OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

15

(R) INDONESIA : CASE STUDY OF THE TIN INDUSTRY

IN

INDONESIA

UNIDO CONTRACT AGREEMENT
NO. : CLT 86/129

SUBMITTED TO : UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
VIENNA, AUSTRIA.

BY : SALEH SUNGKAR
PT. UNECONA AGUNG
JAKARTA, INDONESIA

TABLE OF CONTENT

6. APPENDICES

Appendix 1: Tin Belt in South-East Asia
Appendix 2: Tin Mining on Bangka island
Appendix 3: Tin Mining on Belitung island
Appendix 4: Tin Mining on Singkep island
Appendix 5: Tin Mining on Karimun-Kundur island
Appendix 6: Tin Mines around Bangkinang
Appendix 7: Tin Drilling on Bangka island
Appendix 8: Tin Drilling on Belitung island
Appendix 9: Tin Drilling on Singkep island
Appendix 10: Tin Drilling on Karimun-Kundur island

7. REFERENCES

PREFACE

This Case Study has been prepared to comply with the request from UNIDO, cq. Mr. Lancelot G. Poole, Chief Secretariet Recruitment section, Personnel service of UNIDO, Vienna, in accordance with his letter dated July 10th, 1986, reference no. CLT 86/129.

Tin in Indonesia is classified as a strategic mineral, Publication of report on tin mining and development is prepared by the Government department of Mining and Energy and also by the state Owned PT. Tambang Timah. The published reports are issued mostly for internal use of PT. Tambang Timah and other Government institutions.

although only very limited information could be obtained, the author with to offer his gratitude to some of the staff of PT. Tambang Timah for their helpfull information we need to preprare the Case Study.

Most of the data presented in this writing are official data which usually issued almost a year later.

Data for 1985 will be available sometimes in November or December this year (1986), so that the analysis presented in this Case Study was limited to 1984, based on the published report issued in 1985.

With his limited experience the author have tried to do his best to complete the case Study and to meet the requirement required by the term of reference. any insufficiencies in this writing is due to difficulties faced in obtaining data or due to the confidential nature of the data.

The author wish to thank, Mr. Lancelot G. Poole, for the confidence he gave to the author to develop Case Study of Tin Industry in Indonesia.

Saleh Sungkar

PT. UNECONA AGUNG

1. INTRODUCTION

After petroleum and natural gas, tin is the second most important product from the mining sector industry in Indonesia. Indonesia's average annual production of tin ranges between 25.000 - 29.000 ton. More than 90% of the tin production is exported to various countries. The balance (± 10%) is consumed domestically. The largest domestic consumer of tin is the tin plate factory which commenced its production in the late 1985. Other consumers are mostly small manufacturers of solder, babbit metal, etc.

Tin mining in Indonesia has started in the 18th century. First mining activities were carried out in the islands known as the tin island of Indonesia such as Bangka, Belitung and Singkep. The Indonesian Government began taking over all the mining activities in 1953, after the expiry date of mining concessions with the former Dutch mining companies.

A State owned Company was then established to take charge of all of the mining activities. In 1976, the government changed the company's mining status to full commercial status forming PT. Tambang Timah, which enabled it to be active in mining as well as other business activities.

The government policy on domestic and foreign investment, gave the opportunity to foreign investor to invest in mining industries. At present there are three foreign companies active in tin mining, they are PT. KOBATIN and PT. Broken Hill Proprietary Indonesia (PT. BHPI) both are of Australia and PT. Riau Tin Mining (PT. RITIN) of the Netherland.

Before 1973, that was before the foreign companies started their mining operation, all of the tin produced was mined by PT. Tambang Timah. At present ± 75% of the total Indonesian tin production, is still produced by the state owned PT. Tambang Timah, while the rest ± 25%, by those three foreign companies.

The Tin deposits in Indonesia lie inside the so called tin belt that extends from southern China through Burma, Muangthai, and the Malay peninsula to Indonesia's Riau group of Islands.
The tin belt in Indonesia streches from the north to the south, covering the Islands of Karimun, Kundur, Singkep, Bangka and Belitung as well as at Bangkinang area in the mainland of Sumatra (see map...appendix 1)

At present most of the mining activities are still concentrated on those tin islands, and mostly on the secondary type of deposits (alluvial or elluvial). Mining of primary deposits are only carried out at Pemali area near Sungailiat (Bangka island) by PT. Tambang Timah and at Kelapa Kampit area (Belitung island) by PT. BHPI.

There is only one tin smelting and refining plant in Indonesia, which is owned by PT. Tambang Timah and located at Muntok (Bangka island).

Almost all of the tin concentrate coming from the tin mining areas is smelted and refined here, except the concentrate from PT. BHPI which, because of its chemical characteristics, can not be smelted at Muntok, but has to be smelted and refined at Datuk Kramat Smelter, Penang, Malaysia and Copper Pass & Sons in England.

2. ANALYSIS OF THE TECHNICAL AND SOCIO-ECONOMIC CHARACTERISTICS

2.1. Status of foreign companies in tin mining

In line with the Government foreign investment policy and regulations, foreign companies operating in Indonesia must have a local investor participation in the form of a joint venture company.

Foreign investment in mining of strategic mineral such as tin must be done under a work-contracts with the Government. In this work-contracts system, the foreign company conducts all stages of operation, including general prospecting, exploration, refining and processing, trasnport and marketing of the mineral products, as the contractor of the Government. The foreign company controls and manage all activities and has full responsibility on all risks of operation. Details of the requirements are presented under legal aspect.

In principle, the contract of work stipulate the concessionary right of the foreign companies, which include:

a. Validity of contract

Concessional contract valid for 30 years starting from the completion of the mining facilities or beginning of mining operation.

b. Contract mining area

Off-shore and on-shore areas where the company has the sole right to explore and mine for tin and its associated minerals.
The right include search, development and exploitation of any deposit found and processing, refining, storing and marketing of the product.

c. Royalties

Besides of the normal taxes payable to the Government, such as corporation tax, and sales tax of general application in Indonesia etc., the company shall pay also:

1. Land rent in respect to the contract area.

2. Royalties in respect of the company's production of minerals mined in Indonesia.

* The normal rate of royalties for secondary deposit of tin is 10% of the value of tin metal contained in the concentrate.

* For primary and associated minerals which are not easily and cheaply separable, reduction of the royalty rates to less than 10% can be negotiated.

d. **Program training**

The company have to prepare program training for Indonesian personnel. Within 5 years after initial production, 75% of the personnel should be Indonesian.

2.2. Mining location

(see map on tin mining locations in Indonesia, appendix 2, 3, 4, 5, 6)

PT. Tambang Timah operates on almost all of the tin islands, and devides its operational areas into :

a. Bangka tin mining unit, with its mining head office located at Pangkal Pinang, operate on all of the mining areas in Bangka island, except the Koba area which belongs to the mining area of PT. KOBATIN.

b. Belitung tin mining unit, with its mining head office located at Tanjung Pandan, operates on all of the mining areas in Belitung Island, except Kelapa Kampit area which belongs to the mining area of PT. BHPI.

c. Singkep tin mining unit, with its mining head office at Dabo, include mining activities on the Islands of Singkep, Karimun and Kundur.

d. Bangkinang tin mining project, on the main land of Riau (Sumatra), where the mining operation is subcontracted to local small private mining companies.

PT. KOBATIN operates on the southern part of Bangka Island, at Koba areas. Its operation includes on-shore as well as off-shore areas.

PT. BHPI operates on the primary deposit at Kelapa Kampit area on the Island of Belitung.

PT. RITIN operates on off-shore as well as on-shore area of the Island of Pulau Tujuh Riau (between Bangka and Singkep Islands) and also on the area of Karimata Islands, between Belitung Island and south-western part of Kalimantan.

2.3. Infrastructure

Most of the main roads and ports on the tin islands of Indonesia were built by the government. The roads connecting the mining areas to the main roads were built by the mining companies.

Muntok city on Bangka island where the only tin smelter is located, is also the only port where tin may be exported. The townships on Bangka are connected by a well maintained main road.

Tin ore concentrate produced on Bangka island is transported via the mainroad to Muntok for smelting. Tin concentrate ore from other islands is transported to Muntok mostly by barges and ferries, which serve the inter island sea traffic.

There are airports on Bangka, Belitung and Singkep. The Karimun and Kundur island can be reached by air through airport on Batam island. Bangka, Belitung and Batam Island have direct air connections to Jakarta. For interisland transportation ferries and barges are utilized. A ferry service connects Bangka island with the mainland of Sumatra and Jakarta. Almost all cities on the tin island are equipped with telephones and telexes. Interisland, domestic and overseas communication is effected through Indonesian satelite communication system.

2.4. Labor force

The number of labor employed by PT. Tambang Timah totalled 29.452 in 1984. This includes labor employed in the smelting unit at Muntok and in the Jakarta head office.

The workers employed in mining, are listed below:

Bangka mining unit	=	15.453
Belitung mining unit	=	9.700
Singkep mining unit	=	1.928

About 80% of the labor force in mining units were skilled labor.

Each of the three foreign mining companies employed about 600 - 1000 workers in 1984.

2.5. Tin resources and reserves

Tin mining in Indonesia had been carried out since the 18th century, but data on, the initial reserves in all tin islands are not available from that time. Recent on-shore and off-shore exploration discovered new reserve areas at off shore areas of Bangka, Singkep, Karimun, and Kundur islands.

Total tin potential reserve areas (in Ha) in the tin islands as of 1984 is shown below:

Table 1 MEASURED TIN-ORE RESERVES IN THE TIN ISLANDS 1984

Location	Type of reserves	area (Ha)*
Bangka	Primary	221
	Secondary	24,834
Belitung	Secondary	14,833
Singkep	Secondary	1,621

* included off-shore and on-shore area.
Source: Indonesia, mining year book 1984.

On-shore and off-shore tin potential reserves in Indonesia was estimated at a total of 1,640,000 metric ton of tin content consisting of,

- reserves measured - 740.000 metric ton
- reserves inferred - 400.000 metric ton
- reserves conditional - 200.000 metric ton
- reserves unknown - 300.000 metric ton

About 60% of the potential reserves were found in Bangka Island and its surroundings off-shore area. About 43% of the total potential reserves in Indonesia are all located in off-shore areas.

To support the continous operation of tin mining, exploration of reserve was stepped up during the last 15 years, by PT. Tambang Timah as well as foreign companies.
As can be seen from the following table 2 on the development of tin reserves the prospects of tin mining in Indonesia are more and more directed towards off-shore areas. This is due to the fact that mining of on-shore deposits had been conducted for centuries so that on-shore exploration became more and more difficult to find reserves with relatively high tin content.

In 1966, on-shore to off-shore ratio of tin reserve was 3,6 : 1,0 and declined to 1,96 : 1,0 and to 1,0 : 1.08 in 1977 and 1982 respectively.

Table 2 ON-SHORE AND OFF-SHORE TIN RESERVES IN MT of SN

YEAR	BANGKA		BELITUNG		SINGKEP	
	ONSHORE	OFFSHORE	ONSHORE	OFFSHORE	ONSHORE	OFFSHORE
1966	300.748	37.717	86.822	74.442	23.627	1.112
1974	353.755	186.265	76.047	105.551	17.913	1.364
1982	264.011	206.573	85.365	133.935	13.164	51.804

Source: Study on tin, Department of Mining and Energy

For comparision, table 3 provide the tin reserves in all of the mining companies in 1978.

Table 3. ON-SHORE AND OFF-SHORE TIN RESERVES IN 1978 - in MT of SN

PT. Tambang Timah	714.411
PT. KOBATIN	20.000
PT. BHPI	13.980 *
PT. RITIN	21.500

* Primary reserves.
Source: Study on tin, Department of Mining and Energy.

Some of the primary tin deposit area which have been mined were at Kelapa Kampit (Belitung island) by PT. BHPI and at Pemali (Bangka island) by PT. Tambang Timah.

Recent exploration provided indication of reasonable resources of primary tin on the islands of Singkep, Bangka and Belitung.
Data on primary tin reserve evaluated in 1982, by PT. Tambang Timah showed the following results :

Total proved and probable reserve	: 14 million tonnes
Tin content	: 0,23 %
Total potential reserve	: 50 million tonnes
Tin content	: 0,10 %
Total proved and probable reserve at PT. BHPI areas	: 614.738 tonnes
Tin content	: 1.7 %

2.6.Mining

Mining activities conducted by PT. Tambang Timah, PT. KOBATIN and PT. RITIN are mostly on alluvial and elluvial deposit. The mining method mostly used open pit mining or hydraulicking using powerful water jets. For digging and removal of the earth, sometimes tractors, dredge-line and trucks are also used.
The process of mining and preliminary separation of the ore is as follows :

a. Powerfull jets of water are directed onto the mine face to break down the tin-bearing soil which is allowed to collect in the sump.

b. A gravel pump in a sump elevates the watery mud to a wooden trough ("palong") or jigs where the tin oxide (cassiteriet) particles, which are 2,5 times heavier than sand will sink to the bottom and collected.

c. The collected cassiteriet (preliminary concentrate) which usually contain 30 - 40% tin, is further transfered to the dressing shed for final concentration.

For the mining of alluvial deposits found in big valleys on-shore as well as off-shore, chain buckets or suction cutter dredgers are used. Dredgers are also equipped with jigs for preliminary concentration.

For the weathered primary tin deposit found in Pemali (Bangka Island) mined by PT. Tambang Timah the open pit mining method is used.

Some of the mining activities on the islands of Bangka, Belitung, Singkep and Bangkinang areas, are conducted by private national mining companies working as mining contractors for PT. Tambang Timah, who purchases the tin ore produced.

The areas of PT. Tambang Timah's mining activities and the method of mining is shown on the table below.

Table 4: AREA, NUMBER OF LOCATIONS AND METHODS OF MINING IN PT. TAMBANG TIMAH'S MINING UNITS 1984

Mining area	Number of Dredgers (Size in Cu ft)						Number of open pit mining	Number of sub contracted hydraulic mining
	22	18	14	9	7	D*		
MU* Bangka	1	1	5	6	-	2	53	90
" Belitung	1	-	4	-	7	-	48	46
" Singkep	-	-	3	1	-	-	4	25
Project Bangkinang	-	-	-	-	-	-	-	1

M.U - Mining Unit
D - Dismountable dredger
Source: Indonesia Mining yearbook 1984

Intermediary consumption in mining is mostly energy (fuel) and electricity required for the operations. Water used for separation is recycled.

