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LAO PEOPLE'S DEMOCRATIC REPUBLIC

MINERAL SECTOR ASSESSMENT

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Asia Region
Country Department III
Industry and Energy Operations Division

CURRENCY EQUIVALENTS

Year	1987	1988	May 1989
US$ 1.00 = Kip (KN)	95	380	550
Ruble[a]/ 1.00 = Kip (KN)	191	218	300

a/ Domestic exchange rates.

TECHNICAL UNITS

bm^3/t	-	Bank cubic meter per tonne
kcal/kg	-	Kilocalorie per kilogram (= 1.8 BTU/lb)
kg	-	Kilogram
km	-	Kilometer
km^2	-	Square kilometer
lb	-	Pound (=0.454 kg)
MW	-	Megawatt
t	-	Tonne (metric)
tkm	-	Tonne-kilometers
tpy	-	Tonnes per year

ABBREVIATIONS AND ACRONYMS

ADB	-	Asian Development Bank
AIDAB	-	Australian International Development Assistance Bureau
CMC	-	(Lao) Coal Mining Company
COM	-	Council of Ministers
DGM	-	Department of Geology and Mines
DMR	-	Department of Mineral Resources (Thailand)
ETO	-	Express Transport Organization (Thailand)
GME	-	Geo Mining Enterprise
IDA	-	International Development Association
Lao PDR	-	Lao People's Democratic Republic
LIEC	-	Lao Import and Export Corporation
MCFER	-	Ministry of Commerce and Foreign Economic Relations
MEPF	-	Ministry of Economics, Planning and Finance
MIH	-	Ministry of Industry and Handicrafts
SBL	-	State Bank of Lao PDR
SEML	-	Société d'Exploitation Minière Lao
SME	-	State Mining Enterprise
UN-DTCD	-	United Nations Department of Technical Cooperation for Development (Minerals Branch)
UNDP	-	United Nations Development Programme

LAO PEOPLE'S DEMOCRATIC REPUBLIC

MINERAL SECTOR ASSESSMENT

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Following a mission to Lao PDR in April 1989, this report was prepared by Messrs. Peter C. Kotschwar, Mission Leader and Principal Mining Engineer, Paul Dyson, Senior Geologist of the Asia Technical Department, Stephan von Klaudy, Senior Financial Analyst, of the Africa Technical Department, and E.T. Hunt Talmage III, Legal Counsel and Consultant for the Asia Legal Department.

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EXECUTIVE SUMMARY

A. Objectives and Conclusions

1. This report was prepared following a mining sector mission to Lao People's Democratic Republic (PDR) in April 1989. The main objectives of the report are to (i) establish priorities for promotion of specific minerals based on their geological potential, commercial and financial viability, and financing constraints; (ii) evaluate the existing legal and regulatory framework and provide suggestions for its improvement to make it more conducive to foreign investment; (iii) propose measures to actively promote the mineral sector among foreign investors; and (iv) assess the possible impact for the country of additional mining sector development.

2. The report concludes that the best and most easily accessible potential for mineral development is in some medium- to high-value minerals for export, including tin, lead/zinc/silver, precious metals and gem stones, as well as in gypsum and anthracite coal (primarily for local energy requirements). The recently introduced foreign investment code provides a generally conducive framework for foreign investment but is too general to address the specific requirements of mining regulations. A mining code is therefore necessary and model investment agreements annexed to the code would be desirable. Efforts to prepare this specific mining legislation are currently under way. Active promotion of mining investment could be carried out by the geological service in the context of its role as sectoral umbrella institution. However, a special capacity to do so should be created and maintained, and appropriate documentation, including promotional brochures, should be prepared. Finally, the report concludes that, even with few ventures resulting from this new mining policy, the contribution of the sector to the economy could become considerably more important than it is now.

