

# THE MINERAL INDUSTRY OF THAILAND

By Pui-Kwan Tse

Thailand had been one of the world's fastest-growing economies since the mid-1980s. After four consecutive years of rapid expansion averaging more than 10% per year in the late 1980's, the Thai economy appeared to return to more sustainable paths of 8% yearly in the early 1990's. In 1995, the gross domestic product (GDP) grew by an estimated 8.6% from 1994. The inflation rate rose by 5.8% from 1994. The primary forces of growth were exports, tourism, and foreign investment. Domestic demand also played a significant role in stimulating growth, with a high growth rate in construction, increased spending by individuals, and private and public sector investment. The current account, which measured trade in goods and services plus certain financial transfers, showed a deficit equivalent to 7.1% of GDP in 1995, up from 5.6% in 1994. Thailand's household savings had declined from 15% in 1989 to 7.3% in 1995. While Thailand's overall savings rate was high (34% of GDP in 1994), it was not enough to match the country's rate of investment. In an effort to raise overall savings, the Government considered tax incentives to encourage savings. The central bank imposed a cash reserve requirement rule on all commercial banks and finance companies. The Government also urged banks to limit credit to investors.

Rapid growth was associated with a continuing reorientation of the economy. The share of GDP in agriculture sector had declined from almost one-quarter in the 1970's to 11% in the 1990's, although it still accounted for 60% of the Thai work force. The share of the GDP in the mining and quarrying sector also declined in the last 2 decades. The manufacturing sector increased its share from 17% in 1970 to 30% in 1995. The share of exports in the GDP increased continuously from 32% in 1990 to 42% in 1995. At the same time, the manufacturing sector moved away from low-value-added activities to become a producer and exporter of higher value-added, technology-intensive industries such as petroleum products, transportation equipment, and integrated circuits. The strength of economic growth exerted upward pressure on wage rates, weakening Thailand's competitiveness for a labor-intensive market. Thailand has a high literacy rate, but the education level might well hinder the Government's goal on developing its technology-intensive industry as the future engine of growth.

Mining and quarrying in Thailand accounted for less 1.5% of the GDP and was a smaller share of total employment. Structural changes, as well as land-use conflicts, including

for environmental issues, resulted in sharp declines in the production of certain mineral products. The Government policy for the mining sector changed from being export oriented to promoting sustainable development and serving the needs of domestic industry. The Government imposed export controls on tin ore and certain low-value-added minerals including lignite; gypsum; feldspar; and limestone, for which domestic demand increased.

In Thailand, minerals were owned by the State. All activities regarding mineral development were under the Ministry of Industry (MOI) and the Ministry of Science, Technology, and Environment supervision to ensure that benefits would be maximized for the country. The Department of Mineral Resources under the MOI was responsible for issuing licenses, establishing emission standards, monitoring compliance, and enforcing regulation for mining activities.

Production of nonmetallic mineral products, metal, and fabricated metal products accounted for about 9.4% of the total Thai manufacturing sector output. Iron and steel and petrochemicals were identified by the Government as a sectoral priority of investment promotion. New projects were permitted 8-year corporate income tax exemptions regardless of location. In 1991, the Board of Investment (BOI) decided to liberalize the iron and steel sector to meet the domestic demand. About 90% of domestic production was composed of long products, and the remainder was casting and forging products. Within the next 3 years, BOI was expecting that Thailand would have the capacity to manufacture all types and forms of iron and steel products.

Thailand had reduced its dependence on imported energy for domestic consumption from 90% in 1980's to 60% in 1990's. Domestic production of energy resources (primarily natural gas) increased by eightfold in the same time. In 1995, energy imports accounted for about 70% of domestic consumption, and domestic production was about 810,000 barrels per day. The major problems facing Thailand's energy sector were rapidly increasing energy demand, a distorted pricing structure, environmental deterioration related to vehicle emissions, and the use of lignite coal in power generation.

