เหมืองแร่ปิล็อก

Pilok Mine

Pilok Mine

by

S. Bunjitadulya

as revised by Mining Technology Division

Mining Technology Division

Department of Mineral Resources

November 1983

Pilok Mine,

The First Asset of Mines Organization

S. BUNJITADULYA*

INTRODUCTION

Pilok Mine is one of the state-owned mines that has been operated by Mines Organization for more than 40 years. It is located at about 280 kilometers in the west of Bangkok. The area is mountainous terrain with the altitude ranging from 750 meters to more than 1000 meters above sea level and located in the so called Tennasserim mountains chain which lies along Thai and Burmese territory. The Pilok mines area belongs to the Thong Phaphum district, Kanchanaburi province in Central-Western Thailand and covers an area of more than 30 square kilometers.

There are 10 private mining companies operating in the Pilok area including the Mines Organization which is authorized for mining operation in 35 concessions (covering the total area of 5.6 square kilometers approximately) granted by the Ministry of Industry.

COMMUNICATION

The Pilok Mine can be reached conveniently from Bangkok in all seasons. Starting from Bangkok, one travels on the western route to Kanchanaburi province for 129 kilometers within 2 hours. From Kanchanaburi province, travelling is through Thong Phaphum district on the asphaltpaved road for 90 kilometers and going westwards on the laterite-paved roadbed for 60 kilometers over the mountain range to the Pilok Mine. The total distance is 280 kilometers approximately with 6 hours travelling time. Actually, the Mine is easily accessible by cars/trucks all year round.

---

* Formerly geologist, Geological Survey Division, DMR. Bangkok.
Senior geologist, Mining Division, Mines Organization, Bangkok.

