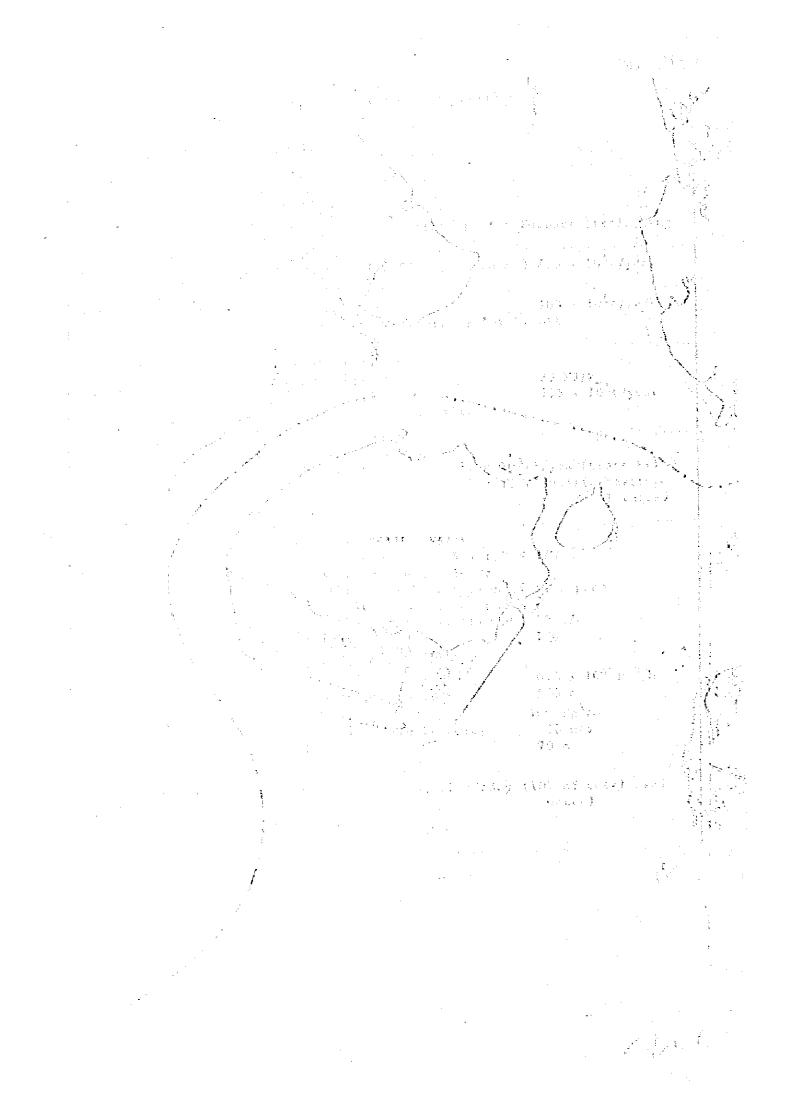
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		an a
Location		Puléu Tekong and an
Production	Process	Grate Kiln and Electric Arc Furnace Steelmaking
Óre Feed		Lump Ore (Fe 62.62, S 0.0182) 800 x 104t/year
Product	- 1997 - 1997 - 1997 - 1997 - 1997	Bar and Wire Rod. Balance (reduced iron) for Export
Reductant		Coal (S 1%vt)30 KJ/kgCalorific Value30 KJ/kgConsumption336 x 104t/year(Operation rate 83%)31
Fuel		Heavy Oil (S 32wt) Consumption 431 x 10 <sup>3</sup> kl/year(Grate kiln)
		and and 357 × 104k1/year (Reheating Furnace)
Stack		Grate Kiln Process Gas Yolume 5 x 10 <sup>6</sup> Nm <sup>3</sup> /h Gas Temperature 100 <sup>o</sup> c (without desulfurization of flue gas) SO2 Yolume 3,500 Nm <sup>3</sup> /h Gas Discharge Velocity Height 30 m/s
· .		Reheating Furnace Gas Volume Gas Temperature SO2 Volume Gas Discharge Velocity Height respective Height respective SO2 Polume Height respective Reference SO2 Polume Height respective SO2 Polume Height respective Reference SO2 Polume Height respective SO2 Polume Height respective SO2 Polume Height respective SO2 Polume Height respective SO2 Polume Height respective SO3 Polume SO3 Polume Height respective SO3 Polume SO3 Polume Height respective SO3 Polume SO3 Polu
Effluent		Volume 9,300 m <sup>3</sup> /day (10% of total used water)
		(COD) Кл 7 ррш