Because of the rapid growth and industrialization of the Thai economy, the Thai Government decided to restructure its tariff system to enable industries to operate efficiently. The Ministry of Finance announced that effective on January

1, 1995, the average tariff rate of mineral fuels and petrochemicals was reduced from the level of 30% in 1994 to 17% by 1997. A grace period for this reform was scheduled in two phases. The first phase would reduce tariffs by only one-half of the intended amount. The second stage would implement the full tariff reduction on January 1, 1997. The number of required import licenses in Thailand had also decreased significantly. A number of major products such as liquefied petroleum gas, kerosene, motorcycles, and certain buses remained subject to conditional import prohibitions.

MOI announced that the Government would suspend the gypsum mining licenses to relieve the oversupply in 1996. However, gypsum exploration was allowed to continue. Gypsum production had exceeded the domestic consumption and the surplus in the domestic market had led to severe price cutting among exporters. Under the Government policy, the export volume of gypsum would be reduced gradually in the next several years in order to protect the country's natural resources.

Thai Copper Industries Co. Ltd. was established by Thai banks and institutional investors as the major shareholder in 1995 after Padaeng Industry Co. Ltd. (PDI) withdrew its participation in the multinational joint venture involving Australia, Japan, and Switzerland in 1993. Thai Copper Industries received a \$455 million syndicated loan from seven Thai banks and financial institutions to finance its 165,000 metric-ton-per-year (t/yr) copper plant in Rayong Industry Park, Rayong Province. The company also planned to offer 80 million shares at \$0.4 per share in the local market. The total cost of the copper project was about \$600 million. Thai Copper Industries awarded Sofresid Francois Thuault of France a \$420 million turnkey contract to build the copper plant. The plant was expected to be on-stream in October 1998. Mitsui and Co. (Thailand) Ltd., Thai MC Co., and Marubeni Corp. of Japan signed an agreement with Thai Copper Industries to purchase 83% of its refined copper output. Swiss-based Interacid Trading S.A. agreed to purchase sulfuric acid produced from the smelter. Slime from the plant would be purchased by the Union Miniere S.A. of Belgium. Construction of the plant was scheduled to begin in April 1996. Union Miniere S.A. would provide technical support in construction as well as in the operation stage. Thailand consumed about 180,000 t/yr of copper, which exceeded the output capacity of the new plant. Therefore, Thailand was expected to continue copper to meet the gap between demand and domestic supply.

Tungkum Ltd., a joint venture of Niugini Mining of Papua New Guinea and Tongkah Harbour and Sintana Resources of Thailand, completed prefeasibility and environmental studies of its gold concession at Loei. A comprehensive report to support the applications for mining leases was submitted to the Thai Department of Mineral Resources. The company planned to build a 900 kilogram-per-year open cut gold mine in that area. The mine life was expected to last for 4 years. However, Tungkum Ltd. believed that there was a good

potential of underground high-grade ore in that area. The construction cost was estimated at \$6 million. The search for additional resources continued in that area.

Because of the domestic market facing excessive overcapacity of steel bars, the Association of Thai Steel Industries urged the Government to stop awarding new investment licenses to steel bar producers. In 1994, MOI issued 11 new mill licenses that were scheduled to begin production in 1996. The country's steel bar annual capacity would be at 4.4 metric tons. However, the projected demand was at 3.8 t in 1996.

Sahaviriya Steel Industries Co. (SSIC) sold a 76.25% of its shares in the Thai Cold Rolled Steel Sheet Co. to Japan's NKK Corp, Marubeni Corp, and other investors from Japan. SSIC did not have sufficient funds to repay the investment costs for the construction of the cold-rolled sheet mill. NKK would supply equipment and provide technical and operational assistance. The mill was expected to come on-stream in August 1997. The new mill would produce high-quality steel sheets of 600 to 1,550 millimeter (mm) wide and 0.18 to 3.0 mm thick for Japan's automotive and electric appliance producers operating in Thailand. SSIC had applied to BOI for approval for increasing its cold-rolled sheet output capacity from 670,000 t/yr to 1 million-metric-ton-per-year (Mt/yr).