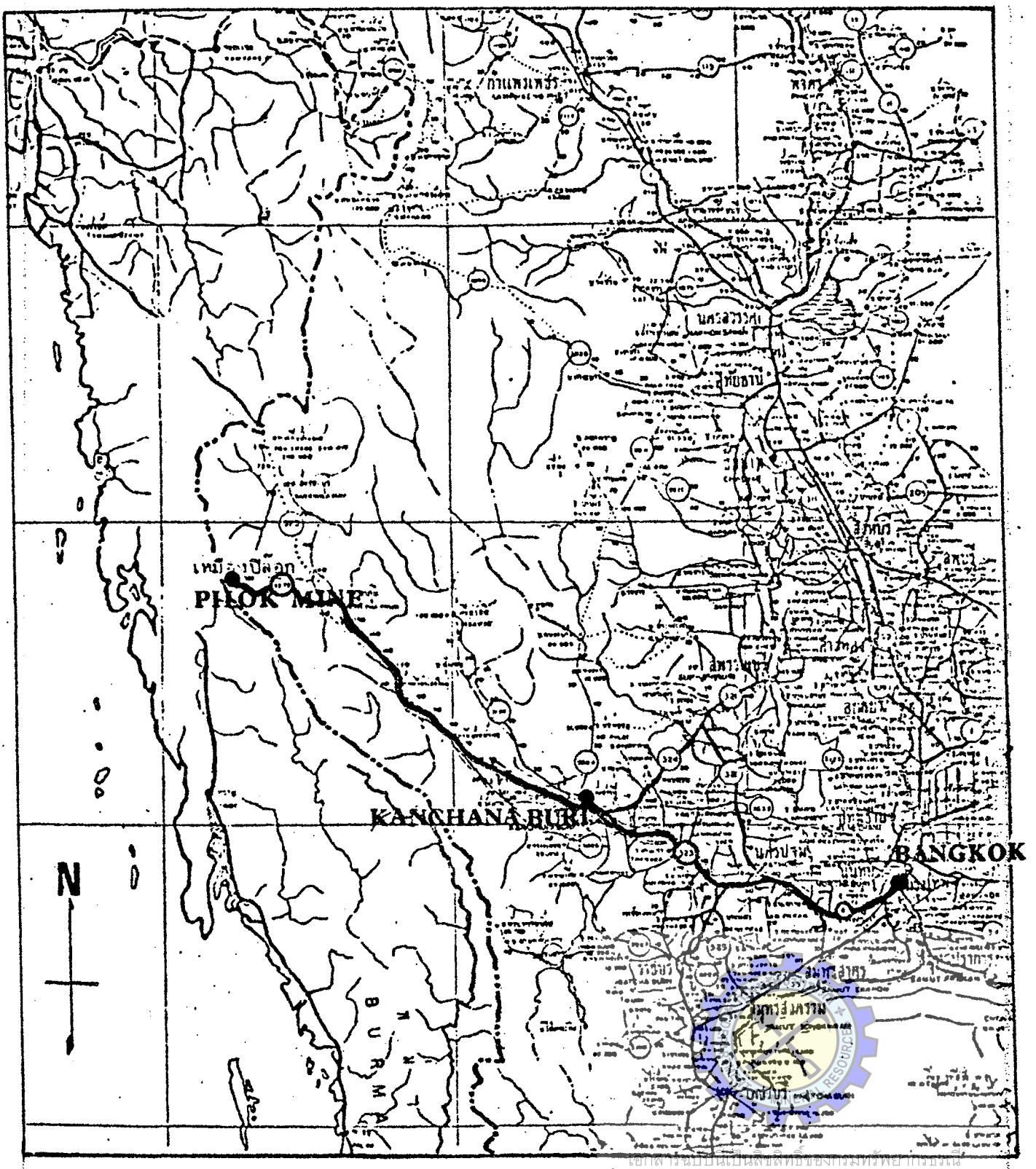


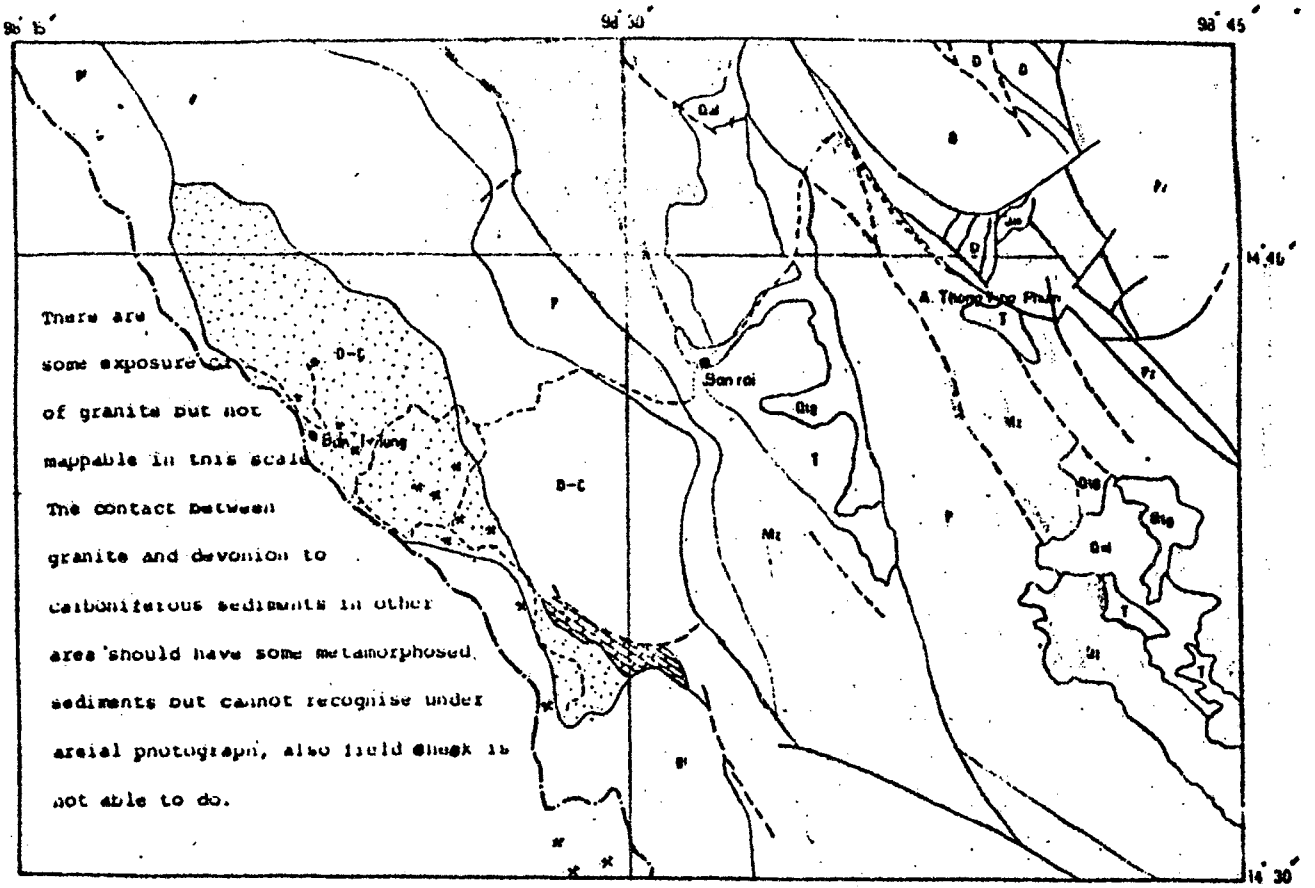
Fig.1 Map showing route from Bangkok to Pilok mine