Table 5 ENERGY UTILIZATION PER M3 SOIL REMOVED IN EACH TYPE OF MINING OBJECT (in Hp Hour/M3 soil)

MINING OBJECT	INSTALLED Hp	CAPACITY AVERAGE M3/600 hrs (one month)	Hp. HOUR/M3
Dredger 7 cuft	1500	128000	7.031
" 9 cuft	1500	149000	6.040
" 14 cuft	3600	249000	8.675
" 18 cuft	4800	324000	8.889
" 22 cuft	8000	405000	11.852
Hydraulic mining Installation unit	500 Hp.	30 M3/hour	19.667
Open pit mining Installation unit	2370 Hp.	125 M3/hour	18.960
Open pit mining (Mechanized) Installation unit	3320 Hp.	125 M3/hour	26.560

Source: PT. TAMBANG TIMAH

PT. BHPI is mining the primary deposits in Kelapa Kampit (Belitung Island) using the open pit and underground mining method. The tin ore, in the form of fine powder containing sulfide compounds, needs flotation before heavy media separation.

At PT. Tambang Timah units, the final concentration of the tin ore is conducted in centralized dressing sheds on-shore and located near the producing (mining) areas.

The cassitiriet containing 30 - 40% tin is procesesd to the final concentrate of cassiteriet containing 70% Sn which is ready for direct smelting into pure tin at the smelter.

In the dressing sheds, associated minerals such as ilmenit, monazite, xenotime etc, are also separated.

The technique used involves the utilization of jigs, high tension separators, cyclones, rotary dryers, etc.

2.7. Smelting

PT. Tambang Timah, PT. KOBATIN and PT. RITIN, smelt and refine their tin concentrate (70% Sn) in Muntok; the smelting and refining plant is owned by PT. Tambang Timah.

The Muntok smelting and refining plant is located at Muntok on Bangka island. Tin metal can only be exported through the Muntok port.

The main equipment used in smelting and refining are the rotary and stationary furnace. There are 3 rotary furnaces and 4 stationary furnaces with a total installed capacity of 38.000 metric tons per year. The highest level of utilization was obtained in 1981 with a production of 32.518 metric tons.

The smelting process for the production of tin metal is carried out by means of reducing the tin concentrate with carbon at high temperature of 1000 - 1300 C.

Furnace charge consist of cassiteriet, anthraciet and coke as the reductor and limestone and silica for the flux.

The composition per charge is as follows

1.	Authraciet coal	-	200 - 300	kg/ton of ore
2.	Limestone	-	40 - 60	"
3.	Coke	-	10 - 15	"
4.	Fuel oil	-	260 - 280	"

Tin metal from Muntok is known as Muntok tin with a purity of 99.8 - 99.9 %.
By product is slag with a tin content lower than 1%.

The total number of labor employed at the Muntok smelting unit was 1171, comprising of 1138 skilled and 33 unskilled worker in 1984.

2.8. Evolution during the last ten years

a. Tin concentrate production

Before the year 1973, all of the tin in Indonesia was produced by the state owned PT. Tambang Timah. The foreign mining companies, such as PT. Koba Tin started production only in 1973, followed by PT. Broken Hill in 1975 and PT. RITIN in 1979.

As shown in table 6 Indonesian tin concentrate production, during the period of 1974 till 1981, increased except in 1975 and 1976. The decrease in production in those years was due to the export quota introduced by the International Tin Council in April 30, 1975.
The peak was reached in 1981 with a total production of 35.391 tons of concentrate. Due to the world economic recession and tighter quota system introduced by the International Tin Council in 1982, Indonesian tin production declined to 33.806 ton in 1982, down to 26.553 tons in 1983 and to 23.223 tons in 1984. The tin output amounted to 16.723 ton in the first nine months in 1985.

PT. Broken Hill which started production in 1975, experiencing problems of crushing and drying of the ore and the low content of its ore feed at that time. But the production stabilized at ± 500 tons after 1979.

PT. RITIN started production only in 1979 with an output of concentrate of 95.3 tons. Production increased to 1.110 tons in 1981 and 1.469 tons in 1982, but fell to 927 tons in 1984.

During 1974 to 1981, production of PT. KOBATIN also increased from only 867 tons in 1974 to the peak of 6.581 tons in 1981, but to fell to 5.471 in 1982, to 5.253 tons in 1983 and 4.215 tons in 1984. PT. KOBATIN started production only in 1973. The increase in output was due to the expansion in mining area and activities. Table 7 below shows the production of KOBATIN and the rate of increase from 1974 to 1984.

TABLE 6: TIN PRODUCTION, INDONESIA, IN

YEAR	PT. TAMBANG TIMAH				
	BANGKA	BELITUNG	SINGKEP	BANGKINANG	OTHERS
1974	17.458.50	5.403.30	1.776.00	185.20	
1975	17.190.50	5.207.00	1.801.00	200.50	
1976	16.046.00	4.717.50	1.269.00	152.00	
1977	17.721.00	4.800.00	1.411.40	881.50	
1978	18.213.50	4.928.00	842.20	80.50	
1979	18.440.00	5.390.00	1.250.00	63.90	
1980	19.501.00	5.417.00	1.126.00	72.00	
1981	19.608.50	6.364.50	1.135.00	70.60	
1982	13.446.00	6.468.50	1.250.00	54.10	
1983	13.892.50	4.513.50	1.506.50	40.00	
1984	11.333.00	4.043.50	2.200.00	31.00	

Source: Indonesian Mining. Year Book, 1980/1984.

SECTION 1

E 6: TIN PRODUCTION. INDONESIA. IN TON Sn - 1974-1984

T. TAMBANG TIMAH				PT. KOBA TIN	PT. BROKEN HILL	PT M
SINGKEP	BANGKINANG	OTHERS	TOTAL			
1.776.00	185.20		25.023.00	686.45		
1.801.00	200.50		24.391.00	867.09	79.20	
1.269.00	152.00		22.202.50	1.021.90	210.15	
1.411.40	881.50		24,020.56	1.609.62	296.28	
842.20	80.50		24,064.20	2.914.00	431.73	
1.250.00	63.90		25.163.90	3.807.63	468.62	
1.126.00	72.00		26,116.40	5,262.23	504.73	
1.135.00	70.60		27,178.60	6,581.16	522.00	
1,250.00	54.10		26,218.60	5,471.00	647.68	
1.506.50	40.00		19,952.50	5,252.95	649.08	
2,200.00	31.00		17,607.50	4,215.00	473.43	

/1984.

SECTION 2

IN TON Sn - 1974-1984

ERS	TOTAL	PT. KOBA TIN	PT. BROKEN HILL	PT RIAU TIN MINING	TOTAL
	25.023.00	686.45			25.709.45
	24.391.00	867.09	79.20		25.337.20
	22,202.50	1,021.90	210.15		23.434.55
	24,020.56	1.609.62	296.28		25.926.45
	24,064.20	2,914.00	431.73		27.400.93
	25.163.90	3.807.63	468.62	95.30	29.535.45
	26,116.40	5,262.23	504.73	644.10	32.527.45
	27,178.60	6,581.16	522.00	1,109.80	35.791.56
	26,218.60	5,471.00	647.68	1.408.80	33.804.08
	19,952.50	5,252.95	649.08	698.40	26.557.97
	17,607.50	4,215.00	473.43	927.40	[illegible]

SECTION 3

Table 7 TIN CONCENTRATE PRODUCTION BY PT. KOBATIN in thousand tons 1973 - 1984

YEAR	PRODUCTION Tons	RATE OF INCREASE (%)
1973	160	-
1974	686	331
1975	867	26
1976	1.022	17
1977	1.609	58
1978	2.914	81
1979	3.807	31
1980	5.262	38
1981	6.581	25
1982	5.471	-17
1983	5.253	- 4
1984	4.215	-19

Source: Indonesia Mineral yearbook 1983-1984

b. Tin Metal production

Indonesian tin metal production followed the same pattern as the tin concentrate production.
Peak of production was reached in 1981, but fell sharply to 22.467 ton in 1984. Compared with the production of 32.519 ton in 1981, the decline was approx. 31%.
Table 8, shows the production of tin metal and the rate of increase/decrease per year from the tin smelting and refining unit at Muntok.

Table 8 TIN METAL PRODUCTION FROM MUNTOK SMELTING & REFINING UNIT (in tons) 1974 - 1984

YEAR	PRODUCTION	RATE OF INCREASE %
1974	15.066	-
1975	17.825	18.3
1976	23.322	30.8
1977	24.005	2.9
1978	25.830	7.6
1979	27.790	7.6
1980	30.465	9.6
1981	32.519	6.7
1982	29.755	-8.5
1983	28.390	-4.6
1984	22.467	-20.8

Source: Indonesia, Mineral yearbook, 1984

The Muntok smelting unit started operation in 1967 using 3 rotary furnaces with an installed capacity of 15.000 ton per year. 3 additional stationary furnaces were then installed with a capacity of 18.000 tons/year and commenced production in 1976. Total smelting capacity was then 33.000 tons per year. After 1976 all of the tin concentrate produced from PT. Tambang Timah, PT. KOBATIN and PT. RITIN was smelted in Muntok which increased its tin metal production in the year 1976 by 30.8% as shown in table 8. In 1982 the smelting capacity was expanded again to 38.000 ton per year, but tin market situation caused the factory to work at under capacity.

c. Marketing, export and import

c.1. Export

Since Indonesia's tin consumption is very small, most of the tin output is exported.
Tin are exported directly to the consumer through PT. TAMBANG TIMAH overseas representative.

Before 1976, some of the tin concentrate production was exported and smelted at Penang smelter and/or Arnhem in Holland. Starting in the year 1977, after Muntok smelter increased its capacity, all of the tin exported were in the form of tin metal.

Export destinations are mainly USA, Netherland, England, Italy, Japan, West Germany, France, East European and other countries, etc.

Indonesia's total tin export during 1974 - 1984 is listed in table 9.

Table 9 INDONESIA'S EXPORT OF TIN 1974 - 1984

YEAR	TIN CONCENTRATE (TON Sn)	VALUE (US$'000)	TIN METAL (ton)	VALUE (US$ million)
1974	8.106	61.393	14.948,4	113.190
1975	7.295	45.834	14.890,7	96.565
1976	1.093	6.160	23.018,4	162.894
1977			24.914,0	250.994
1978			25.549,0	311.293
1979			25.737,0	376.078
1980			30.885,0	499.331
1981			31.879,0	437.383
1982			26.825,0	342.507
1983			25.332,0	313.504
1984			21.640,0	256.680

*Source: PT. Tambang Timah Statistical year book 1984

The export figures show a steady increase of export volume from 14,948 ton in 1974 to its peak of 31,829 ton in 1981, then decline to 26,825 ton in 1982 and drops to 21,640 in 1984.

The decline in volume of export is caused by the weakening of the international tin market, and also by the tighter export quota imposed by the International Tin Council (ITC). The quota system in 1982 allowed Indonesia to export only 22.000 tons a year that was ± 60% of total capacity of Indonesia's tin production of 35.000 ton.

The depreciation of poundsterling on which the Indonesia's tin price is quoted also worsened the market situation.

Table 10 shows the development of tin prices in London Metal Exchange and Penang market.

Table 10 AVERAGE TIN PRICES FROM LONDON METAL EXCHANGE AND PENANG MARKET

YEAR	LME CASH		PENANG	
	L/ton	US$/ton	M$/kg	US$/ton
1974	3.494	8.211	18.80	8.139
1975	3.091	6.275	15.94	6.154
1976	4.255	7.234	15.97	7.469
1977	6.181	11.806	26.26	11.080
1978	6.706	13.613	28.82	13.041
1979	7.276	16.153	32.42	14.804
1980	7.222	17.261	35.71	16.086
1981	7.085	13.532	34.34	14.438
1982	7.300	11.753	30.09	12.970
1983	8.573	12.031	30.19	13.013
1984	9.168	12.285	29.17	11.575

Source: ITC Monthly Statistical Bulletin and IMF Financial Statistic
Derived from Study on tin, Department of Mining and Energy

The steady decrease in the tin price on London Metal exchange from the equivalent of US$ 17.261 per ton in 1980 to US$ 12.285 in 1984, and the tighter export quota by ITC have combined to decrease PT. TAMBANG TIMAH's profits.

The state owned tin mining company reported that its gross profits (before tax) plunged from Rp. 123.1 billion in 1980 to Rp. 64.2 billion in 1981 and to just Rp. 38.9 billion in 1984 as shown on table 11.

Table 11 PT. TAMBANG TIMAH'S GROSS PROFITS 1974 - 1984

YEAR	GROSS PROFITS (Rp. billion)
1974	12.7
1975	7.4
1976	14.6
1977	29.5
1978	53.0
1979	105.8
1980	123.1
1981	62.9
1982	21.9
1983	80.0
1984	38.9

* Source: PT. TAMBANG TIMAH
Statistical year book 1984

The tin market price further decreased in 1985 and 1986 following the abolishment of the export quota system of the International Tin Council as from April 1986.

The collaps of the quota system caused the tin price to plunge from US$ 11,970 a ton on October 24, 1985, to US$ 5440 - 5880 a ton last March 1986. On April 16,1986, the metal was quoted at the Kuala Lumpur Tin Market at US$ 5,531 a ton.

The sluggish tin market also effected other mining companies

PT RITIN began to feel the brunt of the tighter export quota in 1982 when it could only export about 50% of its metallic tin output. In that year, the company produced 1.469 tons of tin in concentrate which were smelted in-to 1.089 tons of metallic tin, but only 575 tons of this volume could be exported due to the quota imposed by the International Tin Council (see table 12).