Thailand was one of the major exporters of tin concentrate in the world, but it became a net importer of tin concentrates lately. In 1994, the country produced less than 4,000 t of tin from its tin mines. Because of depleted tin resources, the total tin output from domestic tin mines fell to about 3,000 t in 1995. Reduction of supplies of tin concentrates from domestic tin mines forced Thailand Smelting and Refining Co. Ltd., the country's only operating tin smelter, to increase tin concentrate imports from Laos and Australia. Thailand consumed about 5,000 t of tin metal each year. Surplus tin metal was exported to Japan and other Asian countries.

PDI, the only zinc metal producer in Thailand, underwent a major transformation in order to be more competitive. PDI decided to focus on zinc exploration and production as its core business. The company planned to explore new zinc resources in Thailand and abroad. PDI signed a memorandum of understanding with Western Metals Ltd. of Australia to buy 31 million shares from Western Metals. PDI would initially invest approximately \$9.75 million to acquire a 10% equity stake at \$0.62 per share from Western Metals. Another 10% would be acquired within 12 months. The agreement would require approval from Australia's Foreign Investment Review Board and the Thai regulatory authorities. Western Metals would use the investment from PDI to develop its Blendevale zinc deposit in Western Australia.

PDI's zinc refinery expansion project was expected to be completed according to schedule. After completion in the early 1997, the refinery would increase its annual output capacity from 70,000 t to 105,000 t. The demand for zinc

concentrates would rise from the present 140,000 t to 210,000 t at that time. PDI's zinc mines were gradually depleted in the past several years and PDI required to import a large percentage of its raw material from Australia. Because of an expansion in the galvanizing sector, the consumption of refined zinc was expected to increase by 8% annually in the next several years. In 1995, Thailand consumed about 110,000 t of refined zinc. The balance was to be met by imports.

ASEAN (Association of South East Asian Nations) Potash Mining Co., a company established by a joint venture of Southeast Asian countries, awarded a \$15 million contract to Trafalgar House Construction Mining of the United Kingdom to take over and restart construction of a decline access into the Bamnet Narong potash mine in the Bamnet Narong District of Chaiyaphum. Construction work was stopped in 1993 when the original contractor hit a brine aquifer that caused flooding in the area. Trafalgar House Construction Mining demonstrated that the company could safely penetrate the aquifer on an incline shaft to the depth of 180 meter (m). The 180-m-deep shaft would connect between the potash processing plant on the surface and the underground deposits. Construction work was scheduled to begin in March 1996 and was expected to be completed in 18 months. During construction, 280,000 t of rocksalt would be produced. It was expected to start production of 1.1 million metric tons (Mt) of potash, 250,000 t to 300,000 t of sodium chloride, and 4.1 million cubic meter of 450 gram-per-liter magnesium chloride solutions yearly by the year 2000 for the next 100 years. ASEAN selected this mine to supply potash to its members and other Asian countries. ASEAN consumed about 1.6 Mt/yr of potash and was expected to reach 2 Mt in the year 2000.

Asia Pacific Potash Corp, a joint venture of Asia Pacific Resources of Canada (62.5%), Thai Central Chemical Corp. (27.5%), and the Thai Government (10%), completed its potash exploration project at Udon Thani, Thailand. Potash reserves in the Korat Plateau were about 160 Mt with an average grade of 25.5% of potassium oxide. The drilling conducted in the Somboom area, a 2% of Asia Pacific's total concession area of 2,333 square kilometers, identified that an average thickness of the potash deposit was 4.1 m at the depth less than 300 m. The potash deposit in the Somboom area was estimated to supply 2 Mt/yr of potash for 20 years. With a final feasibility study due to be completed by the end of 1996, the startup of mine was scheduled for 1999.

In October 1995, MOI announced the invitation to bid for exploration and production of petroleum in an area of 120,000 km<sup>2</sup> in Andaman Sea. The proposals were to be submitted in January 1996.