B. Economic Background

3. While Lao PDR appears from its geological structure to have unexploited mineral potential, its mining sector is now very small and of little, although growing, economic importance. Factors which have prevented a faster development of mineral extraction include the country's landlocked position, underdeveloped infrastructure and the past economic isolation resulting in lack of foreign investment. Over the 1982-86 period, the mining sector contributed about 1% to GDP compared with 10% for the whole industrial sector, mining sector growth amounted to more than 20% (as compared to 2.5% for industry) and its

percentage contribution to total output growth of the economy has exceeded 4%. During the same period, the sector contributed between 4.4% and 9% of official export revenues, thus representing the fourth major export item after logs and wood products, hydroelectric energy and coffee. Since in the past formal mining has been exclusively a public sector activity, the sector's economic potential depended on the priority allocated to it in the development plans and Government budgets. To a large extent, the pattern of growth of the industrial sector as a whole, including mining, is the result of the Government's policy to heavily concentrate investments in a few industrial projects in the export-oriented subsectors of mining, electricity and wood processing.

C. Mineral Resources and Production

4. As a result of the relatively unexplored state of the country, the mineral potential of Lao PDR is relatively poorly known, although the existing indications are that it has a good unexploited mineral potential. There are large reserves of high-grade iron ore and potash, which, because of infrastructure and market constraints, will be of commercial interest only in the longer term. There are possibilities to locate and develop additional deposits of gold, tin, precious stones and coal, while lead/zinc/silver and possibly chrome warrants further investigation, as do industrial minerals for domestic consumption (e.g., limestone for cement production). On a commercial scale, only relatively small quantities of minerals are now being mined. Mining production has over the past five years averaged about 340 tpy of tin concentrate, 74,000 tpa of gypsum, 1,000 tpy of coal and, during a trial period of several years, 15,000 carats of sapphires. Practically all of the tin, gypsum and sapphire production is exported while coal is marketed locally.

1. Minerals Currently Being Produced

5. The country's most immediate potential lies in continued extraction of minerals which have been mined in the past on a commercial or trial basis. Tin offers good prospects because of favorable geological indications and its relatively high value, making it less vulnerable to transport costs. Tin is currently being produced in the Nam Pathene valley, which also contains the country's principal findings and indications of tin minerals. Tin production has been carried out since the 1920s and has with some interruptions continued to today. Since 1985, however, the operations have encountered increasing difficulties due to insufficient exploration and reserve development, equipment deterioration and inadequate processing techniques. Since 1988, commercial mining has virtually been replaced by artisanal mining.

While it is not possible to assess the economics of continued tin production due to lack of sufficient information, the geological potential is such that there is high probability for the existence of tin mineral reserves which would justify the restart of commercial operations. It is therefore recommended that the viability of tin production be established by a prefeasibility study followed, if adequate data become available, by a full feasibility study, to serve as a basis for any further investment decision.

6. There are large gypsum reserves being exploited in Savannakhet Province in Southern Lao PDR. Production is almost totally exported to Vietnam and depends on the demand from Vietnam's cement industry. Although gypsum is a low-value, bulk mineral and transport routes to the consumer are long, prices comparable to F.O.B. export prices in Southeast Asia are paid at the mine-mouth. Production costs, however, are high. The outlook for gypsum in the medium to long term remains favorable only if the present customer remains willing in the future to absorb the cost of transportation, since other markets close to the mine are limited. While some cost reduction will result from planned expansions, additional cost savings measures should be implemented to enhance the operation's competitiveness and attractiveness to the customer.

7. There are numerous indications of coal varying from anthracitic to lignitic grade. However, extensive exploration has been carried out in only one small area at Bo Chan in Vientiane Province, where a pilot mining operation was started in 1983. A small coal mining operation is presently being prepared to start commercial production in 1989 and meet domestic demand which is estimated to amount to 5,000 tpy in 1991. It could, however, increase significantly to 15,000 tpy if a local cement industry project, located near the coal mine, is implemented. Additional exploration and a feasibility study are being carried out to establish the viability of an expansion of coal production at Bo Chan to meet these additional requirements. While there may also be some export possibilities, Bo Chan is not expected to have the necessary capacity to enter this market, for which exploration investment from private sources could be promoted in other or adjacent areas. Although Bo Chan coal is unlikely to be a cheap energy source, its production costs will be below import parity prices and its anthracite qualities and low sulphur content make it a sought after commodity.