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THE STUDY OF ENVIRONMENTAL EFFECTS OF COAL FIRING POWER STATIONS AND INTEGRATED STEEL HILL

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## MINUTES OF REETING

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ΥΤΗΛΝΟ ««ΤΑΝ Η ΡΑΙΙΩΑ" <sup>111</sup>

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#### MINUTES OF REETING

The Japanese study team for the Water Quality Survey of the Study of Environmental Effects of Coal Firing Power Stations and Integrated Steel Mill in the Republic of Singapore (Hereinafter referred to as "The Team"), sent by the Japan International Cooperation Agency (Hereinafter referred to as "JICA"), presented to the Singapore authorities a report entitled "DRAFT REPORT ON ENVIRONMENTAL EFFECTS OF COAL FIRING POWER STATIONS AND INTEGRATED STEEL MILL IN THE REPUBLIC OF SINGAPORE VOLUME 1 - WATER QUALITY".

transmission of the following is a summary of the meetings and discussions: "

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The schedule of meetings and participants are listed in Annexes 1 & 2.

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2 ... Presentation of the Draft Report

2.1 The Team presented the Draft Report which has been prepared based on the objectives, the scope of work, and information described in the following record of discussions:

- Scope of Work dated 19 December 1980 - Minutes of Meeting dated 21 February 1981

The presentation was made by highlighting the features of the study and results.

- 2.2 The Singapore authorities and the Team exchanged views on the Draft Report.
  - 1 The Singapore authorities expressed satisfaction and appreciation for the dedication, efforts and hard work put in to complete the study.

2 A preliminary review of the Draft Report indicates that the contents of the Report are objective. 此时,可以说:"你不要心心理想到

4 The Singapore authorities expressed the intention of making questions in order to clarify the contents of the Draft : . . . . Report pif necessary a strait fill feige tolegyadel la se se se la seconda de l The Team replied to the Singapore authorities that such Questions should be made to JICA's office in Singapore by a de la filia de la 28 February 1982. The answers will be made in written form outside the finals report i de budebase and brident Base

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-Final Report of Volume 1 - Water Quality 1004202 of H 3

> The Draft Report of Volume 1 - Water Quality vill be considered eras final, eeusteen too egabbleo Carolafabat adī 12 8 F 1998 and

The Final Report of Volume 1 - Water Quality will be submitted to the Singapore authorities by the end of Arpil 1982.

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YOICHI SUZUKI LEADER OF THE JAPANESE WATER CUALITY SURVEY TEAM CO-OPERATION AGENCY

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RANG YING YUX PRINCIPAL DIRECTOR (TECHNICAL) JURONG TOWN CORPORATION FOR GOVERNMENT OF REPUBLIC OF SINGAPORE

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一些"你们",这些是我们想到了,"我们的现在?"他看着一声声道

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#### Annex 1

#### ENVIRONMENTAL STUDY WATER QUALITY SURVEY

#### Presentation of Draft Report

Venue:	VIP Lounge, Jurong Town Hall	, Singapore	a de la composición d Persona de la composición de la composic
Tine:	9.00 an - 10.00 an	en la construction de la constru	-
Date:	4 February 1982	n a transforma a star e transforma	

是这些"这些"是想到我们",让我们还是这个"小",这个人的""。 王王、马马曼是是这个人都是这些我们的人们。"你们是你不是

이 아파 바람이 나는 것이 아파.