The Petroleum Authority of Thailand (PTT) implemented a program to restructure the agency into five sectors—exploration, gas, oil, petrochemical, and production and refinery. PTT allowed a float of 25% shares in each sector to be listed in the stock market as a step toward

privatization. The remaining 75% in each sector remained under the control of PTT. The restructuring and privatization moves reflected the continuous growth in demand for energy because of the country's strong economic growth. It also reflected the agency's increasing demand for capital to compete with other multinational oil companies in Thailand. The PTT also expanded its business activities in Asian countries. It had established retail gasoline and liquid petroleum gas markets in Burma, China, Cambodia, Laos, the Philippines, and Vietnam.

In 1995, PTT signed a 30-year concession agreement with Thaipo Ltd., a subsidiary of Pogo Producing Co. of the United States, to supply natural gas from the Tantawan Field in the Gulf of Thailand. The agreed price was \$1.90 per million British thermal units. The Tantawan Field had proven reserves of 8.5 billion cubic meters of natural gas and was 56 kilometers from the PTT's transmission pipeline.

Thailand's petrochemical sector continued to expand to meet the country's demand. New integrated complexes were being built by Thai Petrochemical Industries and by Siam Cement Co. Ltd. (SCC). TPI's 350,000 t/yr cracker plant was scheduled to begin operation in 1998 and the company planned to build a second unit after that. SCC's naphtha-based 600,000 t/yr cracker plant was expected to come on-stream in 1999. Under the Government's tariff protection and controlled investment policies, the petrochemical sector became sufficiently mature to sustain international competition. Therefore, BOI announced that the Government would liberalize the country's production capacities of olefin in 1997 and aromatics in 2003.

### **Major Sources of Information**

Department of Mineral Resources  
Ministry of Industry  
Thanon Rama 6, Bangkok 10400, Thailand  
National Statistical Office  
Office of the Prime Minister  
Larn Luang Road, Bangkok 10100, Thailand  
Mining Industry Council of Thailand  
132 Sinthorn Building, Room 11, Wireless Road  
Bangkok 10500, Thailand  
The Electricity Generating Authority of Thailand  
52 Charan Sanit Wong Road  
Bang Kruai, Nonthaburi 11000, Thailand

### **Major Publications**

Department of Mineral Resources, Bangkok: Mineral Statistics of Thailand (annual).  
National Statistical Office, Office of the Prime Minister, Bangkok:  
Statistical Summary of Thailand, 1987 et seq.  
Statistical Yearbook of Thailand, 1990 et seq.  
Bank of Thailand, Bangkok: Annual Economic Report.