The situation worsened in 1983 when the company could export only 140 tons, thereby cousing its revenues to fall to a mere US$ 1,78 million, compared with US$ 14.06 million in 1981 and US$ 7,66 million in 1982, in 1984 tin sales recovered to 820 tons valued at approx. US$ 10,0 million.

Table 12 PT RITIN PRODUCTION, SALES AND REVENUE 1980 - 1984

	1980	1981	1982	1983	1984
- Tin in concentrate ore (tons)	644	1.110	1.469	698	927
- Tin metal (tons)	580	971	1.089	1.014	990
- Tin sales (tons)	635	970	575	140	820
- Revenues (US$'000)	10.506	14.058	7.661	1.777	10.08

Source: Ministry of Mines and Energy

PT. RITIN which began production in 1979 had constantly operated in the red since 1983. It was reported that in 1984 alone, the company suffered a loss of US$ 3,5 million.
In June, 1985, PT. RITIN decided to cease operation.

PT. KOBATIN is also adversely affected by the market slump, as can be seen in the decline in its production from 6.518 tons in 1981 to 5.253 tons in 1983 and 4215 tons in 1984 as shown in table 13. The company sales revenue was declined from US$ 74,4 million in 1981 to US$ 55 million in 1983, and to $ 50,0 million in 1984.

TABLE 13 PT. KOBATIN PRODUCTION, SALES AND REVENUE 1980 - 1984

	1980	1981	1982	1983	1984
Tin in concentrate ore (tons)	5.262	6.518	5.471	5.252	4.215
Tin metals (tons)	5.174	6.337	5.114	4.382	4.257
Tin Sales (tons)	5.062	6.207	5.020	4.382	4.167
Revenue (US$'000)	71.390	74.358	56.715	54.983	50.032

Due to the world market situation PT.Broken Hill Proprietary Indonesia (BHPI) had to cut down its production 40% of its capacity. Its output was rather stable in recent years compared with the two other foreign mining companies because its export quota was set by the government at over 500 tons a year.

Since Indonesia was granted an export quota of only 22.236 tons in 1985 and PT. TAMBANG TIMAH will take up 16.698 tons of the total quota, the other three companies will have to share the remaining 5.538 tons or only about 67% of their 1981 production level.

c.2. Domestic tin market

Indonesia's tin processing industry has not developed as yet. Domestic tin consumption is still very small. Metal tin is mostly absorbed by the small tin alloy metal manufacturer's such as solder and babbit metal. Pewter craftsmen consumed about 25 tons annually.

Domestic requirements of tin plate and other articles made from tin are still imported. The first Indonesia's tin plate factory was built in 1982 and started trial production in October 1985.

PT. TAMBANG TIMAH is the only company supplying tin for domestic market/use. Average annual tin consumption amounted to approx. 400 tons over the past years. Government efforts for promoting the development of export commodities (including tin articles) has positively effected tin sales for local consumption in 1984 as shown on table 14.

Table 14 DOMESTIC TIN SALES BY PT. TAMBANG TIMAH 1974 - 1984

YEAR	SALES (ton)	AVERAGE PRICE Rp.'000/ton
1974	334,5	2717.0
1975	382,3	2520.7
1976	567.0	2708.3
1977	445.8	3908.9
1978	430.2	4961.6
1979	389.9	8196.0
1980	335.2	10037.2
1981	378.4	8470.2
1982	554.7	8373.4
1983	364.5	10384.8
1984	1495.4	11131.1

*Source: Mineral year book, Indonesia 1984

The tin price reflects on international tin market prices allowing adjustments for the domestic market situation.

Indonesia's tin consumption is projected to increase to about 2000 tons a year when the first tin plate factory reach its full production capacity.

c.3. Indonesia's tin import

Indonesia' imports of tin mostly in the form of tin plate and other articles made from tin. As shown in table 15, the import of articles made from tin fluctuated in volume and value, during the reported period as consumption depends on industrial users and requirements of local manufacturers of equipment for mainly the chemical and food industries, etc.

No.	ARTICLES	1977		19
		TON	US$	TON
1.	Tin Waste and scrap			
2.	Unwrought Tin	0.650	5.300.000	20.670
3.	Tin Wire	11.630	53.368.000	15.620
4.	Wrought. Bars. Rods. Angel shape NSF-TR	2.890	21.810.000	19.780
5.	Rods of tin base solder			
6.	Wrought Bars. Rods. angle shape SF-TR	0.050	404.000	5.790
7.	Wrought plates sheet and strips NSF-TR	0.050	12.000	74.950
8.	Wrought plate sheet and strips SF-TR	26.970	18.651.000	74.620
9.	Tin Foil	5.290	18.690.000	7.050
10.	Tin powder & flakes	0.030	217.000	0.100
11.	Tubes & pipe of Tin	2.790	29.483.000	1.050
12.	Collapsible Tubes for packing	1.550	38.854.000	0.930
13.	Handicraft of Tin			
14.	Ash-trays of Tin			
15.	Other articles of Tin	0.240	1.387.000	0.220
	T O T A L :	52.140	188.176.000	220.780

Source: Central Bureau of Statistics

SECTION 1

TABLE 15 IMPORT OF TIN AND ARTICLES THEREOF 1977 - 1984

1978		1979		1980	
TON	US$	TON	US$	TON	US$
		0.090	1.822.000	0.010	29.000
20.670	100.016.000	18.360	46.937.000	11.670	37.897.000
15.620	102.085.000	12.740	48.358.000	12.620	39.198.000
19.780	48.882.000	50.530	41.319.000	67.120	620.425.000
5.790	51.501.000	2.460	16.422.000	1.520	9.897.000
74.950	23.185.000	57.080	48.659.000	1.390	6.398.000
74.620	22.761.000	9.470	11.546.000	74.140	29.376.000
7.050	33.551.000	5.190	27.110.000	6.180	32.903.000
0.100	857.000	0.020	208.000	0.090	1,184.000
1.050	115.000	19.510	41.689.000	2.130	16.774.000
0.930	49,142.000	1.770	34.649.000	1.270	30.477.000
0.220	1.046.000	1.270	10.249.000	12.380	22,152.000
220.780	433,141.000	178.490	328.968.000	190.520	846.710.000

SECTION 2

1977 - 1984

980	1981		1982		198
US$	TON	US$	TON	US$	TON
29.000					
37.897.000	64.790	61.717.000	2.270	17.169.000	1.040
39.198.000	20.150	66.332.000	67.520	155.006.000	28.870
620.425.000	0.300	3.500.000	0.710	10.785.000	
	9.970	80.240.000	17.100	186.871.000	9.670
9.897.000	0.570	4.381.000	0.280	2.580.000	1.120
6.398.000	6.900	145.113.000	62.420	91.582.000	0.200
29.376.000	42.140	564.520.000	28.520	20.126.000	38.420
32.903.000	8.200	30.929.000	1.700	10.064.000	5.780
1.184.000	0.110	1.473.000			0.150
16.774.000	0.010	292.000	271.790	403.572.000	0.010
30.477.000	2.370	83.180.000	0.860	45.975.000	2.370
	12.000	5.826.000			
	0.240	2.334.000	0.020	173.000	
22.152.000	7.140	9.498.000	0.120	2.868.000	0.120
846.710.000	174.890	1.059.335.000	453.310	946.771.000	87.750

SECTION 3

1982		1983		1984	
	US$	TON	US$	TON	US$
				0.002	104.000
2.270	17.169.000	1.040	14.113.000	0.260	3.648.000
7.520	155.006.000	28.870	93.443.000	8.710	49.038.000
0.710	10.785.000			1.290	2.170.000
7.100	186.871.000	9.670	120.456.000	2.440	41.269.000
0.280	2.580.000	1.120	15.810.000	0.520	8.490.000
2.420	91.582.000	0.200	96.861.000	23.116	19.672.000
28.520	20.126.000	38.420	33.337.000	24.870	67.946.000
1.700	10.064.000	5.780	43.863.000	1.320	9.535.000
		0.150	1.253.000	0.100	1.665.000
71.790	403.572.000	0.010	502.000		
0.860	45.975.000	2.370	51.787.000	1.460	69.924.000
				0.001	24.000
0.020	173.000				
0.120	2.868.000	0.120	2.041.000	0.390	2.471.000
53.310	946.771.000	87.750	473.466.000	64.469	276.456.000

SECTION 4

The demand of tin plate has been markedly increasing these years due to the growth of can industrial users such as canned fruits, fish, beverages, biscuits, milk, paints, cosmetics, pharmaceuticals, etc.

Indonesia's tin plate consumption (equivalent to the volume of imports) increased from 72.598 tons valued at US$ 28.6 million in 1977 to 137.362 tons valued at US$ 70.6 million in 1985 as shown on table 16.

Table 16 INDONESIA'S TIN PLATE IMPORTS 1977-1985

YEAR	VOLUME (ton)	VALUE (US$ '000)
1977	72.598	28.557
1978	89.699	36.335
1979	116.163	53.786
1980	146.779	73.542
1981	110.934	58.237
1982	118.837	62.049
1983	119.117	66.204
1984	114.612	68.306
1985	137.362	70.585

Source: Central Bureau of Statistics

The total requirements for tin-plate is projected to increase to about 200.000 tons in 1990.

In order to meet the domestic requirements for tin plate, and to develop and promote domestic consumption of tin so as to reduce the heavy dependence on tin export market, and save foreign exchange, PT. TAMBANG TIMAH sponsored the construction of the first tin-plate factory in Indonesia.

2.9. Tin-plate factory

This factory is located at Cilegon Industrial Estate, about 100 kilometres West of Jakarta. Engineering & Construction work started in early 1982, and the plant was commisioned in 1985. Trial production was conducted in October 1985. The plant has now come on stream and will produce about 115.000 tons of tin plate in 1986. It is expected that the factory will run at its full capacity of 130.000 tons in 1987.

The factory is owned by PT. LATINUSA, a joint venture company between the state owned PT. TAMBANG TIMAH, state owned PT. KRAKATAU STEEL and a national private firm PT. NUSAMBA.

This project was part of the business diversification scheme of PT. TAMBANG TIMAH and is concurently designed as a down stream unit of PT. KRAKATAU STEEL which will supply the steel plate for the factory.

Construction of the factory was awarded to Mannesman Demag Sack GmbH of West Germany and Hitachi Zosen Corp. of Japan.

The factory required investment of about US$ 96.2 million. 30% (or US$ 28.8 million) was financed by PT. LATINUSA, and the balance 70% with foreign loan funding.

PT. TAMBANG TIMAH owns 52% PT. KRAKATAU STEEL 24% and PT. NUSAMBA 24% of the capital of PT. LATINUSA.

Judging from the company's production plan, Indonesia will still import tin plate in 1986, but imports will likely to stop altogether beginning in 1987 as the plant work at full capacity.

Technology

Process used	:	Ferrostan Electrolytic Tinning Process
Licenced by	:	U.S. Steel Corporation
Design capacity	:	130.000 tons per annum
Product	:	Tin plate in coils Tin plate in sheet
Quality	:	90% prime 10% waste/waste

Raw materials : 1. Black plate ± 140.000 ton per annum. Supplied by PT. KRAKATAU STEEL.

2. Tin metal ± 700 ton per annum suplied by PT. TAMBANG TIMAH

3. Chemicals

- Alkaline cleaner
- Sulphuric acid
- Phenol sulphonic acid (PSA)
- Stannous sulphate
- Ethoxylated naphtalene Sulphonate (ENSA)
- Wetting agent
- Sodium dichromate
- Chromate
- Chromic acid
- Electrostatic oiling agent

The major chemicals consumed are:

Alkaline cleaner	± 140 ton/year
Sulphuric acid	± 200 ton/year
P S A	± 165 ton/year

Alkaline cleaners and sulphuric acid are domestically manufactured while PSA is still imported. Other chemical requirements of about 2 - 5 tons annualy each are still imported.

The flow of process is as follows :

1. Electrolytic cleaning in alkaline solution to remove grease that may be present on the black plate surface.

2. Water rinsing to remove all traces of alkali.

3. Acid pickling with electrolytic action, to activate the plate surface for preparation of tin plating process.

4. Electrolytic tin plating.

5. Rinsing with water to remove all traces of electrolyte.

6. Drying to remove all traces of water.

7. Marking of the plate to indicate coating thickness.

8. Melting of the tin deposited layer to give a shiny appearance, characteristic of tin plate.

9. Chemical treatment of the tinplate with electrolytic action to produce a thin film of tin oxyde that inhibits surface oxidation.

10. Spray rinsing with water to remove all previous chemicals applied.

11. Drying of the tin plate.

12. Electrostatic oiling, to provide protection against scratching during handling and also to provide lubrication in subsequent container making operation.

13. Packing

At full capacity the factory is expected to employ about 500 workers and will save ± US$ 70 million annually in foreign exchange.

3. LEGAL AND INSTITUTIONAL ASPECT

A. Government policies and regulations

Foreign investment in Indonesia is governed primarily by the Foreign Investment Law of January 1967 (Law No. 1, 1967), as amended in August 1970 (Law No. 11, 1970) and their ancilliary regulation.

The law stipulates that foreign companies may invest and operate in Indonesia either in dependently or in joint venture with an Indonesian partner and with the approval of the Government for a maximum period of 30 years. Since January 1974, all foreign investments, other than investments in some specific areas, have been undertaken through joint ventures with Indonesian partners.

The Government recognizes that foreign investment has a mayor role to play in tne continueing development of the economy.
Indonesia welcomes private foreign investment, particularly in those areas where capital, advanced technology and management skills are not yet available internally. Investment projects given high priority are those which best support Indonesia's own national development objectives.

Certain Government policies are formulated to encourage business activities in general and capital investment in particular, namely :

1. Increasing exports of certain or all products of investment projects (especially non-oil commodities) without neglecting domestic requirements.

2. Saving foreign exchange by reducing imports or producing substitutes for imported goods.

3. Utilizing local raw materials and products, including capital goods.

4. Added value; i.e., promoting the processing of raw materials into half-finished or finished products, stepping up assembling to manufacturing, etc.

5. Augmenting economic and social effects of capital investments so that they yield more benefits.

6. Absorbing new technology know-how through the transfer of technological and managerial skills to Indonesians.

7. Yielding new or rare types of products, particularly capital goods or industrial raw materials.

8. Protecting the economically weak against possible competition from investors who receive investment facilities/incentives by assisting them in promoting their activities.