2. Additional Mineral Potential

8. The outlook for gold and precious stones is good, principally because of a dispersed and fragmented market with many small producers, the probability of encountering a large number of possibly high-grade deposits requiring small investments, and little dependence on infrastructure. Therefore, it is easier to attract foreign investors and to mobilize risk capital which is not contingent on financial

contributions by the Government. While there is no formal gold production on an industrial basis in Lao PDR, a systematic approach to the promotion of gold occurrences is warranted in view of reported grades in alluvial placer deposits. Furthermore, sapphire occurrences are known to exist, and there appears to be a potential for other gemstones, such as ruby and zircon which are mined in neighboring countries in similar geological formations.

9. There are promising occurrences for lead/zinc minerals, frequently containing silver as by-product. In this combination, an intermediate product (concentrates) with relatively high value could be competitively produced while infrastructure and capital requirements are likely to range within feasible margins. It is therefore worthwhile to follow up on these occurrences. Chrome, for which indications exist, also appears a promising mineral to be further promoted.

10. While iron ore, potash, bauxite and copper reserves exist in Lao PDR, they do not appear to be particularly large or rich if compared to world-class deposits. They would therefore not lend themselves to large-scale, low cost mining operations which would be internationally competitive. Infrastructure investments would be considerable, bulk transport to sea ports would be extremely expensive and the Government would most likely be required to share some of the financing responsibilities. For these reasons, the above minerals offer no development potential in the medium term and only minimal efforts, if at all, should be made for additional reconnaissance work by the Government.

D. Institutional Framework

1. The Department of Geology and Mines (DGM)

11. This institution is entrusted with the regulatory and monitoring function in the sector and will as such be in charge of the application and supervision of the Mining Code, which is presently under preparation. It also provides basic geological services, such as preparing the geological map of the country, geological reconnaissance, scout-type exploration, laboratories and other basic services. As such, it will remain dependent on the budget, although it may sell certain services.

12. The Department was reorganized in 1989 and its staff reduced from 400 to 130 persons. At the same time, Geo Mining Enterprise was created as an exploration service entity and staffed with part of DGM's previous personnel. Although the Government's policy is to reduce to a minimum publicly funded exploration in the future, a local exploration company is justified since it provides an essential service to foreign investors in mining. In order to function effectively, both entities will require investments in technical assistance, equipment and upgrading of facilities.

2. Operating and Production Entities

13. The commercial mines in Lao PDR (tin, gypsum, coal) were formerly operated by the Société d'Exploitation Minière (SEML), which was also involved in sapphire mining on a pilot basis. In 1989, the Societé was dissolved, and four State Mining Enterprises (SME's) for the exploitation of these minerals were formed in addition to an SME in charge of gold exploration and mining, in order to increase efficiency and to isolate the Government budget from their losses.

14. As necessary as it may have been to break up, rather than to reorganize the Societé, the government is left without a State-controlled entity to take care of government interests on the operational side of the sector. Therefore, this function should be reinstituted by the creation of a holding company to serve as the operational arm of the Government, to assist in negotiations with foreign investors for commercial exploration and production, to serve as a counterpart agency with joint ventures and other business associations, and offer technical, managerial and financial advise to the State Mining Enterprises, out of whose dividends it would be financed. It should be staffed by a small number of highly qualified managers, and would probably during its inception require training and advisory services.

E. Development Issues and Constraints

15. The prospects for Lao PDR's mineral development depend on its physical mineral potential, which relies on its geology and appears to be good. However, since the knowledge of the geological potential is scant and superficial, the country's mineral future will also be determined by the extent to which its geological and exploration services can be strengthened and their activities increased and focussed on priority targets. Another important factor is the availability of infrastructure, such as roads and electric power distribution.

16. The exploitation of the mineral potential will depend on specific investments which, in line with the Government's policy, should increasingly come from private investors, especially for commercial exploration and new mine development, so that public funds can be allocated to geological services and non-operational sector development, including sector promotional activities, which are typical government support and service functions for the sector. In order to facilitate this development and to attract private investment, a solid legal and regulatory framework is required, which would also establish basic rules for environmental protection in mining operations.