GEOLOGICAL BACKGROUND

Few selected reports on geological investigation and mining of this area may be reviewed as follows :

Tin and tungsten deposits in the Pilok mining district, Amphoe Thong Pha Phum, Kanchanaburi province were first investigated by Brown and others(1951). The deposits situated in the Tavoy range along the Burmese border and the mineralization is believed to cover an area of 40 km long and 5 km wide along the mountain range between Burma and Thailand. Tin and tungsten veins were found to be associated with granite intruding a series of metasedimentary rocks. The veins are in weathered granite or shale, sandy shale, sandstone, slate, quartzite and specially phyllite. The granite in this district is termed the Pilok granite (G.G.M Report, 1972) and the metasediments that were intruded are of Paleozoic age. Yaemniyom (1977) noted that this biotitemuscovite granite is Cretaceous in age and the Paleozoic rocks are assigned to the Kanchanaburi Series. Veins are quartz-rich and at few localities can be classified as pegmatite veins. Cassiterite and wolframite are the major ore minerals with minor pyrite, chalcopyrite, molydenite, scheelite and beryl. The G.G.M Report(1972) stated that the veins and vein systems in the Pilok mining district are striking in two major directions : E-W and N-S. The E-W veins are within the granite and contain almost solely cassiterite and, very rarely, gold. In contrast, the N-S veins, frequently within the country rocks, are coarsely pegmatitic and contain wolframite and scheelite. The ore content can be mixed in the intersection of the two vein systems. Mining activity is located in both primary veins and in alluvial placers.

Bunjitradulya (1980) reported the tin and tungsten occurrences at I-tong mine of the Pilok mines area, Amphoe Thong Phaphum, Kanchanaburi province. Tin and tungsten occur in the quartz veins which are almost in N-S direction. The host rocks are biotite-muscovite granite with a few small aplite veins and greissenized. This batholith granite is a combination of complex Phases of various geologic times and the ages are ranging from Triassic to Tertiary which was capped by metasedimentary rocks of the Carboinferous in age. The major ores in quartz veins are wolframite with



Scale

Explanation in brief

Qal	Alluvium
Qtg	Gravel
Qt	Terrace, tufa, colluvium
T	Tertiary rocks compose of semi-consolidated to consolidated sandstone, shale, siltstone, mudstone and conglomerate
Mz	Mesozoic rocks compose of conglomerates (Mz. cgl), limestone and silicified siltstone (Mz)
P	Permian limestone with chert nodule
C	Carboniferous rocks - mainly pebbly sandstone, pebbly mudstone with fine - grained sandstone. Boiled pattern is phyllite and quartzite due to contact metomorphism, and also limestone (in pattern) of unknown age.
D	Devonion rocks - mainly shale and fine - grained sandstone
S	Silurian compose of black shale
O	Ordovician limestone the limestone show band of argillaceous material
Pz	Paleozoic rocks are in Cambrian age compose of gneiss, calcsilicate rocks, schist and marble
gr	Granite of Tertiary age

Fig.2 Geological map of Pilok mining district
(SIRIBHAKDI , 1979)