9. Protecting companies against competition from foreign investors who possess greater capital and technological capabilities.

10. Protecting investment projects, which have passed the period in which facilities/incentives are provided, against possible competition from new projects in the same field of activity.

11. Measures for environmental conservation are a prerequisite for certain types of activities which pose environmental hazards.

12. Capital and operation risks; operations requiring huge financing with high risks which national capabilities still lack, are a priority for foreign investments.

13. Local equity participation in accordance with the priorities of the national development plans.

14. Types of activities, be they raw material processing, marketing, infrastructure, services etc., are a consideration in determining priority areas.

15. Consideration will be given to such factors as saturation and the creation of an efficient business climate.

Based on the affformentioned consideration, and requirements, investment plans have been prepared with the goal to direct capital investment which contribute to achievement of development targets. These investment plans have been set forth in the Priority List For Investment (known as DSP), reflecting the various possibilities for capital investment in Indonesia.

The Priority List remains in effect for three years and is reviewed each year for adjustment to current conditions. Additions to or reductions in the fields of investment in the Priority List will be issued after agreement has been reached with the Minister in charge of the particular field of investment concerned.

The 1986 Priority List for Investment (DSP 1986), which constitutes a revised version of the DSP 1985, is organized according to the International Standard Industrial Classification (ISIC) and Departmental Codes.

Investment is defined as follows:

a. Foreign Investment (PMA) is investment which is subject to and is eligible for facilities under Law Number 1 of 1967 and Law Number 11 of 1970 and their ancillary regulations.

b. Domestic Investment (PMDN) is investment which is subject to and is eligible for facilties under Law Number 6 of 1968 and Law Number 12 of 1970 and their ancillary regulations.

c. Non PMA/PMDN is investment which is not subject to and is not eligible for facilities under Law Number 1 of 1967 on Foreign Investment and Law Number 6 of 1968 on Domestic Investment.

The Priority List for Investment consists of four categories, namely:

Category I : Fields of investment which are open to Foreign Investment (PMA)

Category II : Fields of investment which are open to Domestic Investment (PMDN).

Category III : Fields of investment which are open to small-scale enterprises and to Non-PMA/PMDN investment.

Category IV : Fields of investment which are closed to all types of further investment.

A potential investor who is interested in fields of investment which are not listed in the DSP may request clarification from the Investment Coordinating Board (BKPM). The decision on each particular request will be issued after taking into consideration the opinion of the Technical Department or Agency concerned.

The Technical Department or Agency concerned may suggest the addition or deletion of conditions and/or fields of investment which are not yet listed in the DSP.

B. The Investment Coordinating Board (BKPM)

Indonesia's Investment Coordinating Board, or "Badan Koordinasi Penanaman Modal" (BKPM) is a one stop investment agency.

For all the approvals, licenses and permits required to establish or expand production facilities in the country and recieve fiscal facilities, grants and other incentives, the investor deals solely with BKPM (except for forestry and mining projects). Moreover, the processing of applications is undertaken completely by BKPM. The Board administers the Foreign and Domestic Investment Acts and is the central point of investment authority under Presidential Decrees No. 33 of 1981 concerning the status, duties and functions of BKPM, and No. 54 of 1977 concerning the principal rules regarding capital investment procedures.

This has permitted the streamlining of processing procedures and provides a single point of advice and guidance for prospective investors.

The Board has 13 major obligations:

* coordination and planning of sectoral and regional investments and the synchronizing of these plans with a master plan
* formulation of investment policies
* preparation and publication of priority lists
* encouraging the spread of investment activities to the provinces in accordance with development policies
* supervising the implementation of approved investments
* development and processing of priority projects
* encouraging and fostering the completion of investment projects
* establishing effective promotional communication with investors in particular and the business world in general
* evaluation and screening of investment applications
* submission of evaluated foreign investment applications to the President for his approval
* approval of domestic investment applications
* issuing of required permits and the granting of facilities
* provision of general investment services

The Board also oversees investments in oil related industry, mining and forestry, although it does this for these sectors only after an initial working contract or forestry agreement has been issued by the appropriate ministries.

In addition to its main office in Jakarta, the investment Coordinating Board has regional offices to coordinate local investment in the following areas: West Java, Central Java, Jogjakarta, East Java, Aceh, North Sumatra, West Sumatra, Riau, Jambi, Bengkulu, Lampung, South Sumatra, West Kalimantan, East Kalimantan, Central Kalimantan, South Kalimantan, North Sulawesi, Central Sulawesi, Southeast Sulawesi, South Sulawesi, Maluku, Bali, West Nusa Tenggara, East Nusa Tenggara, Irian Jaya and the Jakarta Special District.

These offices, each under the direction of the provincial Governor, monitor and evaluate capital investment at the provincial level.

In 1981, BKPM opened investment offices in Paris, Frankfurt and New York. These offices are staffed by BKPM officers who are responsible for providing information regarding investment in Indonesia and serving as liaison between Indonesian and potential foreign business partners.

C. Several provision regarding conditior on Foreign Investment in 1986 :

1. The license for a Foreign Investment (PMA) company lasts for thirty years from the date of incorporation of the legal entity.

2. Foreign investment may only be conducted through joint ventures between foreign companies and Indonesian national companies or individual Indonesian citizens with the shares of the Indonesian partners at the time of formation of the joint venture company constituting at least 20% of the authorized capital of the companv.

3. For a Foreign Investment (PMA) company which:

   a. faces a high risk of business failure,
   b. requires large amounts of capital and high technology,
   c. is located in a remote area, or
   d. produces entirely for export,

   the initial share of the national participant may start at 5% and there after be increased to 20% within five years after commercial production.

4. The foreign partner must allow the Indonesian partner to increase its shareholding to a majority position (51% or more of the authorized capital of the joint venture company) within ten years of commercial production. In the event that the existing national partner is unable to increase its share ownership, offers may be made to other national partners, and where there are no other interested national partners, offers may be made to banks, to non-bank financial institutions or through the capital market.

   If after following the above steps the foregoing provisions still cannot be carried out within the stipulated period, then it can be fulfilled gradually with the assistance and guidance of BKPM. The same provision applies to the additional share capital required to finance expansion programs.

5. A Foreign Investment (PMA) company which increases its capital to expand its investment by constructing additional infrastructures and adding production equipment may obtain an additional license for at most thirty years from the approval or the additional investment by the Government.

6. Foreign Investment (PMA) companies must comply with Government Regulation Number 36 of 1977 concerning the Termination of Foreign Business Activities in the Field of Trade which stipulates that Foreign Investment (PMA) companies are not permitted to engage in trading activities.

7. A Foreign Investment (PMA) company which meets any of the following conditions will be afforded the same treatment as a Domestic Investment (PMDN) company :

   a. 75% of its shares are owned by the state and/or by national private parties, or
   b. It has gone public and the percentage of its shares have been sold through the capital market, or
   c. It has gone public and the percentage of its shares owned by the state and/or national private parties and which have been sold through the capital market is at least 51%, provided that at least 20% of the total shares are offered through the capital market.

   Treatment as a Domestic Investment (PMDN) company does not alter the status of the Foreign Investment (PMA) company.

8. A Foreign Investment (PMA) company may reinvest its profits either in its own company for an expansion program or in other companies, whether new or already in operation. The same provision applies to new investments from Foreign Investment (PMA) companies using funds other than profits. Any company, all or part of the shares of which are purchased by a Foreign Investment (PMA) company, will automatically have its status changed to a Foreign Investment (PMA) company.

9. A minimum investment of US$ 1,000,000. is required for a Foreign Investment (PMA) company, except for investments in consulting and engineering services and in certain fields as stipulated by the Department concerned based on special conditions or by BKPM based on specific policies.

10. All fields of investment, whether declared open or closed in the DSP, may be open in the scope of Foreign Investment (PMA) and Domestic Investment (PMDN) as well as Non-PMA/PMDN investment if the entire production is intended for export. For this purpose, entire production means at least 85% of the production must be sold on the export market.

11. Fields of investment that are only open for Domestic Investment (PMDN) and Non-PMA/PMDN investment (Category II) may be open for Foreign Investment (PMA) if a cooperative(s) is invited to participate with a shareholding of at least 20% at the time of formation of the joint venture company.

12. A joint venture company may undertake an expansion program in fields of investment that are currently not promoted for Foreign Investment (PMA) but are only open for Domestic Investment (PMDN) and Non-PMA/PMDN investment (Category II), provided that 20% of the share have been sold publicly on the capital market or a cooperative(s) is invited to participate as shareholder and holds at least 20% at the time the application for the expansion program is submitted.

13. Investment activities in certain provinces require Security Clearance from the Department of Defence and Security of the Headquarters of the Armed Forces, which can be obtained by or through the Investment Coordinating Board (BKPM).

14. Investment companies must comply with the rules on efforts to prevent environmental pollution as well as efforts to conserve nature and preserve the environment in accordance with Law Number 4 of 1982 concerning Basic Provisions on Management of the Environment.

15. Investment companies may utilize foreign experts which are required to quarantee the success of the venture, provided that such companies offer education and training as well as transfers of knowledge and technology programs so that gradually and within the stipulated time the work performed by such foreign experts may be performed by Indonesian workers.
The rules on the utilization of foreign experts in investment companies are issued by the Minister of Manpower taking into account the considerations of the Minister responsible for the development of the field of investment concerned and the Chairman of BKPM.

16. The procedures for applications for approvals of investments in the scope of Foreign Investment (PMA) and Domestic Investment (PMDN) are issued by the Chairman of BKPM. For Foreign Investments (PMA) in the field of general mining pursuant to contracts of work, the procedures are issued by the Minister of Mines and Energy. For fields of investment outside the scope of Foreign Investment (PMA) or Domestic Investment (PMDN), the procedures are issued by the Minister in charge of the development of that particular field of investment.

D. Investment Incentives 1986

1. With the enactment of Law Number 7 of 1983 on Income Tax, Law Number 8 of 1983 on Value Added Tax and Luxury Sales Tax, Law Number 12 of 1985 on Tax on Land and Buildings and Law Number 13 of 1985 on Stamp Duties, the fiscal facilities which may be granted in the scope of Foreign Investment (PMA) and Domestic Investment (PMDN) are as follows:

   a. Exemptions or reductions in import duties on machinery and equipment and spare parts.
   b. Exemptions or reductions in import duties on raw materials or materials used to assist in production for at most two years.
   c. Deferral of payment of the Value Added Tax (PPN) on the importation of capital goods utilized in the production of goods and in services.
   d. Exemption from duties on the registration of ships registered for the first time in Indonesia.

2. The importation of goods which are already produced domestically in adequate quantities and which have been listed on the List of Capital Goods Which Are Not Eligible For Import Duty Facilities (the "negative list") will not enjoy import duty facilities. Companies which export their entire production may still import such goods with import duty exemptions. Goods not listed on the "negative list" may still be imported by Foreign Investment (PMA) and Domestic Investment (PMDN) companies with import duty exemptions.

3. Foreign Investment (PMA) and Domestic Investment (PMDN) companies which purchase capital goods from domestic production may obtain exemptions from import duties on raw materials and/or components which were previously imported to produce such capital goods.

E. Foreign Exchange Transfer

The enterprise shall be granted the right to transfer foreign currency abroad at the rate of exchange prevailing at the time, for:

a. Net operating profits in proportion to the shareholding of the foreign participant

b. Allowance for depreciation of capital assets in respect of imported plant machinery and equipment in accordance with the foreign investment scheme.

c. Proceeds from the sale of shares by the foreign participants to the Indonesian participants or to Indonesian nationals

d. Expenses of foreign personnel assigned to the enterprise and for Indonesian employees training abroad

e. Principals and interests on foreign loans

f. Compensation in case of nationalization of the enterprise

F. Freedom to Manage

The investor has full authority to determine his own management and may use foreign managerial and technical employees in positions for which qualified Indonesians are not yet available.

While the investor is required to train and develop Indonesian personnel gradually to take over the running of the venture, certain key expatriates essential to the safeguarding of the investor's interests will be permitted for the duration of the investment.

G. International Protection Agreements

a. Guarantee Agreement
A number of foreign governments provide investment guarantees to their nationals who make investments in other countries. These guarantees cover, in most cases, compensation in case of nationalization or expatriation, in case of damage or loss caused by incidents of war, revolution or insurrection and payments for any approved remittance pursuant to the investment in case of non-convertibility of the currency of the host country. Indonesia has concluded agreements concerning guarantees of this general type with the United States, Denmark, the Netherlands, the Federal Republic of Germany, Norway, Belgium, the Republic of Korea, Canada, Switzerland, France and the United Kingdom.

b. Convention on the Settlement of Investment Disputes
Law No. 5 of 1968 ratifies Indonesia's adherence to the Convention on the Settlement of Investment Disputes between States and Nationals of other States. This convention has as its executive body the International Center for Settlement of Investment Disputes in Washington D.C.

H. Arbitration

In late 1977, a National Arbitration Board (BANI) was set up to assist in the arbitration of disputes arising from contracts and contractual provisions. The Boards accepts cases in all fields of trade, industry and finance and is empowered to resolve disputes between domestic firms, domestic and foreign enterprises or between either domestic or foreign businesses and the Government.

The Board was established with Government support and with the sponsorship of the Indonesian Chamber of Commerce and Industry (KADIN). It is chaired by a retired Justice of the Supreme Court.

I. Exchange Regulations

Bank Indonesia, as the central bank, is responsible for the regulation and administration of the banking system and foreign exchange regulations. Indonesia has virtually no foreign exchange controls, and foreign investors may freely transfer funds to or from abroad.

Payment for the importation of goods and services is not restricted. All export proceeds of goods and services need not be surrendered.

J. Registration of Foreign Capital

Foreign investors must register their equity and loan capital contributions with Bank Indonesia and must observe any stipulations on transfers of funds in their investment approvals. Repatriation of investors' equity capital is generally not allowed while the company is enjoying Indonesian tax incentives. An exception is, however, made where the funds remitted are derived from a sale of shares to an Indonesian national. Foreign companies must state investment capital in the foreign currency from which the subscription was made in addition to Indonesian rupiah as a means of quantifying the amount of any future repatriations of capital.