F. Legal, Fiscal and Contractual Framework

17. In line with a new system of economic management the Government in 1988 promulgated a legal and regulatory framework to encourage private sector investment activities and to attract foreign capital. A major example is the Investment Code, but other decrees dealing with pricing, trading, foreign exchange, banking and taxation also reflect the new philosophy.

18. This framework constitutes a useful and attractive base upon which a legal regime specifically applicable to the mining sector can be fashioned. The preparation of a Mining Code, which should reflect and amplify the relevant provisions of the Investment Code, is well advanced. Its completion and promulgation is of utmost urgency since foreign mining investors are becoming increasingly interested in Lao PDR and are pushing for early conclusion of exploration and mining agreements. Without a clear Mining Code, however, it is difficult to prepare balanced agreements and assure a fair and equal treatment of investors.

19. A new Tax Code, including tax regulations for mining, has been issued. While this Code is an important step towards definition of an appropriate fiscal regime for mining investments, it contains shortcomings which have been addressed in the fiscal provisions of the draft Mining Code.

20. The Government's liberal investment policies and the enactment of the Investment Code have already attracted foreign venture capital for commercial exploration in the mineral sector. Several contracts with foreign firms for precious stones, gold and other minerals have been signed. At least some of these contracts appear inconsistent with the provisions of the investment legislation and diverge considerably from each other. In order to assure consistency and fair and equal treatment of investors, and to make future negotiations easier and shorter, it would be useful to design a model mining agreement which would serve as a basis for future negotiations with investors and could be annexed to the Mining Code.

21. In order to foster foreign investment in the mining sector it is necessary to actively promote it. For this purpose, a specialized promotional capacity needs to be established, probably within the framework of the DGM, which would be responsible for guiding investors and providing relevant information through seminars and conferences. Easy access to all relevant documentation needs to be established and promotional materials including maps and brochures need to be prepared.

G. Possible Economic Impact

22. If over the next few years 10-15 exploration ventures were implemented and eventually 2-3 of those were successful, the country's benefits from these projects would by far exceed those from its total mining sector in the past. Under the assumption that these ventures are, on the average, projects with a gold production of about 500 kg/year each, gross foreign exchange generation would amount to US$13-19 million/year (compared with US$1.2 million from mining in 1988). This would be equivalent to a 20%-30% increase in gross export earnings. Net foreign exchange generated would range around US$6-8.5 million/year. Government revenues from these projects would be about US$1.9-2.8 million/year, an increase of 3%-5% over total budget revenues in 1987. Employment creation would be relatively small, totalling several hundred people, but the training and technology transfer aspects would be important and some infrastructure provided (e.g., access roads, houses, schools, water supply) may also have positive indirect effects. If, in addition, some small precious stones projects and possibly a lead/zinc/silver project were carried out, the economic impact of mining development could take on sizeable proportions and result in considerable multiplier effects.[1]

H. Recommendations

23. The recommendations made throughout the report are summarized below:

1. Mineral Resources and Production

(i) Priority should be given to the exploration and development of high-value, low-bulk minerals (e.g., gold, precious stones, tin, lead/zinc/silver). These require minimal infrastructure, minimal investment, short project implementation times and, consequently, result in fast cash flows and paybacks. Bulk minerals, in general, should be developed only for local consumption (with the exception of gypsum, which is exported, and possibly coal) and reconnaissance expenses for export-oriented bulk minerals should be minimal in the future;

1/ Since little mineral exploration has been carried out in Laos, the estimates on possible economic benefits are purely indicative. They are not based on any specific assessment of the country's mineral potential.

(ii) For the tin mines, a pre-feasibility study should generate the necessary information for a full feasibility study (including detailed exploration and metallurgical tests), which should be carried out to prove the viability of rehabilitation of the operations. Marketing arrangements should be reviewed in order to ensure realization of international tin prices for the concentrates;

(iii) At the gypsum mine, there is room for cost savings. All efforts should be made to increase cost-efficiency in order to make the mines more competitive and maintain the product's attractiveness to the customer; and

(iv) The coal mining project now under implementation will have sufficient production capacity for the domestic market, but could not supply possible exports. If an export demand is realized, foreign investors should be attracted to explore for coal and develop additional mines.