TABLE 1  
THAILAND: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1991	1992	1993	1994	1995p/
<b>METALS</b>					
<b>Antimony:</b>					
<b>Ore and concentrate:</b>					
Gross weight	141	632	1,464	1,123 r/	522
Sb content e/	60	269	620	500	230
Metal, smelter	2,256	1,847	1,692	1,424 r/	577
Cadmium	--	635	449	643	600 e/
<b>Columbium and tantalum ores and concentrates: 2/</b>					
Gross weight kilograms	3,000	--	--	--	--
Cb content do.	510 e/	--	--	--	--
Ta content do.	810 e/	--	--	--	--
<b>Iron and steel:</b>					
<b>Iron ore:</b>					
Gross weight	240,075	427,242	208,939	142,795 r/	34,480
Fe content	132,040	234,980	115,000	78,000 r/	17,000
<b>Metal: Steel:</b>					
Crude thousand tons	711	779	954	1,460 r/	1,500 e/
<b>Ferroalloys:</b>					
Ferromanganese	1,546	549	70	140	150 e/
Silicomanganese	3,938	4,275	1,503	689	650 e/
<b>Lead:</b>					
Mine output, Pb content of 42.5% Pb concentrate	16,680	11,880	6,050	7,950	9,680
Metal: Ingot, secondary	12,843	18,906	17,060	16,904 r/	19,070
<b>Manganese ore:</b>					
Battery- and chemical-grade, 75% MnO2	2,539	1,676	1,925 r/	1,152 r/	815
Metallurgical-grade, 46% to 50% MnO2	8,493	6,151	4,530 r/	5,300 r/	2,663
Total, gross weight	11,032	7,827	6,455	6,452 r/	3,478
Total Mn content e/	5,300	3,800	3,100	3,100	1,600
<b>Rare-earth minerals:</b>					
Monazite concentrate, gross weight	400	89	220	57 r/	--
Xenotime	15	--	--	--	--
<b>Tin:</b>					
Mine output, Sn content	14,937	11,484	6,363	3,926 r/	2,201
Metal, smelter, primary	11,255	10,679	8,099	7,759 r/	8,243
<b>Titanium:</b>					
Ilmenite concentrate, gross weight	17,071	2,922	20,715	1,600 r/	--
Leucoxene concentrate, gross weight	4	45	106	77 r/	33
Rutile concentrate, gross weight	76	281	87	49 r/	--
<b>Tungsten concentrate:</b>					
Mine output, gross weight	440	178 r/	203 r/	93 r/	92
Mine output, W content	230	70	80 r/ e/	40 r/ e/	60
<b>Zinc:</b>					
Mine output, gross weight	496,006	407,180	445,761	349,642 r/	135,198
Mine output, Zn content	87,000	62,000 e/	70,000 e/	55,000 e/	20,000
Metal, smelter, primary	62,152	60,557	65,000 e/	58,513 r/	46,398
Zirconium concentrate, gross weight	2,573	1,723	707	326 r/	--
<b>INDUSTRIAL MINERALS</b>					
Barite	92,974	46,328	42,385	53,248 r/	58,807
Cement, hydraulic thousand tons	18,054	21,832	26,870	26,000 e/	26,500 e/
<b>Clays:</b>					
Ball clay	178,192	224,254	345,846	329,286 r/	308,001
<b>Kaolin, marketable:</b>					
Beneficiated	255,543	301,035	397,330	417,064 r/	460,629
Nonbeneficiated	125,563	182,255	209,994	108,442 r/	--
Filler	733	3,445	6,699	8,503 r/	10,856
Diatomite	7,328	10,425	8,290	5,874 r/	5,991
Feldspar	702,603	559,806	600,835	554,227 r/	670,178
<b>Fluorspar, crude mine output</b>					
Metallurgical-grade	60,617 r/	51,597 r/	48,387 r/	23,705 r/	24,114
Low-grade	--	--	600	--	--
Total	60,617 r/	51,597 r/	48,987 r/	23,705 r/	24,114
Gemstones thousand carats	4,352	4,766	3,032 r/	2,105 r/	1,036
Gypsum thousand tons	7,196	7,111	7,456	8,140 r/	8,533
Phosphate rock, crude	5,936	7,981	10,764	7,739 r/	9,301
<b>Salt:</b>					
Rock	124,500	212,750	261,612	287,806 r/	380,544
Other e/	100,000	100,000	100,000	100,000	100,000

See footnotes at end of table

TABLE 1--Continued  
THAILAND: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1991	1992	1993	1994	1995 p/
<b>INDUSTRIAL MINERALS--Continued</b>					
Sand, silica	657,464	595,325	459,062	471,386	325,492
Stone:					
Calcite	18,000	17,215	7,037	23,300 r/	37,700
Dolomite	481,866	331,819	537,119	744,847 r/	668,795
Limestone for cement manufacture only	19,517	25,272	32,036	42,224 r/	45,559
Marble	74,984	86,995	88,398	87,163 r/	96,992
Marl for cement manufacture only	718	675	564	562 r/	611
Quartz, not further described	20,312	18,051	18,193	9,770 r/	11,288
Shale for cement manufacture only	2,448	2,860	3,597	3,574 r/	4,357
Talc and related materials:					
Pyrophyllite	42,960	34,638	43,404	55,326 r/	76,189
Talc	5,575	4,786	7,007	8,950 r/	4,252
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Coal:					
Anthracite	14,300	22,000	15,500	11,900 r/	5,000
Lignite	14,689	15,618	15,593	17,100 r/	18,419
Natural gas (gross production)	8,079	8,643	9,675	10,723 r/	11,389
Petroleum:					
Crude	8,938	9,632	9,120	9,161 r/	8,159
Natural gas condensate	7,938	9,676	10,505	11,174 r/	10,936
Refinery products: e/					
Liquefied petroleum gas	2,350	2,400	2,400	2,400	2,400
Gasoline	18,200	19,000	19,000	19,000	19,000
Jet fuel	12,000	12,500	12,500	12,500	12,500
Kerosene	900	900	900	900	900
Distillate fuel oil	28,400	28,500	28,500	28,500	28,500
Residual fuel oil	22,300	22,500	22,500	22,500	22,500
Unspecified 3/	3,400	3,400	3,400	3,400	3,400
Total	87,550	89,200	89,200	89,200	89,200

e/ Estimated. p/ Preliminary. r/ Revised.