K. Investment on Mining

Foreign interest in mining activities was stimulated by the so-called First Generation work contracts in 1967, offering such incentives as reduced tax rates for 10 years, duty free import of equipment and accelerated depreciation of fixed capital assets. Certain requirements also were set for using domestic labor, materials and technology.

Second Generation work contracts in 1972 increased Indonesian participation and benefits, including a timetable for replacing all foreign managers and technical personnel by Indonesians.

In April 1977, the first Third Generation work contract was signed. The Third Generation contract provides for greater benefit to Indonesia. Among the new conditions are a 10% export tax on unprocessed minerals and a 60% tax on profits in excess of a return of 15% of investment cost averaged over a three-year period. Incentives provided for mining activities are based on Government Regulation No. 21 of 1976, and Presidential Decree No. 49 of 1981, adjusted to Tax Laws No. 7 and 8 of 1983.

For mining investment purposes, minerals are divided into three categories:

a. strategic minerals: oil, tin, nickel, uranium and other radioactive minerals, coal, cobalt, asphalt and others.

b. vital minerals: gold, silver, lead, zinc, copper, bauxite, manganese, iron and others.
c. other: primarily industrial minerals such as limestone, clay, sulphur, gypsum and so on.

The mining of strategic minerals can, in principle, only be done by the State, but arrangements have been worked out to permit private companies, both domestic and foreign, to mine strategic minerals. Foreign investment in mining must be done under either production-sharing contracts or work contracts with the Government.

The principle underlying this system is that the foreign party conducts all stages of the operation, including general prospecting, exploration, refining and processing, transport and marketing of the mineral products as contractor to the Government or State enterprise.

The foreign party, as the operating company, has to be incorporated in Indonesia unless special exemption is granted. It has control and management of all its activities under the agreement and has full responsibility assuming all risks of operation.

In general, the various stages of work to be stipulated in the contract comprise:

* general prospecting for a period of up to 12 month
* exploration 36 months
* evaluation 12 months
* construction 36 months
* operation 360 months

During the general prospecting, exploration and evaluation periods, the company has to relinquish periodically its right to non prospective parts of its contract area.

As to land retained under the contract, the Government undertakes to resettle indigenous inhabitants, but the company must pay compensation to them.

Furthermore, the company has to keep the Government informed of its activities through submission of quarterly progress reports and annual programs.

Within one year after termination of the exploration period, the company has to file with the Ministry of Mines and Energy a summary of its geological, mining, ore-dressing and metallurgical investigations together with representative samples, drawings, logs and other data. The Government has title to all documents and data suplied by the company, but, at the request of the company, certain data may be treated as strictly confidential.

The company must also submit to the Government its annual work programs and budget plans, together with the regular reports on progress. Furthermore, it is required to employ Indonesian personnel to the maximum extent and must undertake schooling and training for them.

In addition, the company must endeavor to use Indonesian services, raw materials produced from Indonesian sources and products manufactured in Indonesia. It should also provide a genuine opportunity for Indonesian capital participation as soon as production of the project commences.

Regarding financial aspects, the company will be subject to the payment of land rent in respect of the contract areas, royalties in respect of the company's production of minerals mined, corporation tax in respect of annual profits and sales tax of general application in Indonesia, together with tax upon transfer of ownership of motor vehicles and ships.

Exemption is provided from import and other customs duties in relation to the importation of machinery, equipment, tools and ancillary supplies needed for the operation of the project. Any item imported by the company for the operation of the project and no longer needed may be re-exported free from all export and other custom duties, or sold in Indonesia after compliance with customs and import laws and regulations.

The law furthermore permits transfer of profits, profiding taxes and other official obligations have been met. Provision is also made for accelerated depreciation of fixed capital assets.

L. Working condition, health and safety, wage level

1. Wage Rates

Indonesia has one of the lowest average wage rates in Asia. There are, however, considerable differences between the minimum wage rates of different industries. For example, rates for workers on agricultural estates are much lower than rates for workers in manufacturing and mining industries. Wage rate guidelines are determined by the Minister of Manpower on an industry sector and geographic location basis following review of input and material from various sources. Furthermore, even within each industry, huge differentials can exist between minimum and maximum wages; these gaps are highest in the estate, manufacturing, construction and mining industries where demand for skilled labor is strongest.

There is a statutory minimum wage in the private sector decided by the Minister of Manpower. Companies are free to determine the wages and salaries of employees beyond the minimum wage. Wages tend to be lowest in heavily populated areas like Central Java, Jogjakarta and Bali. The highest rates in Java are in the urban areas, particularly Jakarta, but these are lower than wage rates in either urban or rural areas of less populated Sumatra, Sulawesi, Irian Jaya and Kalimantan, particularly in areas where there is a strong demand for labor for new investment projects.

As a general guide, wages range from approximately Rp. 1,000 (about US$ 1.00) per day for a laborer to Rp. 250,000 (about US$ 250) per month for good clerks and secretaries. Well qualified Indonesians, especially those trained abroad, can generally demand much higher salaries. However, salaries much in excess of Rp. 500,000 (about US$ 500) per month would be exceptional.

2. Compensation

An employer must provide compensation equivalent to the full amount of wages for the entire contractual period if the employee has been hired for a definite period of time. Severance pay is given in lieu of the notice period and is calculated as the current month's pay multiplied by the number of months in the notice period. In addition, merit allowances of one to five months' wages are provided to factory employees with five or more years of continuous service. A month's pay is the basic wage plus all allowances and any accrued vacation. Included in the allowances is additional compensation fixed at 10% of cash wages, if free housing is provided, and compensation for any medical benefits which is fixed at 5% of the cash wage.

An employer is, basiccaly, exempted from paying a dismissed worker severance pay if that worker has committed a crime or caused damage to the enterprise. Any dispute between employer and worker, however, should be settled through a committee of labor dispute settlement. The department of Manpower must be notified within 30 days of intention to open, remove, or close down an enterprise.

3. Industrial Safety

According to Indonesia's industrial safety measures, employers are expected to maintain basic health, cleanliness, and lighting facilities in factories and work places. Provision must also be made for first aid and medical facilities as well as maintenance of on-premises eating areas.

The Safety Act of 1970 further provides for safety measure installations in factories against fires, industrial accidents, and defective building structures. It is mandatory for employers to provide their employees with self-protection apparatus during their course of work so as to guarantee the safety of the worker involved, the safety of the product itself, as well as the general safety of the factory.

Inspectors from the Safety Inspection Offrice of the Department of Manpower as well as technical officials and experts appointed by the Minister conduct periodic checks to ensure the safety of factories and work sites as well as to ensure factory conformity to regulations.

4. Accidents at Work

Employers in industry, mining, transportation, construction, plantation and fisheries, as well as enterprises using power machinery or explosives, are required to undertake a compensation scheme which provides substantial payment to workmen injured in the course of their duties or to their dependents in the case of fatal accidents. Compensation for a temporary disability is 100% of an employee's earnings for the first 120 days and 50% of his earnings thereafter.

In addition, a cash benefit in the form of an invalid pension scheme has to be provided by the employer for the permanently disabled employee. This guarantees a monthly allowance of 50% of his earnings plus a 20% supplement to cover the cost of an attendant. An employee who is partially disabled is entitled to a monthly pension ranging from 2% to 40% of his earnings, depending on the extent of his disability. Medical expenses, including hospitalization fees, have to be borne separately by the employer. However, should the employee refuse or discontinue treatment against medical advice, or leave the area, then the employer is no longer liable for any payment.

All accidents must be reported to the Regional Office of the Department of Manpower within 48 hours of occurrence and a record of the accident must be kept by the employer.

5. Overtime

On regular working days, overtime is payable as follows:

a. for the first hour of overtime, at the rate of 1 1/2 times the hourly wage.
b. for succeeding hours of overtime, at the rate of twice the hourly wage.

On Sundays and public holidays, overtime is payable as follows:

a. for the first seven hours of overtime, at the rate of twice the hourly wage.
b. for every hour in excess of seven hours, at the rate of thrice the hourly wage.

It is also customary for an annual bonus to be given to employees. The amount is not fixed, but is usually the equivalent of one month's full pay.

In addition, it is still a common practice for employers to provide such benefits as meals, transportation allowances and work clothes.

6. Youth and Female Workers

Young persons between the ages of 14 and 17 can be employed as workers in factories but not in mines or work sites which are dangerous or injurious to health. They can only be employed between the hours of 6 a.m. and 6 p.m.

Women may be employed other than for underground manual work. Indonesia's labor laws prohibit the employment of female workers during the hours between 6 p.m. and 6 a.m. However, if a company, for reasons of public interest of welfare, feels it requires female workers to be employed during these hours, permission may be requested from the head of the Labor Inspection Office. approval in such a case may require the company to comply with specified conditions.

Women are allowed maternity leave of 1 1/2 months both before and after confinement. During this period, a maternity allowance equivalent to full wages is given, provided application for leave has been made in advance. The benefit period before confinement can be extended to a maximum of three months on grounds of medical health.

7. Termination of Employment

An employee cannot normally be dismissed without Government authorization from the Regional Committee for Labor Disputes. Dismissal of more than 10 employees in any one month can only be made through the employer's direct request to the Central Committee at Jakarta. If the request is turned down, an appeal can be made to the Minister of Manpower. In addition, an employer may not dismiss a worker who is on sick leave for up to one year, a worker performing a Government service or one performing religious duties approved by the Government.

8. Unionization

Union membership is voluntary for employees in Indonesia. Some 40% of the labor force is nominally unionized but active membership is probably only 5% to 10%.

Indonesia has one official labor federation (the FBSI) to which all unions must be affiliated in order to receive Government recognition. A strike will be recognized only if it follows legal procedures in its implementation and only if it does not obstruct the nation's development process.

9. Labor Disputes

The Department of Manpower provides conciliatory services at the written request of either party to an industrial dispute which has not been resolved through direct negotiation or referred to an arbitration board for settlement.

Should conciliation not be effected within seven days, the dispute is referred to a Government tribunal comprising representatives from the Departments of Manpower (Chairman), Industry, Finance, Agriculture and Communication/Navigation. The private sector is represented by five representatives each from labor and management.

The decisions of this tribunal are legally binding unless appealed within 14 days by either party to the Central Disputes Committee in Jakarta which has overriding authority.

10. Collective Bargaining

Trade unions and employers are free to negotiate on a voluntary basis and to enter into collective agreements concerning wages and conditions of employment. The Government must, however, approve the contract. Approval may be withheld if the terms are not desirable in the public interest or if the Government is financially involved.

In the event of a dispute between union and employer, they are free to negotiate a settlement. Where they fail to reach a settlement, both parties may agree in advance to accept the decision of an arbitrator acceptable to both parties on the questions which they submit. If the parties cannot reach an agreement on their own in selecting arbitrators, then either party may seek the assistance of the Ministry of Manpower.

Collective bargaining agreements are valid for a maximum of three years. They are binding upon the parties to the agreement and may be extended through a "roping in" process to others at the request of the Minister of Manpower. This ministerial prerogative may be applied not just to individual companies but also to industries.

11. Business Hours and Holidays

The Indonesian Labor Law provides for a six-day, 40-hour week, with a maximum of seven hours per day. Many foreign companies prefer a five-day, 40-hour week and permission for this can be obtained.

Employees are entitled to a maximum leave period of 12 working days with full wages after 12 months' continuous service, which has to be taken within six months from being earned or is forfeited. Daily paid workers normally receive their wages before their annual leave commences. If the employee is on piece time, the daily wage is calculated as the average wage within the preceding six months from the date leave commences.

The main public holidays in Indonesia include:

New Year's Day
Saka New Year's Day
Good Friday
Ascension of the Prophen Muhammad
Ascension Day
Idul Fitri
Independence Day
Idul Adha
Moslem New Year
Birthday of the Prophet Muhammad
Christmas

In addition to the main public holidays, festivals are held on various islands throughout the year and these should be checked locally.

12. Land

The Basic Agrarian Law recognizes several types of rights on land. To the foreign investor, the following three main rights are significant:

1. The right of explo ration (Hak Guna Usaha). This is the right to use State-owned land of not less than 25 hectares for purposes of agriculture, including plantations, fishing of cattle raising.
2. The right of building (Hak Guna Bangunan), is the right to construct and own buildings
3. The right of use (Hak Pakai), is the right to use State-owned or other land.

These rights do not convey sub-surface, air or water rights which are dealt with separately and must be specifically acquired if the investor expects to use them. Water and mineral rights are covered by special laws and must be dealt with within the framework of those laws.

Government policy is to offer foreign investors those rights on land which are relevant to the nature of the enterprises concerned, such as the right of building for industries and other purposes.

Foreign investors who have obtained mining rights from the Minister of Mines and Energy have automatically obtained the use-right to use the land within their concession boundaries for purposes directly connected with the operations of the enterprises. Outside these purposes, special applications should be submitted to the ministry concerned.

The President's Decree No. 23 of 1980 assures joint venture companies utilization of land through the transfer of exploitation rights from the Indonesian partner to the joint venture.

4. STRATEGY OF DEVELOPMENT

4.1. Non Exploited Mines and Investment

The non exploited tin deposit in Indonesia are mainly the primary deposit which was found in significant quantity on the islands of Bangka, Belitung and Singkep.
Tin primary deposit on Bangka island located at Pemali north of Sungailiat (see map on tin drilling on Bangka island, appendix 7). On Belitung and Singkep island the location are shown on the maps of tin drilling on Belitung and Singkep islands (see maps, appendix 8,9) and is marked with a dotted line. The proved and possible deposit is marked with triangle.

Evaluation of the primary deposit conducted in 1982, for the total primary deposit on Bangka, Belitung and Singkep islands, indicates a total amount of ± 14 million tons of proved and possible deposit with an everage tin content of 0.23%. About 2.535,600 tons of which are found at Pemali area on Bangka island with an average tin content of 0.2%. This figure did not include the proved and possible deposit at Kelapa Kampit, Belitung island, in the concenssional area of PT. Broken Hill.