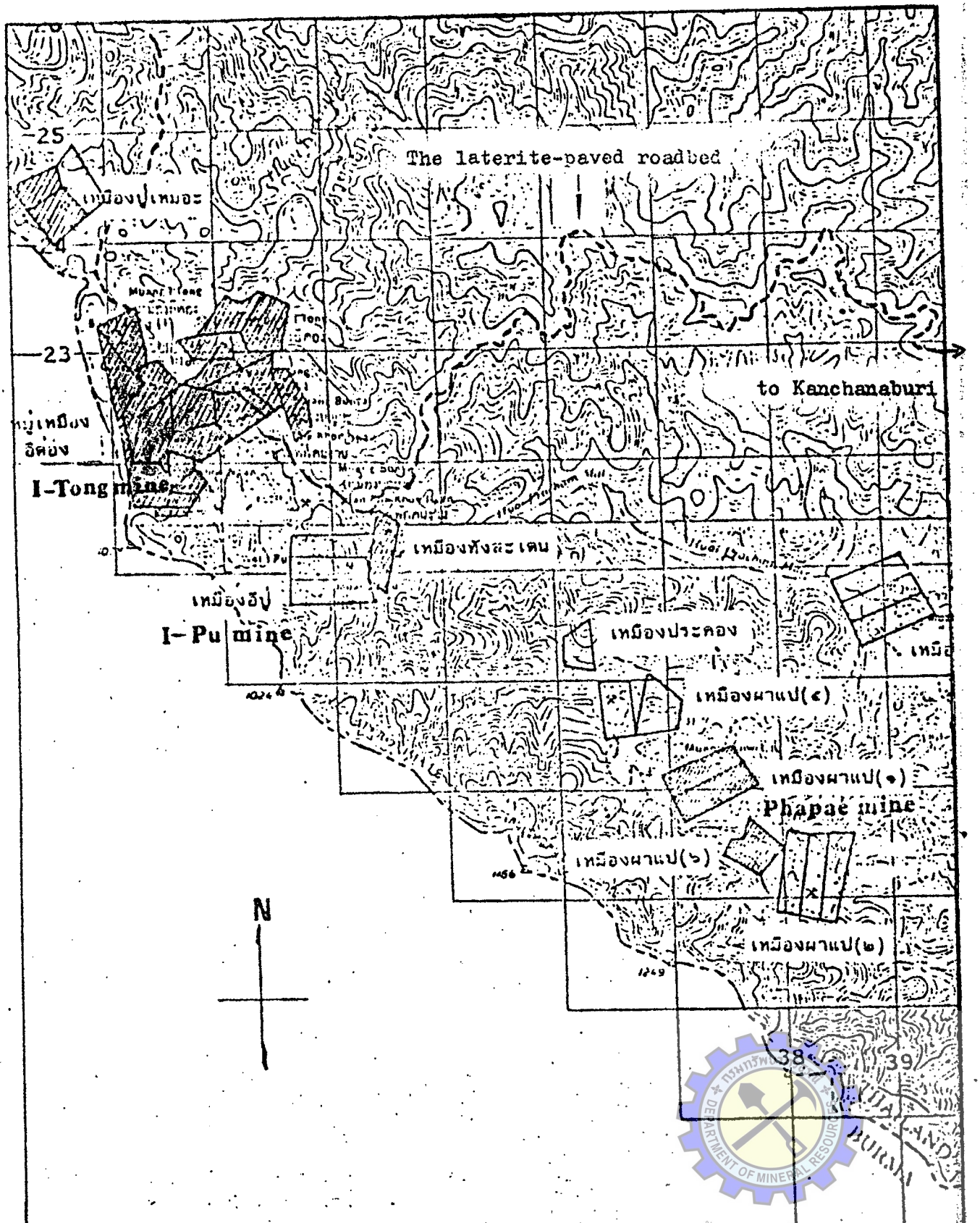


Fig. 3 Map shows location of mining lease in Pilok mining district; scale 1:50,000

20-30% of cassiterite. The ores exist not only in the quartz veins but also in the interface of the granite and the capped rock. The mining has been operated both in the veins and in the placers of eluvial, alluvial deposits.

Bunjitradulya (1981) reported the evaluation of tin and tungsten deposits on the eluvial and alluvial deposits of Huai I-tong and Huai Khun Chai of the Pilok mines area. The evaluation of these ores reserves was obtained from the pitting results. It was found that the average pit value of Huai I-tong alluvial deposits was 0.45 catties per cubic yard at average depth of 4.20 meters. The average pit value of Huai Khun Chai alluvial deposits was 0.68 catties per cubic yard at average depth of 3.20 meters.

MINING CONCESSIONS

At present, numerous mining concessions have been granted and belong to the government-owned organization and private owners. There are altogether 144 holders of concessions which have a combined area of 27,034 rai (acres 10,813). Mineral production in 1982 was 795.2 tonnes of tin ore and 348.65 tonnes of Wolfram from the whole area.

The Mines Organization presently has five concessions in the Pilok district with the total area of 440 rai (about 175 acres). Besides, it has pending approval a number of applications for mining concessions covering 750 acres in the district.

MINING METHODS

Two mining methods used at Pilok Mine are ground sluicing and dry mining methods. The former is employed on the primary deposits where the ores are of disseminated and decomposed nature in the granitic rocks and hydrothermal quartz veins. Blasting is sometimes required for breaking hard ground and rocks, after which a dozer is used to dirve the loose material from the mine working face. The water from monitors, 1½ inch diameter, is then used to wash the material down on to the wooden sluice boxes or ground sluices. The boxes are 3 to 10 feet wide, and up to 200 feet long, with approximately 5% slope. Water supply is obtained from the reservoir and creeks around the mining areas. Thus, this mining method is employed mainly in the rainy season which runs from July to November.