2. Sector Institutions

(i) The role of the Department of Geology and Mines as a regulatory and service organization should be maintained and strengthened, and funds should be made available to upgrade its facilities and to provide technical assistance. It should, however, have no direct involvement in mineral production or commercial exploration. Also, environmental regulations should be prepared and monitored by the Department;

(ii) For Geo Mining Enterprises, funds for exploration equipment and technical assistance should be made available to enable it to function as a commercially-oriented sector service organization;

(iii) For gold and gemstone exploration, foreign investments should be used, since these minerals are most likely to attract foreign investors. However, technical assistance should be provided to the Lao Gold Mining Enterprise to reactivate its exploration and mining activities in order to enable this State Mining Enterprise to enter into joint venture agreements with foreign investors; and

(iv) The Government should consider establishing a holding company over the State Mining Enterprises, which would also act as the Government arm when dealing with investors in commercial exploration and development, and serve as a counterpart for joint ventures and other associations. Technical assistance, training and advisory services will be required for the establishment of such an entity.

3. Legal, Fiscal, Contractual and Promotional Aspects

(i) Define and adapt fiscal regime and provisions of the Investment Code and new Tax Code to suit the peculiarities of the mineral sector, by incorporating adequate provisions in the Mining Code;

(ii) Promulgate a definitive Mining Code, including the fiscal provisions mentioned above;

(iii) Establish model contract agreements to serve as guidelines when negotiating mining agreements with foreign investors. Technical assistance will be required, especially for review and appraisal of investment proposals; and

(iv) Promote the sector internationally by establishing a promotional and information office, and prepare promotional documents. For this, technical assistance will be required.

LAO PEOPLE'S DEMOCRATIC REPUBLIC

MINERAL SECTOR ASSESSMENT

I. INTRODUCTION AND BACKGROUND

1.1 While the Lao People's Democratic Republic (Lao PDR) appears from its geological structure to have unexploited mineral potential, its mining sector is very small and of little, although growing, economic importance. Factors which have prevented a faster development of mineral extraction include the country's landlocked position, underdeveloped infrastructure, distance to the ocean, expensive foreign transport routes and possible trade restrictions, and the past economic isolation resulting in lack of foreign investment, in particular for high-risk exploration activities. The mining sector consists of four small operations which up to 1988 before being decentralized, were managed by the Société d'Exploitation Minière Lao (SEML) and a small gold enterprise. These former SEML operations comprise tin production in the center of Khammouane Province, gypsum mining near Savannakhet, coal extraction in Vientiane Province, and pilot sapphire test extraction in Bokeo Province. In addition, some salt and construction materials such as clays and limestones are produced. Recently, licences for exploration of precious stones and metals have been given to foreign investors but no production has, as yet, resulted.

1.2 Mining production has over the past five years averaged about 340 tpy of tin concentrate, 74,000 tpy of gypsum, 1,000 tpy of coal and, during a trial period of several years, 15,000 carats of sapphires. Practically all of the tin, gypsum and sapphire production is exported while coal is marketed locally. The mining sector contributed about 1% to GDP compared with 10% for the whole industrial sector. However, since over the 1982-86 period mining sector growth amounted to more than 20% (as compared to 2.5% for industry), its percentage contribution to total output growth of the economy has exceeded 4%. Not untypical for mining, the sector's share in employment is low, amounting to about 4% of the industrial and only 0.1% of the total labor force while most of the industrial employment is concentrated in manufacturing. During the same period, the sector contributed between 4.4% and 9% of official export revenues thus representing the fourth major export item after logs and wood products, hydroelectric energy and coffee.

1.3 Since in the recent past formal mining has been exclusively a public sector activity, the sector's economic potential depended on the priority allocated to it in the Government's development plans and budgets. To a large extent, the pattern of growth of the industrial sector as a whole, including mining, is the result of the Government's policy to heavily concentrate investments in a few industrial projects in the export-oriented subsectors of mining, electricity and wood processing. Such a strategy was reflected in the 1981-85 Development Plan period when about 70% of investment took place in mining (gypsum and tin mine expansion), electricity (Nam Ngum expansion), and forestry exploitation and wood processing. The industrial investment strategy in the 1986-90 Development Plan period was a continuation of this strategy. About 70% of industrial sector investment was allocated for power generation, rural distribution and transmission; mining (tin and coal); and forestry enterprise improvements. This heavy emphasis on public investments is likely to

be reduced in the future in mining, with priority given to privately-funded investments, although public investments for improvement of the services to the sector and for infrastructure will remain essential for fostering mineral development and attracting private venture capital.