Total potential primary deposit found on those tin islands evaluated in 1982, amounted to about 50 million tons at 0.10% tin content.

Up till now, the primary tin deposit which had been exploited are in the area of Kelapa Kampit (Belitung), mined by PT. Broken Hill. PT. Tambang Timah mined only the weathered primary deposit at Pemali area.

Tin primary deposit are mostly embedded in granite rock. Exploitation required more complex recovery method and more expensive compared with mining of the secondary deposit. Survey and exploration of primary tin deposit which was intensified since 1975, are mainly conducted for the future support of the secondary tin reserve and deposit.

As the basic infrastructure for mining on those tin islands is alredy in place, only supplementary investment in the form of access roads, water and energy connections and additional new equipments will be required to exploit new mines for primary deposit.

World market demand for tin, and the present market price situation cause most of the tin producing countries to limit their tin production. In 1982, total on-shore and off-shore secondary tin reserves on the tin islands of Indonesia amounts to 754.852 tons Sn (see table 2). Based on the present average Indonesia's annual tin production of 30.000 tons, together with the intensified exploration conducted nowadays, secondary tin deposits in Indonesia can still be exploited for more than 25 years.
Long term new exploitation will focus on secondary tin deposit on-shore as well as off-shore. It is most likely that mining of the non exploited primary tin deposit will be carried out, when the secondary deposits have come to a stage where further exploitation was not justified any longer due to exhaustion.

Estimate investment required for mining and exploitation of primary tin deposit at Pemali area on Bangka Island is about US$ 3-4 million. This includes investment for machinery and equipments, piping and installation, staff housing, infrastructure and spare parts.

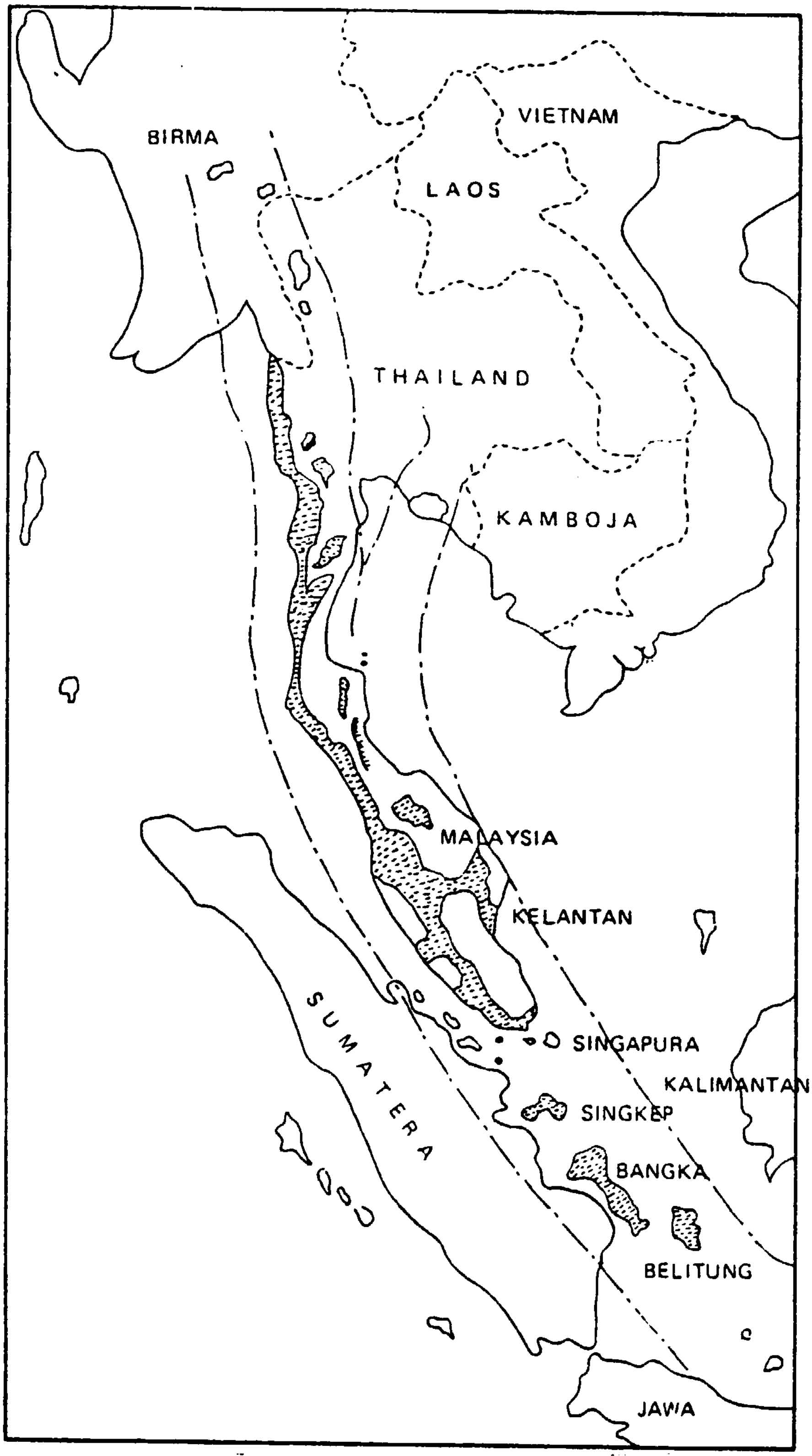
4.2. Strategy

Considering the fact that 90% of the Indonesia's tin production are exported, the depress international tin market gave a negative impact to the tin mining industry in Indonesia. The situation cause Indonesia to decrease its volume of export and limits its mining capacity.

To reduce the heavy dependency on export market Indonesia has develop and promote the local tin consuming industries. Deversification of product and increase their production capacity for export, may be one of the alternative to increase the local consumption of tin.

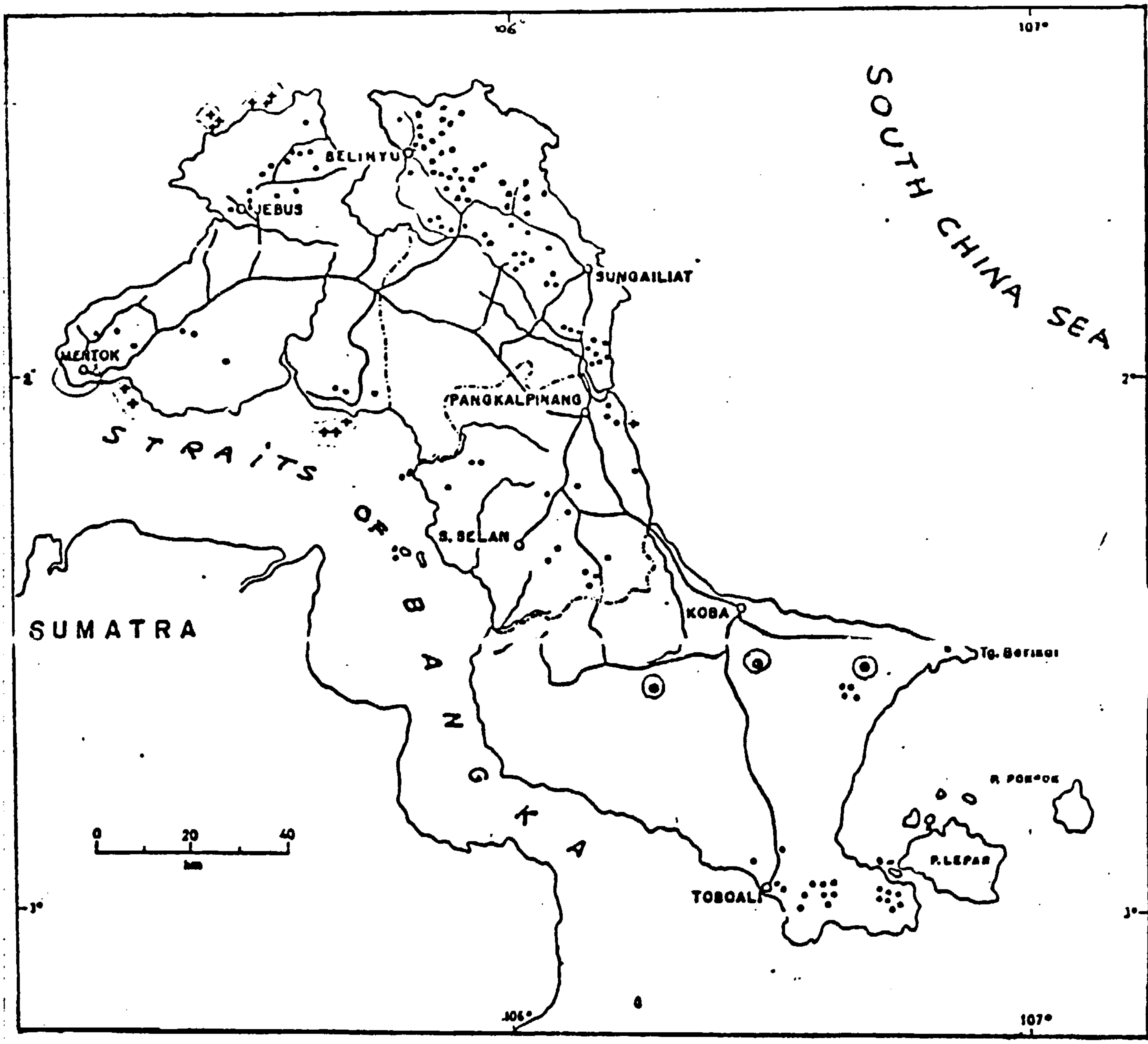
5. CONCLUSION

1. Indonesia's tin processing industry has not developed as yet. Domestic tin consumption is still very small.
2. Present largest domestic consumer of tin is the tin plate industry which commenced production in late 1985.
3. Other tin consuming industries are small industries which mostly not registered in the Department of Industry.
4. 90% of the total output of Indonesia's tin are exported.
5. Government promotion for the development of tin downstream industries still requires considerable time and efforts.
6. This case study stress more on tin mining, smelting and tin plate industry rather than tin industry as a whole.