1/ Includes data available through May 7, 1996.

2/ Excludes columbium- and tantalum-bearing tin slags.

3/ Includes refinery fuel plus refinery gains or losses.

TABLE 2  
THAILAND: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity e/
Antimony, concentrate	Associated Minerals Co. Ltd.	Bo Thang, 130 kilometers southeast of Bangkok (temporarily inactive)	6
Do.	Parasit Mining Co.	Doi Ngoem, 100 kilometers southeast of Chiang Mai	2
Barite	American Thai Barite Co. Ltd.	Siam Mine, 200 kilometers southeast of Phuket	25
Do.	P&S Mining Co. Ltd.	Loei Mine, 10 kilometers northwest of Loei	70
Do.	STA Mining Co. Ltd.	STA Mine, 105 kilometers southeast of Chiang Mai	100
Cement	Siam Cement Co. Ltd.	Kaeng Khoi, 90 kilometers north of Bangkok	3,300
Do.	do.	Tambol Tabkwang, Kaeng Khoi District 90 kilometers northeast of Bangkok	2,800
Do.	do.	Tha Luang, 90 kilometers northeast of Phuket	3,200
Do.	do.	Thung Song, 130 kilometers east of Phuket	900
Fluorspar, concentrate	Phanom Thuan Mining Co. Ltd.	Phanom Thuan, 45 kilometers north of Kanchanaburi	60
Do.	Skt Minerals Co. Ltd.	Mine is 47 kilometers southeast of Krabi	65
Do.	Thai Fluorite Processing Co. Ltd.	Ban Lad, Phet Buri	120
Do.	United Fluorite Co. Ltd.	Salak Pra, 80 kilometers northwest of Kanchanaburi	26
Do.	Universal Mining Co. Ltd.	Mae la Luang, 120 kilometers west of Chiang Mai	35
Lead, concentrate	Kanchanaburi Exploration and Mining Co. Ltd.	Song Toh, 250 kilometers northwest of Bangkok	45
Steel, rolled	Bangkok Iron & Steel Co. Ltd.	Bangkok	160
Do.	Bangkok Steel Industry Co. Ltd.	Samut Prakan Province, south of Bangkok	210
Do.	Sahaviriya Steel Industries Co.	Bang Saphan District, Prachuap Khiri Khan Province	2,400
Do.	Siam Iron & Steel Co. Ltd.	Saraburi Province, 100 kilometers north of Bangkok	220
Tantalum and niobium in tin slag	Thai Tantalum Co. Ltd.	Rayong	500
<b>Tin:</b>			
Concentrate	Numerous small companies	Offshore Andaman Sea from southern tip of Burma to south of Phuket	NA
Do.	do.	Mostly south Thailand and along southern Burma border	NA
Refined	Thailand Smelting and Refining Co. Ltd.	Phuket	38
Tungsten, concentrate	Parasit Mining Co.	Doi Ngeom, 100 kilometers southeast of Chiang Mai	0.1
Do.	Siamerican Mining Enterprise Co. Ltd.	Khao Soon, 185 kilometers east of Phuket (temporarily inactive)	1.2
Do.	Sirithai Scheelite Thailand Co. Ltd.	Doi Mok, 120 kilometers northeast of Chiang Mai (temporarily inactive)	0.4
<b>Zinc:</b>			
Ore	Padaeng Industry Co. Ltd.	Mae Sot, 64 kilometers west of Tak	350
Refined	do.	Tak	72

e/ Estimated. NA Not available.