1.4 In 1985, Lao PDR initiated a reform of its system of economic management. Initially focused on improving public enterprise management, the reform process was widened in 1987 and 1988 and now encompasses the whole economy. The objectives are to improve the utilization of Lao PDR's natural resources, including minerals, improve public enterprise management, increase the role of the private sector and attract foreign venture capital.

II. MINERAL POTENTIAL

A. Mineral Resources and Production

2.1 The mineral potential of Lao PDR is not well-known compared to that of its neighboring countries due to the relatively unexplored state of the country. It has large reserves of high grade iron ore and potash which have been explored to stages at which conceptual feasibility studies have been done for their development. There are also some indications of bauxite resources. However, capital costs for mine development and associated infrastructure required to export these minerals will for quite some time prevent the realization of this potential. Mineral production has been limited (para. 1.2) to small-scale mining of tin and coal, a pilot sapphire operation and medium-size gypsum mine. There are possibilities to locate and develop additional production from deposits of gold, tin, precious stones and coal, in order of priority, while the apparent potential for lead/zinc and chromium warrants further investigation. A summary review of the potential for the different classes of minerals is given below, a detailed account of recent mineral production is provided in Annex I, and an assessment of prospects for mineral development is given in Annex II.

1. Minerals Currently Being Produced

2.2 Tin Minerals. Tin offers a promising mineral potential because of favorable geological indications, the country's experience with tin, and its relatively high value, which makes it less vulnerable to transport costs. Tin is currently produced in the Nam Pathene valley in southeastern Lao PDR from an ore which is a surface enrichment of iron oxide (laterite) containing pockets of quartz with fine needles of cassiterite (tin oxide). While extensive work has been carried out adjacent to these known deposits and some regional work (geochemical sampling at less than 1 sample/10 km^2) took place in the 1980s, there is no information to indicate that the more widespread showings reported by both the Indochina survey and by France's geological service have ever been evaluated. Furthermore, the recommendations made in 1972 for an evaluation of the tin potential of Houa Khong Province in northwest Lao PDR have apparently not been followed up. This area is believed to have particularly good prospect as it not only lies midway between the tin- producing area of northern Thailand and the major Chinese tin field of Mengtzu in Huanan Province but also is in the same geological province (Northwestern Indosinidian fold belt).

2.3 Tin has been mined on a commercial basis in Lao PDR since the 1920s. After the country's liberation, the tin mines were rehabilitated and recommenced production in 1980. Production increased to reach about 150 tpy of tin metal contained in 1985. All concentrates were exported to the Union of Soviet Socialist Republics (USSR). However, due to falling metal content in the ore because of inadequate reserve development, and to large metal losses in the concentrating process, the mines became financially unviable and were shut down in 1988. Since then, production has continued on an artisanal basis which resulted in lower operating costs and higher concentrate grades. Production in 1988 amounted to about 100 t of tin metal contained. However, this kind of mining entails disadvantages particularly for larger deposits since it tends to high-grading1/ and consequent waste of ore material and mineral losses, and reduces the economic life of the reserves.

2.4 Technical process difficulties and inadequate reserve development have created uncertainty about the future of tin production. While recent production costs were below the relatively depressed world market prices (appropriately adjusted for transport and processing) these figures do not provide an adequate basis for future planning. However, the geological potential suggests a high probability that further high-grade reserves can be identified in the deposits which are being mined or which have been mined until recently. It therefore appears justified that the situation be re-appraised and a pre-feasibility study be carried out, which should provide the basis for a full feasibility study (including detailed exploration and metallurgical tests) to prove the viability of mine rehabilitation. Meanwhile, no more investments should be made.