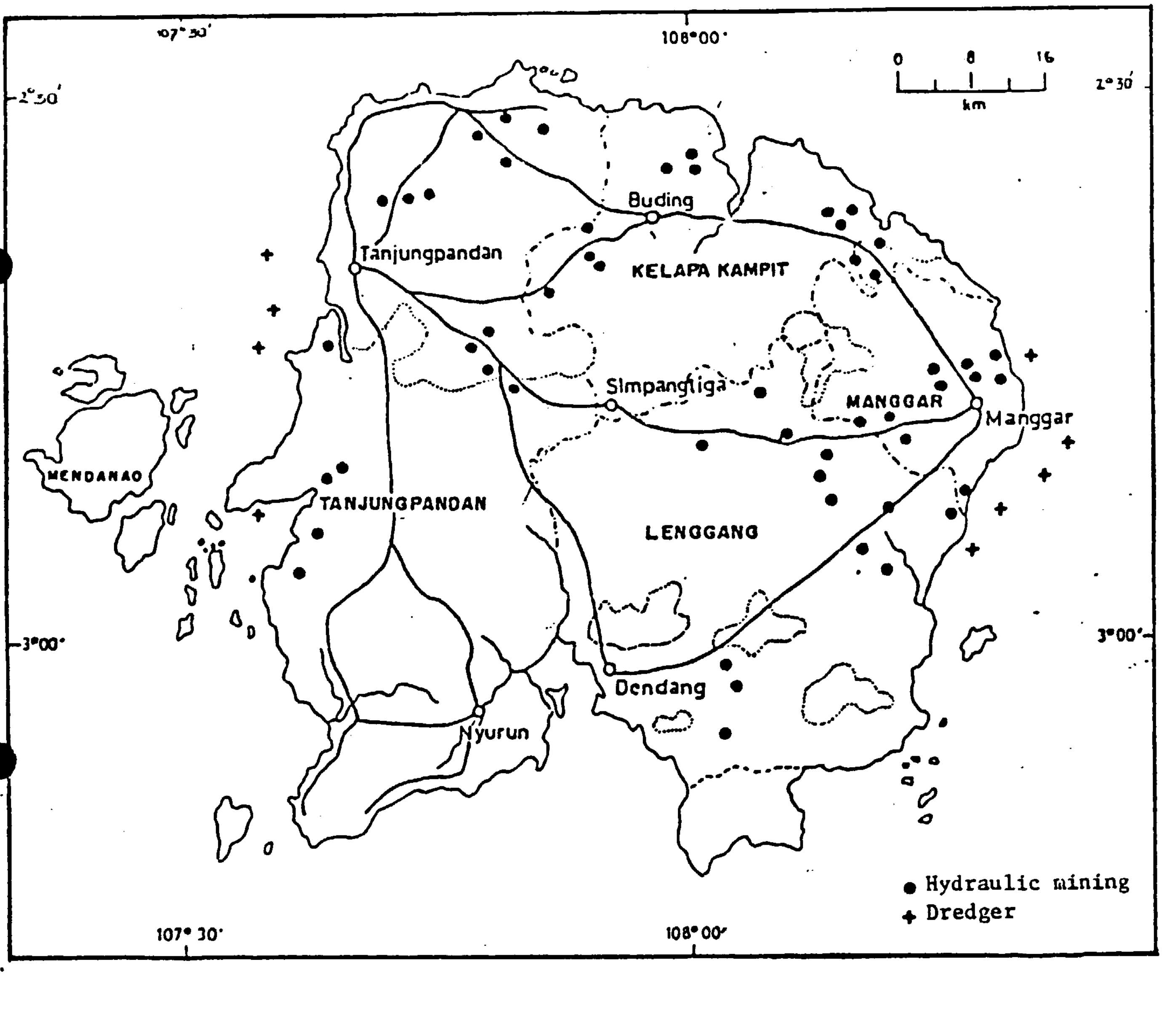
TIN BELT IN SOUTH-EAST ASIA

TIN MINING ON BANGKA ISLAND

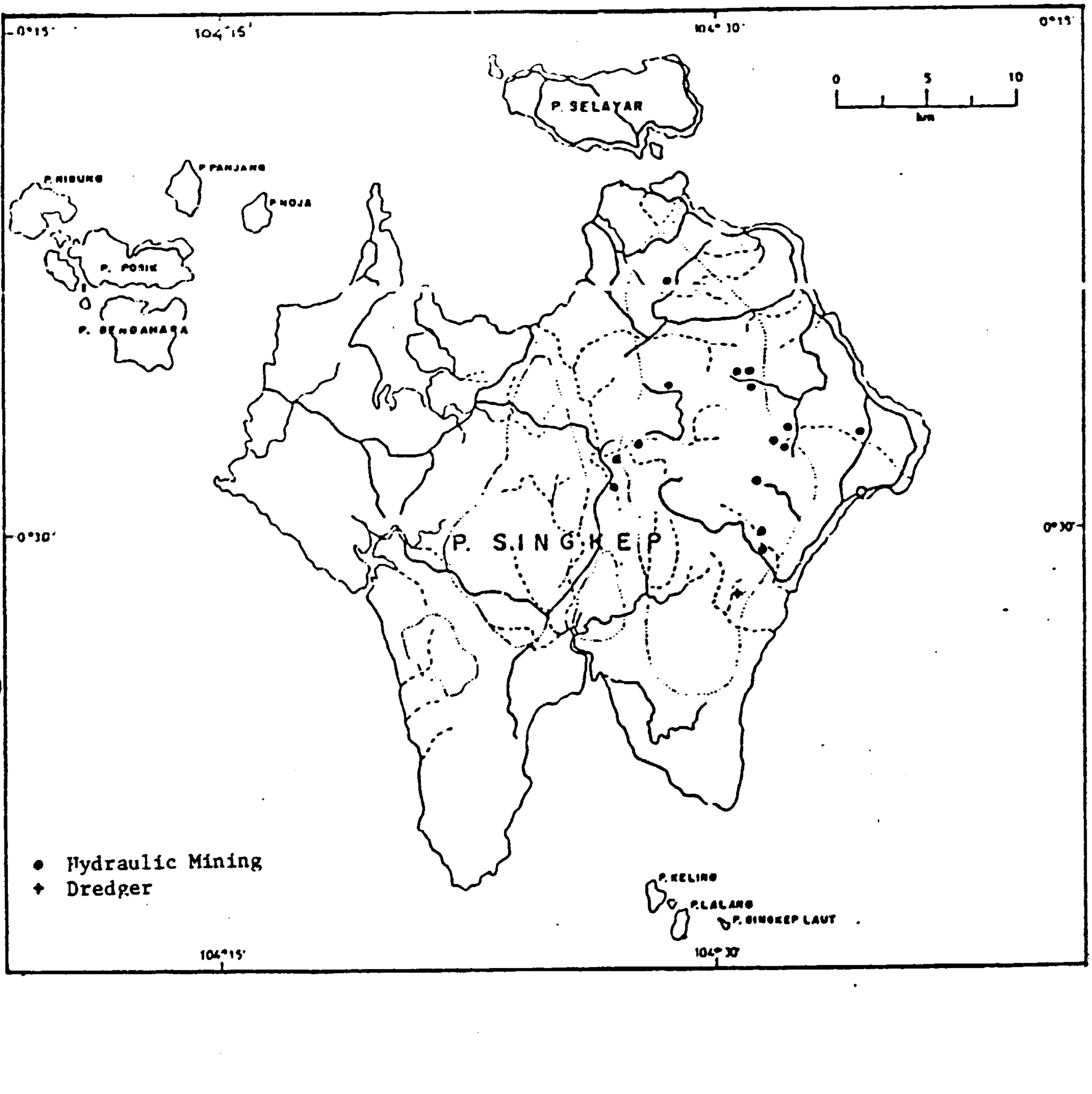


- Hydraulic mining } Operation PT Tambang Timah
- Dredger } Operation PT Tambang Timah
- Operation PT. Kobatin