The dry method is suitable to break loose the primary, decomposed-granite rock of Pilok. The method is also used on the eluvial and alluvial deposits of some intermitten streams. The dozers (D.6 and D.7 type) and shovels are used to push and load the material on to the pararell bars for screening. The monitors, 1½ inch diameter, and employed to deliver high-pressure water to wash the materials on to the palong (or sluice-box) which is 14 feet wide and 100 feet long with approximately 4% slope. Water supply is obtained from the reservoir near the mine office. This method is basically employed during dry season when water supply is limited. Dry mining is also used to supplement hydraulic method in other seasons.

Dry mining is mainly used for hard vein-type deposits. In this case, drilling and blasting is required to break up the hard ore in the veins. The broken ore is then collected and taken to the ore-dressing shed where it is crushed and ground toliberate minerals before concentration by gravity and other suitable means.

ORE DRESSING

Primary dressing process is carried out at Pilok Mine by gravity concentration method. Roll-crusher and roller are used to crush the hard ores into 80 # before washing in the lanchutes at the dressing plant. Panning is also used to wash the material to obtain the concentrates. These concentrates obtained are sent for more treatment at Phra Pa Daeng dressing plant near Bangkok. Dressing at the Phra Pa Daeng plant is employed with high-tension separators together with magnetic separators. The final concentrates contain 72-75% Sn (of cassiterite) and 70-75% WO_3 (of Wolframite). The ratio of cassiterite to wolframite of Pilok Mine product is 3:7 (30 kg. of cassiterite to 70 kg. of wolframite).

PRODUCTION

The Pilok Mine has been is operation to produce cassiterite and wolframite for more than 40 years. The following statistics of the production during the years of 1940 to 1981 are recorded in the table below :

Year	Production (Kg)	Year	Production (Kg)
1940	95,595.5	1961	175,823.5
1941	288,066.1	1962	184,958.9
1942	678,113.6	1963	145,730.0
1943	706,672.0	1964	147,555.3
1944	387,799.8	1965	132,850.0
1945	205,141.0	1966	108,754,0
1946	28,245.7	1967	135,919.5
1947	31,805.5	1968	105,662.0
1948	75,340.0	1969	115,000.0
1949	88,875.5	1970	99,333.5
1950	130,886.0	1971	119,081.0
1951	150,300.0	1972	90,102.0
1952	150,500.0	1973	60,892.5
1953	140,020.0	1974	87,993.0
1954	114,810.0	1975	88,525.8
1955	156,683.5	1976	97,500.0
1956	302,937.5	1977	81,300.0
1957	307,011.5	1978	59,300.0
1958	257,961.0	1979	57,300.0
1959	116,270.5	1980	51,630.0
1960	167,135.5	1981	38,749.0
		1982	48,300.0

CONCLUSIONS

The Pilok district is considered one of Thailand's principal areas for tin and tungsten production. Although the deposits have been exploited for more than 40 years, it is believed that a substantial amount of the two minerals mentioned still remain.

The problem of ore exploration and evaluation has been the main constraint for many mines including Mines Organization. The lack of proper knowledge of the ground value and extent of the deposits makes it difficult to implement a suitable mining practice. Shortage of water in dry season is another main problem to be solved.

Given a thorough investigation of the deposits and hence a proper mining technique on a more-than-medium scale, the deposits covered by concessions of Mines Organization could yield greater production of tin and tungsten ores in the future.

REFERENCES

Brown, G. Fl, Buravas, Sl, Charaljavanaphet, Jl, Jalichandra, N., Johnston, W.d., Sresthaputra, V., and Taylor, G.C., 1951, Geological reconnaissance of the mineral deposits of Thailand: U.S. Geol. Survey Bull. 984; Geol. Survey Mem. 1, Roy. Dept. Mines, Bangkok (1953), 183 p.

BUNJUTRADULYA, S., 1980, Tin-Tungsten deposit in I-Tong mine, Pilok area, Amphoe Thong Phaphum, Kanchanaburi, Western Thailand; Geol, Survey Sec., Min. Div., MINORG.. of Thailand, 23 p.

BUNJITRADULYA, S., 1981, On the pitting results of Huai I-Tong and Huai Khun Chai placer deposits, Pilok mines area, Kanchanaburi province, Western Thailand, Geol. Survey. Sec. Min. Div., MINORG. of Thailand, 26 p.

German Geological Mission to Thailand, Final Report, 1972, Geol. Survey of the Federal Republic of Germany, Hannover, 94 p.