2.5 The market and price outlook for tin are important parameters for assessing the future viability of tin production. Although the tin market collapsed in 1985, it has since been recovering and prices in the range of US$3.8-4.2/lb of metal (in 1989 constant terms) are expected for the early 1990's. However, there is sufficient low-cost capacity (around US$3/lb of metal) available world-wide to meet demand. Therefore, any new production capacity with costs significantly above this level, or significantly above US$2/lb contained in concentrates, is likely to be financially unviable. Output which can be produced at costs around the mentioned level should be viable and be easily marketable since sufficient smelter capacity with a shortage of concentrates is presently available in Southeast Asia.

2.6 Gypsum. Large gypsum reserves have been exploited in Savannakhet Province in Southern Lao PDR since 1980. Production (around 80,000 tpy) is almost totally exported to Vietnam and depends on the demand from the cement industry in that country. The current planning calls for an increase in demand and thus production to 150,000 tpy within two years and 200,000 tpy at a later

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1/ High-grading means mining only the highest-grade portions of a deposit to reduce costs and increase revenues per unit of output. This frequently leaves the rest of the deposit technically and economically unrecoverable.

stage. Although gypsum is a low-value bulk mineral and transport routes to the consumer are long, prices comparable to F.O.B. export prices in Southeast Asia are paid at the mine-mouth. Production costs, however, are high.

2.7 The outlook for gypsum in the medium to long term remains favorable only if the present consumer remains willing in the future to absorb the cost of transportation, since other markets close to the mine are limited. While cost reductions will result from the planned capacity increases, additional efforts need to be made by the gypsum operation to increase cost efficiency in order to enhance its competitiveness and remain attractive for the customer.

2.8 Coal. There are numerous indications of coal varying from anthracitic through lignitic in Lao PDR. In one area, Bo Chan in Vientiane Province, significant exploration has taken place but the economic potential of the majority of the coal resources remains undetermined. Only artisanal coal production has occurred historically, but after 1983 a pilot mining operation was started at Bo Chan. A small coal mining operation is presently being prepared to start commercial production at Bo Chan in 1989. It is estimated that domestic demand will be around 5,000 tpy in 1991, based on the current industrial structure of the country. However, this could increase significantly to 15,000 tpy if a local cement industry project, located near the coal mine, is implemented. The feasibility of Bo Chan satisfying this additional demand has not yet been established but an exploration program and study to this effect are being prepared. While Bo Chan would not be a low-cost source of energy, its production costs are estimated to be below import parity prices and its coal is sought after because of its anthracite quality and low sulphur content.

2.9 There is also a possibility of coal exports into neighboring areas of Thailand where cement manufacturers could blend high quality anthracite from Bo Chan with local low-quality lignite. However, if the cement project is realized, the Bo Chan deposit would most likely be unable to satisfy any additional markets estimated to range between 6,000 and 12,000 tpy. Therefore, foreign investors should be encouraged to explore for coal if any export volumes are required in addition to identified local demand and requirements of the planned cement project.

2. New Minerals with High Potential

2.10 Precious Metals. While there is no formal gold production in Lao PDR, there are numerous reports of artisanal production of gold from alluvial deposits which are believed to contain gold derived from quartz veins associated with granodioritic rocks. The gold SME, although endowed with minimal resources, has undertaken limited exploration and minimum production in the past, but presently there is little systematic exploration/prospecting for gold reported. There are private investors interested in joint ventures with the gold SME, which, however, in order to gain a justified equity share, should be strengthened, both in equipment and technical capabilities. In view of reported grades exceeding 1 g/tonne in the alluvials, a more systematic approach to the evaluation of the reported gold occurrences is warranted. Occurrences along the Mekong River appear to be a continuation of the Udon Thani-Nong Khai gold belt in Thailand, investigated by that country's Department of Mineral Resources (DMR). No primary silver occurrences have been reported in Lao PDR. However, there are many recorded instances of high silver content in lead-zinc

mineralizations in northern Lao PDR. Perhaps more striking are the recorded 1.2 kg of silver per ton of ore reported near the Lao PDR border in northern Vietnam. While these figures represent only the analysis of "grab" samples and do not indicate exploitable silver, they do indicate the possibility of locating ore bodies containing commercial amounts of silver in Lao PDR. No occurrences of platinum have been reported but it should be noted that platinum has been found in Thailand in association with gold in the alluvials adjacent to the Mekong River.