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#### Kenber Lists

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Yeaber Lists	: 			
Japanese Report Team		· .		
Mr Yotchi Suzuki	an Stat	Í Í Á Ó Á Í ,	Leader, Water	Quality Survey Team
Nr Kihachi Inagaki	<u>N</u> ata	IPCAJ,	Co-ordinator	2 ° prin d'redder de de
Kr Kisaburo Nakata	-	MITI		
Kr Kasaya Konno	-	HITL		

#### ್ ಸ್ಟಿಕೆ ಕಲ್ಪಿಗಳ ಕಲ್ಪನೆ Singapore Counterpart (JTC) Hr Tang I Fang - Chairman - **:** ] Hr Francis Mak -General Manager and the second second

Хr	Ying Yok Hang	Principal Director (Technical)
Яr	Lim Sak Lan	- Sénior Director (SXE)
Μr	Tan Suan Yong	Senior Principal Civil Engineer
Mr	Hee Ab Mul	- Senior Civil Engineer

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### ENVIRONMENTAL STUDY WATER QUALITY SURVEY

WATER QUALITY SURVEY
Technical Session for The Discussion on
The Draft Water Quality Survey Report
Venue: Jurong Town Hall, Singapore
Tine: 9.30 am - 12.00 nóon - 12.00 nóon - 12.00 nóon
Date: 5 February 1982
Keober Lists
Japanese Report Team
Nr Yoichi Suzuki - IPCAJ, Leader, Water Quality Survey Team
Mr Kihachi Inagaki - IPCAJ, Co-ordinator install bis fill
- Ar Kisaburo Nakata - HITI Ičeti - odtoki konstrati Vandata -
Kr Kasaya Konno - KITI andre e Die Berger Aller andre Berger Aller
Japanese Eobassy (DTL) mentatural successful
Mr Tokio Katayama - Ist Secretary, Commercial Attache
Singapore Tean
Mr Lin Sak Lan - Jurong Town Corporation
Kr Tan Suan Yong - Jurong Town Corporation
Kr Hee Ah Mui - Jurong Town Corporation
Hr Ng Hwee Choon - Jurong Town Corporation
Mr Chiang Kok Heng - Hinistry of the Environment
Hr Foong Chee Leong - Hinistry of the Environment
Xr Jasbir Singh - Port of Singapore Authority
Kr Yang Keng Num - Port of Singapore Authority
Hr Wong Seng Chee - Port of Singapore Authority
Mr Joseph Hui - Anti-Pollution Unit
Dr Tay Joo Hwa - National University of Singapore
Dr Ng Wun Jern - National University of Sincapore

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OF COAL FIRING POWER STATIONS

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YING YOK HANG PRENCIPAL DIRECTOR (TECHNICAL) JURCHIG TOWN CORPORATION ON BEHALF OF THE COVERNMENT OF THE REPUBLIC OF SINGAPORE

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KIHACHI INAGAKI

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TEAM LEADER JAPANESE SURVEY TEAM ON BEHALF OF JAPAN INTERNATIONAL COOPERATION AGENCY

The Japanese Survey Team and the Singapore Counterpart had held discussions with the Relevant Authorities on future and present emission sources data for the purpose of setting up conditions and input data pertaining to the study on the environmental effects of coal firing power stations and integrated steel mill, and the following were mutually agreed upon -

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For facilities commissioned before 1975, they are permitted to continue the use of the present quality of fuel; and For facilities commissioned after 1975, they are required to use fuel which contains less than 2% of sulphur, with the exception of PUB's Senoko Power Station.

Besides the present three existing power stations, the following power stations are expected to be in operation -

Senoko Power Station Phase III

Expected Date		Sulphur Content	Stack				
of Operation	Capacity	of Fuel	Diameter				
i June 1983	1 x 250 KH	2.8%	4.30m				
	1 x 250 XW	and a second second	4.30m				
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### Séraya Power Station Phase I

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Expected Date			Sulphur Content	Stack
of Operation		Capacity	of Fuel	Diameter
£	1987	2 x 250 MW	2%	4.30m
ii	1988	1 x 250 MW	2%	4.30=

The projection of growth of industries will be based on information and data provided by EDB earlier, except that the petroleum refining industries will maintain the present level of production until 1990.

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3. La dependencia esta de la constancia de la composición de la defición de la defición de la defición de la sense de la dependencia de la devencia de la defición de respecte de la devencia de la devencia de la defición de la de

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