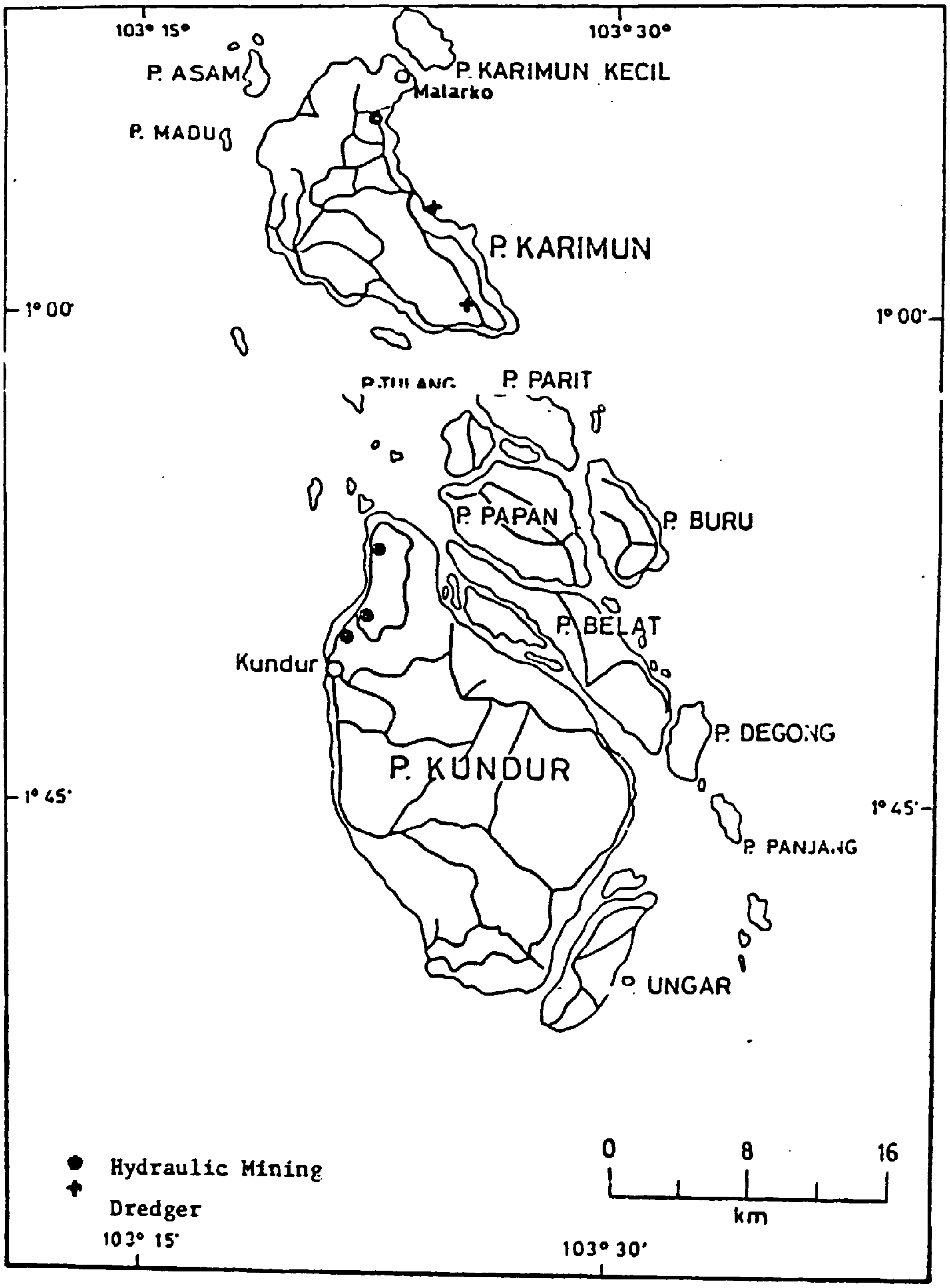
TIN MINING ON BELITUNG ISLAND



TIN MINING ON SINGKEP ISLAND

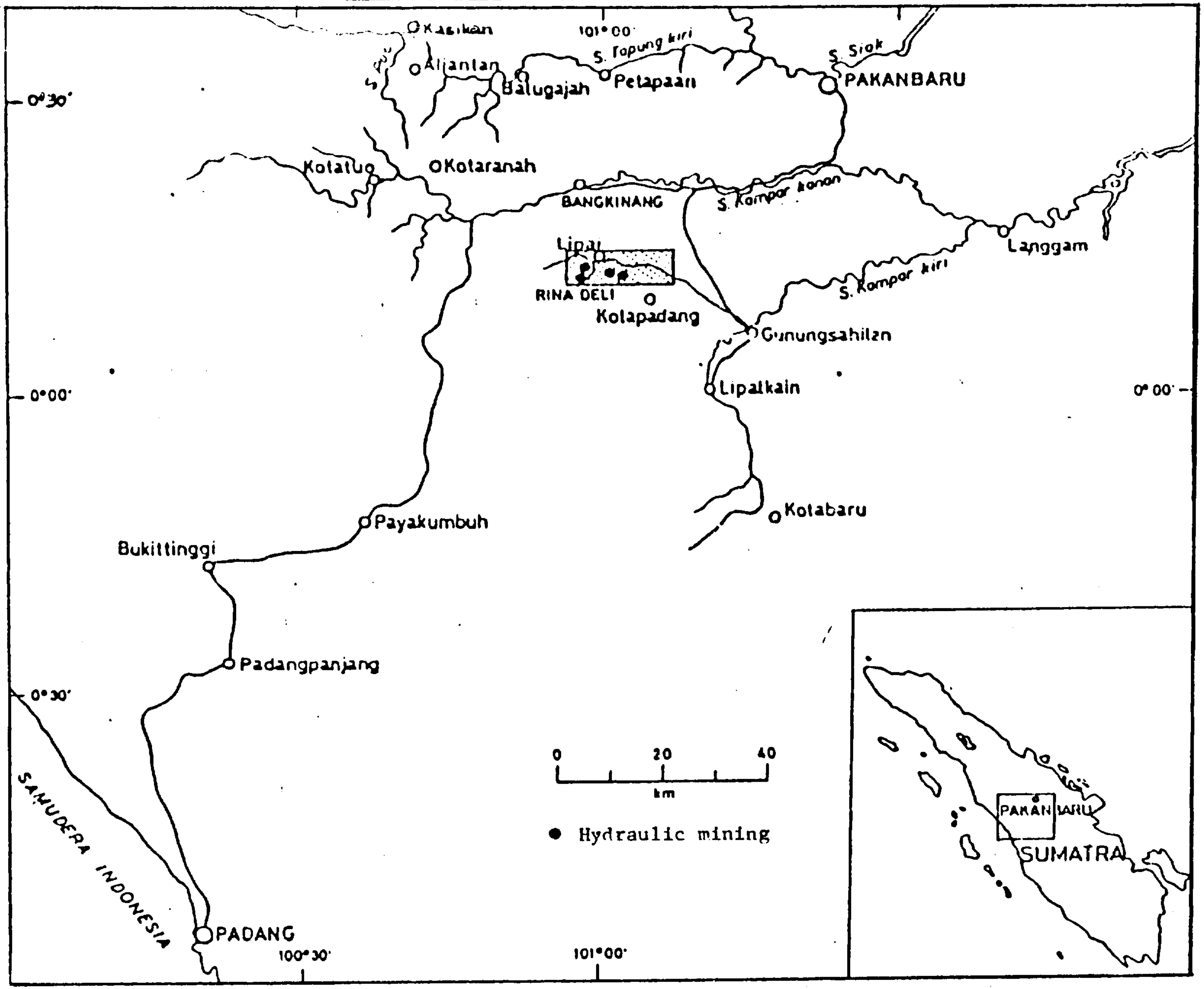


TIN MINING ON KARIMUN-KUNDUR ISLAND

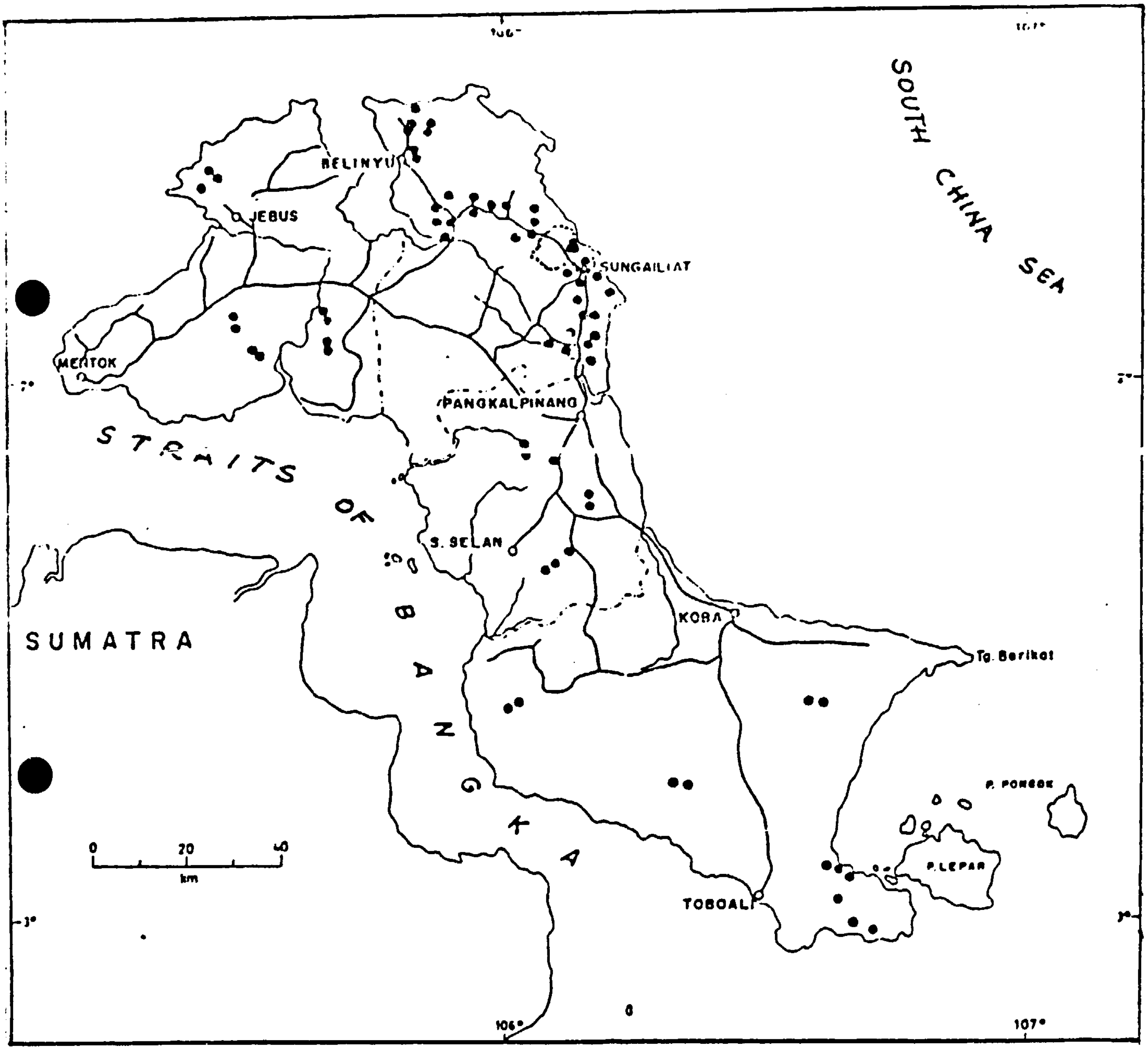


Appendix 6

TIN MINES AROUND BANGKINANG



TIN DRILLING ON BANGKA ISLAND

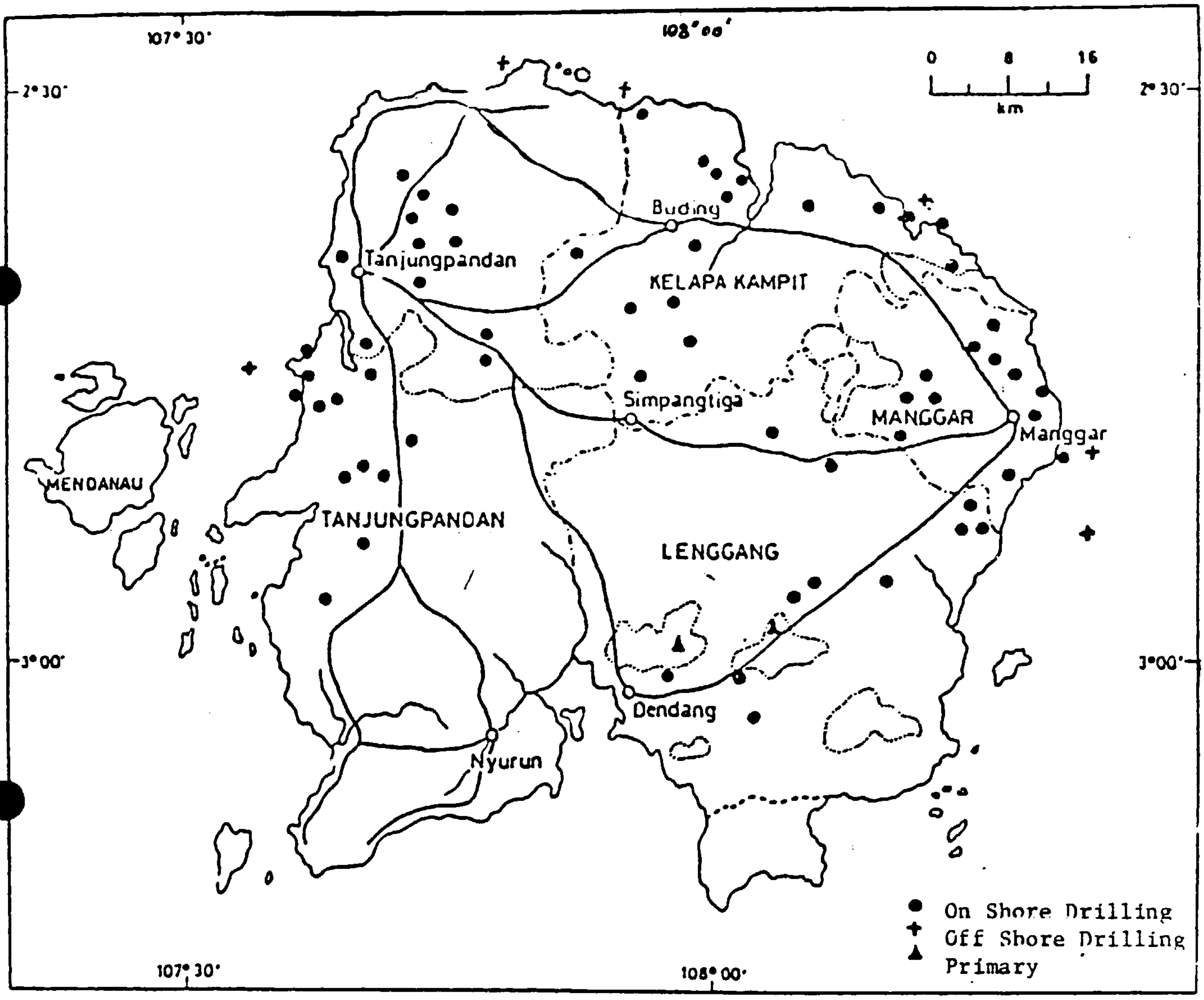


● drilling site

primary tin area

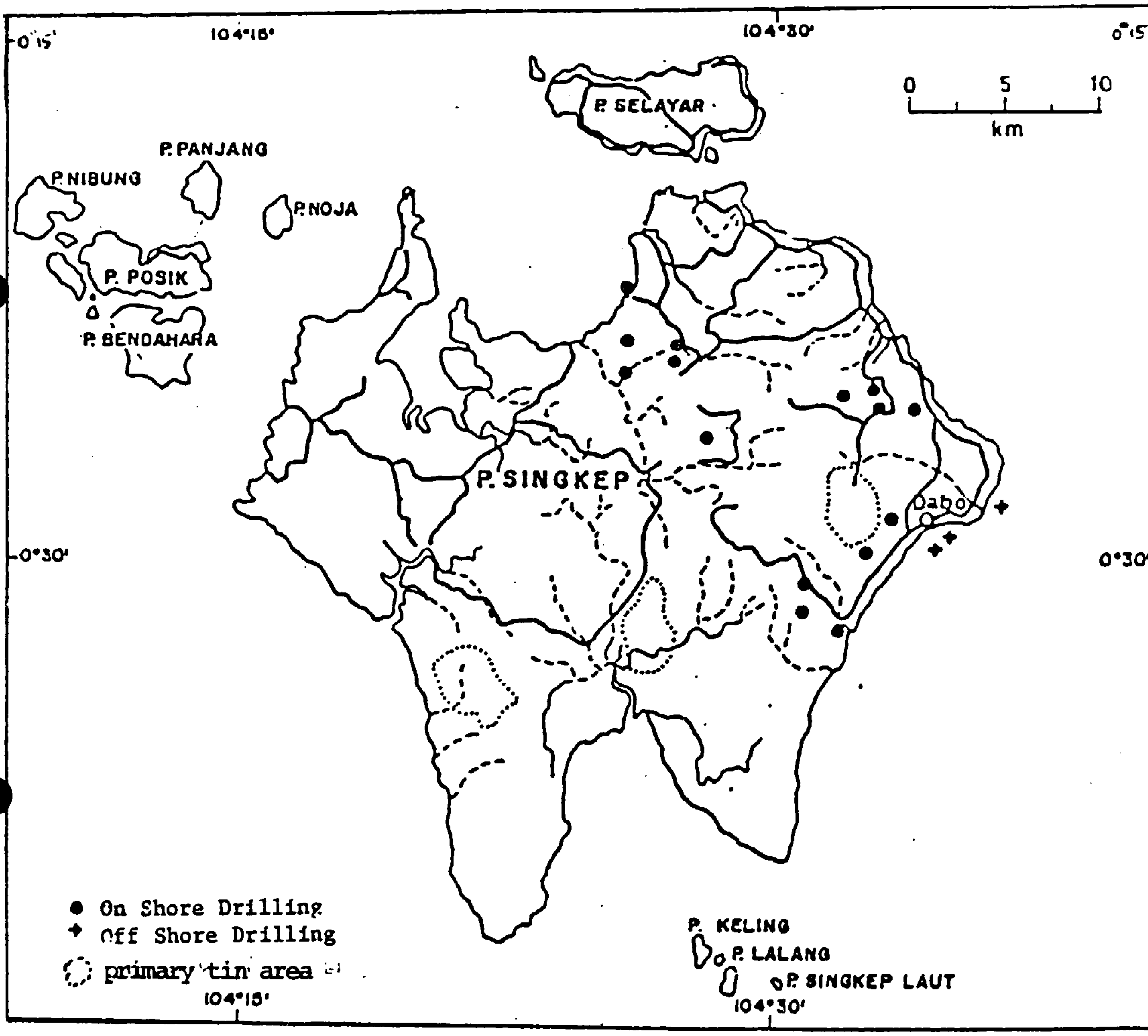
▲ primary tin

TIN DRILLING ON BELITUNG ISLAND

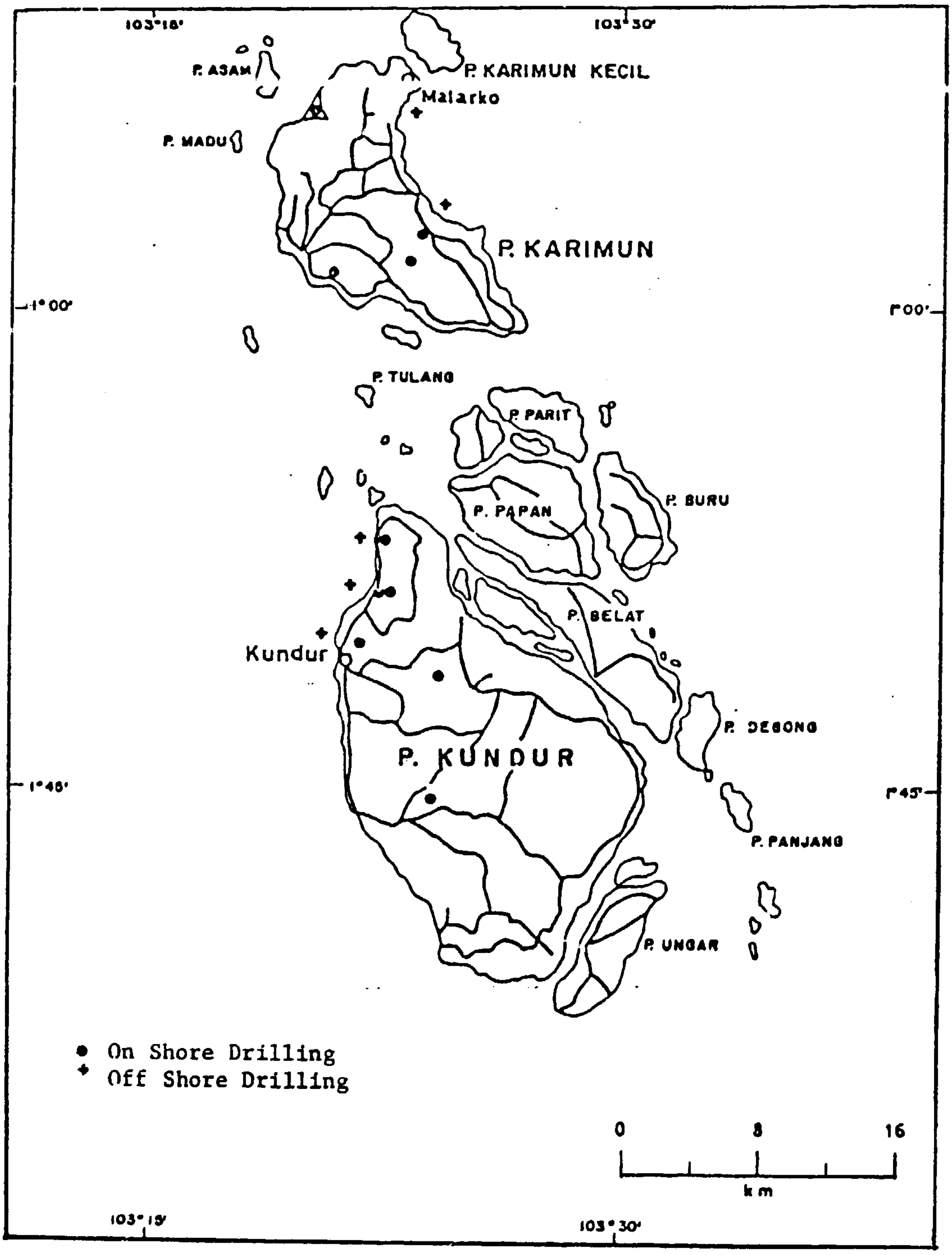


primary tin area

TIN DRILLING ON SINGKEP ISLAND



TIN DRILLING ON KARIMUN-KUNDUR ISLAND



REFERENCES

1. INDONESIA, MINERAL YEAR BOOK 1984/1985

2. STATISTIC, PT. Tambang Timah 1984

3. STUDY ON TIN, Special Bulletin No. 4-86
Mineral Information Centre Development Project,
Department of Mineral and Energy 1986.

4. Trend in Indonesia's tin Production 1971-1980
Economic report on Mineral No. 26, by Mr. Adjat
Sudradjat, Development Centre of Mineral Technology,
Directorate General of General Mining - 1983.

5. Tin Mining and Processing B.2.B.A.
PT. Tambang Timah

6. Prospect of Aluvial Tin deposit in Bangka island.
Geological Exploration Devision, Bangka Unit of Tin
Mining, PT. Tambang Timah 1982.

7. Off-shore Exploration For Tin and Tin ore Dressing
Research, Technical Report MD.21.
Mineral Dressing Division, Belitung Unit of Tin Mining,
PT. Tambang Timah 1973.

8. Indonesian Commercial Newsletter.
April 1986, July & February 1985, January, November,
December 1983.

9. Business News, February 1985.