TDRI Quarterly Review
Published in *TDRI Quarterly Review*
Vol. 5 No. 1 March 1990, pp. 16-18
Editor: Nancy Conklin

# Mineral Resources Development: Status of and Issues in the Mineral Industry

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**M**inerals have played an important role in Thailand's economy. Geologically, Thailand has a variety of mineral resources—including tin, tungsten, lead, zinc, lignite, feldspar, kaolin, limestone and gypsum. Minerals should be recognized as a nonrenewable resource, whose contribution as raw material for mineral-based manufacturing and engineering industries can be substantial.

Given the importance of mineral resources, Thailand's mineral policy has not been clearly defined, and this lack of a well-formulated mineral policy has resulted in inappropriate mineral exploitation and utilization, environmental complications, and poor mineral conservation. Thus, a well-defined national policy and planning effort for mineral resources development is necessary, particularly because of the current climate of rapid industrial development.

This paper is part of the Mineral Resource Development Project being carried out by the Natural Resources and Environment Program (NRE) at TDRI. The study's objective is to formulate a well-designed strategy for mineral resource development that will correspond with the current direction of national economic development. The study has been undertaken with the joint cooperation of the Department of Mineral Resources and the Mining Industry Council of Thailand.

## PREVIOUS NATIONAL ECONOMIC AND SOCIAL DEVELOPMENT PLANS

The development of mineral resources has lagged behind that of other natural resources such as forestry, land, and water. Since the initiation of the First Plan (1964-1966), development of the mineral sector has been included as an objective of national economic development in order to ensure that the mineral industry will be developed in a manner consistent with development in other economic sectors. However, upon analysis, the strategies and measures adopted in all five previous plans as well as the current Sixth Plan appear to have been formulated according to the existing situation at the time of implementation, without consideration for long-term planning. One apparent oversight is that the plans failed to set up an assessment mechanism that could effectively monitor actual progress or evaluate the results of the implemented plans.

Minerals have been regarded as an export earning commodity in all the previous National Economic and Social Development Plans. A large volume of the minerals mined has been exported without further refining or value addition. This occurred most notably during the Fourth Plan (1977-1981), when mineral exports reached peak levels. Since the Third Plan (1972-1976), the importance of utilizing indigenous minerals as raw materials in domestic mineral-based manufacturing has begun to be realized to some extent. However, progress by the local mineral-consuming industry has been slow and thus has been overshadowed by the large volume and value of export minerals.

The same problems that have been recurring since the First Plan can be listed as follows:

1. The promotion has been primarily concentrated on production of minerals for export, with the remainder allocated for local consumption. Thus, local utilization almost always takes a secondary role

instead of a primary role. This has been depriving the country of an opportunity to increase the value-addition of the minerals as well as the chance to develop downstream industries domestically.

2. There is an ongoing existence of illegal mining activities and encroachment into the others' property—such as in the offshore tin areas in Phang-nga, the Wolfram area at Khao Soon and in other rich mineral areas—resulting in a loss of government revenues, destruction of resources, and low economic returns.

3. There is lack of coordination among government agencies such as agriculture, forestry, water, fishery, tourism and mining. Because many of the mineral deposits exist in areas that lack a specific focus toward their utilization, the deposits in certain areas cannot be developed.

4. Sufficient basic infrastructures, such as access roads and electricity, are not provided by the government. Thus, small-scale mine operators, who constitute the major group of mine operators in the country, cannot afford to shoulder the cost of providing the necessary infrastructure requirements.

5. The producers' lack of financial assistance, technical services, and relevant marketing information have resulted in inappropriately developed technology and unsystematic resource management.

## CURRENT STATE OF THE MINERAL INDUSTRY

A total of over 40 minerals have been developed and exploited in the country. As shown in Table 1, the values for local consumption of minerals have been consistently rising, while the export values of minerals have generally declined, indicating the definite trend toward utilization of minerals to gain value added. The manufacturing sector's contribution to total gross domestic product (GDP) is over 20 percent—of which 30 percent is derived from mineral-based manufacturing and engineering industries.

Among the 40 minerals produced, only 20 minerals are considered to be important enough for further studies due to their sizable production value. These 20 minerals can be divided into two groups, according to their main markets:

- **Export-Oriented Minerals:** Antimony, barite, fluorite, lead, tin, tungsten, tantalum-columbium minerals
- **Consumption-Oriented Minerals**: Ball clay, feldspar, gypsum, kaolin, glass sand, iron ore, limestone, lignite, manganese, potash, phosphate, rock salt and zinc

Export of minerals—mainly, the minerals in group 1—has substantially decreased since 1980. The contribution of mineral exports to the country's total export earnings and gross national product (GNP) is not significant: only 1.5 percent and 0.36 percent, respectively. Presently, the role that minerals play in the economy has been changed toward internal uses, such as raw materials in the mineral-based manufacturing industry, with only a surplus being exported.

The domestic consumption-oriented minerals are used mostly as raw materials in four manufacturing industries:

- Cement manufacturing
- Glass and ceramics manufacturing
- Metallic industries
- The energy sector

These manufacturing industries consume about 96-97 percent of the country's total mineral consumption. The per capita consumption of minerals in these four categories is increasing.

Substantial value addition is realized from the mineral-based manufacturing industry. To ensure long-

lasting maximum value addition through the use of indigenous minerals, attention should be drawn to these manufacturers so that a sufficient, good-quality supply of mineral raw materials will be maintained. Mineral reserves for supplying future needs are a major concern. Known reserves of some important minerals—such as zinc, gypsum, and lignite—have a limited exploitable life, even when considered at a freezing of the current level of demand. Since the current known reserves of these minerals are definite, the immediate strategy should be to improve reserves by instituting depletion control measures.

One of the major elements in the mineral industry is technological input. Technology in the mineral industry generally consists of five main areas—including mining, mineral processing, metallurgy, utilization, and environmental protection. Evaluation of technology status was obtained by observation of actual technological applications in mineral production and utilization. Large-scale operations sufficiently apply technology to production and utilization, whereas small-scale mines lack efficient technological input. Environmental protection technology is an important aspect, in which both large- and small-scale operations should be concerned. Research and development and consultancy services are important factors for improving the technological capability of the mineral industry.

## CLASSIFICATION OF CRITICAL MINERALS

It is fortuitous that the country is endowed with relatively rich mineral deposits, although they are scattered. The raw materials required for developing manufacturing industries can be supplied from these presently limited known reserves. Mineral supplies will be critical if existing reserves are limited or unknown, and they will be accompanied by a rapid rate of consumption, since they are the essential raw materials required by the domestic manufacturing industry. Less critical minerals are those raw materials with larger reserves. In addition, minerals having high or potentially high consumption in the present and future, but having known potential reserves might also be categorized as potentially critical minerals.

Based on these definitions, minerals can be categorized as follows:

### Critical Minerals

- Metallic Minerals — Zinc
- Cement Raw Materials — Gypsum
- Ceramic Raw Materials — Ball Clay
- Glass Raw Materials — Silica Sand

### Less Critical Minerals

- Metallic Mineral — Lead
- Cement Raw Materials — Limestone
- Ceramic Raw Materials — Kaolin, Feldspar
- Energy—Lignite

### Potentially Critical Minerals

- Iron Ore
- Copper Ore
- Aluminium Ore
- Rare Metal Minerals
- Potash
- Rock Salt

Classification of minerals would lead to appropriate management strategies and the appropriate policy guidelines to ensure a stable supply at a reasonable cost to meet future demands.

## ISSUES IN THE MINERAL INDUSTRY

The following issues have emerged from the development of the mineral industry in the past and require a closer look from the government:

- Should the direction of mineral industry development be adjusted toward a more internal-consumption-oriented one, with a surplus for export in order to gain more value added benefits to the country?
- What would be the controlling measures and regulations of the mineral trade for low-priced minerals like gypsum and feldspar when local utilization assumes first priority over exports?
- What would be the appropriate legal and regulatory framework for a more efficient control of resources to utilize the existing law to regulate the trade of certain minerals?
- How can the exploitation of resources be intensified while maintaining the same or even better quality of the environment?
- How can land-use prioritization be identified so that natural resources will be developed according to economic priorities?
- How can the technological practices in the mineral industry be improved, and how can more technical knowledge be transferred to the industry?
- How can taxes such as royalty and municipal taxes be used to stimulate mineral investment?

These major issues require a well-formulated master plan and a practical management strategy. National mineral policy guidelines should soon be defined before any measures can be implemented.

**CONCLUSION**

Development of mineral resources is observed to be directed toward more internal utilization in domestic industries with a smaller surplus for export. Secondary mineral industries or mineral-based manufacturing industries demand minerals as raw material input, especially in the existing important, fast-growing cement, glass and ceramic, metallic, and energy manufacturing industries.

The anticipated high future demand of mineral raw materials necessitates a greater and more efficient supply. The minerals that have limited currently known reserves with high consumption in industries—such as zinc, cement raw materials, glass and ceramic raw materials, and energy materials—will become even more critical if additional reserves cannot be improved.

Environmental coordination with the Office of the National Environmental Board and the existing legal and regulatory framework are the avenues that should be pursued in revising a mineral resources plan. Technological availability, including human resources, must be taken into consideration for efficient, systematic planning.

It is the government's duty to take the initiative in eliminating the obstacles precluding the development of the mineral sector while also preserving the environment. Fulfilling this obligation will require skilled management. Thus, more systematic mineral management strategies and a stronger emphasis on domestic development should be initiated with the Seventh National Economic and Social Development Plan.

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