2.11 Precious Stones. Sapphire exploration is now being conducted in conjunction with a small pilot mining operation in northwestern Lao PDR at Ban Houei Sai in Bokeo Province. The stones are found in alluvial gravels assumed to be derived from the Quaternary basalts that outcrop in the area. In Cambodia and Vietnam, sapphires, rubies and zircons are produced in a similar manner from alluvials associated with Quaternary basalts. As large areas of similar basalts are present in southern Lao PDR, it is reasonable to assume that potential for the discovery of precious stones exists in that area as well. Systematic evaluation of alluvials adjacent to the basalts in the Ban Houei Sai areas may also locate additional gem deposits as only some 17 km^2 have so far been prospected.

2.12 In addition to some selected base minerals (tin, gypsum, coal, lead/zinc), it is in precious metals and stones where the prospects for short and medium term development are best in the sector. The reasons for this are principally (i) dispersed and fragmented markets with many small producers, permitting relatively easy access to additional marginal volumes; (ii) probability of encountering a larger number of generally small economic occurrences than is usually the case with base metals; (iii) because of the higher number of occurrences, also the likelihood to find some which are high-grade and low-cost; (iv) little dependence on infrastructure, in particular for transporting the high-value end product; (v) less importance of economies of scale; and (vi) low investment costs and short pay-back periods. For the above reasons it is much easier to attract foreign investment in precious stones and precious metals than in base metals or other bulk minerals. The number of possible investors is much larger, risk capital is more readily available, the planning is easier and shorter, and in most cases the Government effort and contribution involved is minimal, as is the risk the Government is taking.

2.13 Lead and Zinc Minerals. Lodes of galena of hydrothermal origin are frequently found in Lao PDR and they usually contain other sulphides, particularly sphalerite (zinc), stibnite (antimony) and mispickel (arsenic). High silver content is common. The principal occurrences have arbitrarily been divided into four areas:

Lao PDR-Vietnam border near Dien Bien Phu
North-central Lao PDR (Xieng Khouang)
Tchepone (Savannakhet)
Southern Lao PDR

While many of the occurrences have been randomly sampled at surface and are known to extend along strike for tens of meters, no systematic exploration has apparently been undertaken. Some underground drivage and limited hand production is reported to be ongoing near Vang Vieng under the auspices of Vientiane Province carried out by Geo Mining Enterprise (GME). There is a

definite potential for the location of economic lead/zinc deposits with significant percentages of silver, which, if economic grades and tonnages could be proven, would warrant development. The market outlook for zinc and lead suggests that the prospects of deposits with high zinc content and additional by-products are favorable, although lead is likely to play only a minor role in the deposit's economics. Lead will, however, in many cases be associated with zinc and silver, thereby adding to the deposit's return. A follow-up on lead-zinc occurrences appears for the above reasons worthwhile and will have a better chance of resulting in a viable deposit than other base metals. Moreover, as zinc is a higher-value product than, for instance, iron ore or bauxite, its demands on transport infrastructure are lower and economies of scale (i.e., large volumes) are less important, particularly if there is a considerable percentage of by-products, especially silver.

2.14 Chrome Minerals. While no chromite has been reported in Lao PDR, two areas of the country have prospects: (i) the area of Sam Neua Province in northeastern Lao PDR, the site of alluvial chromite deposits derived from the serpentine massif of Nui Na Son which are worked at Co Dinh in Vietnam; and (ii) the serpentine belt known to contain chromite in Uttardit Province of northern Thailand and extending into western Lao PDR. (The Tah Plah deposit in Uttardit Province has been commercially exploited on an intermittent basis for a number of years.) There are good possibilities for the location of additional areas of ultrabasic igneous rocks in Lao PDR which would naturally provide targets for regional and detailed prospecting.

2.15 Industrial Minerals are likely to follow economic growth. The most important growth area is construction materials including limestone, gypsum, clays and sands. The construction sector could grow rapidly as a consequence of the new system of economic management both in private housing and in production-related buildings. While construction materials are a prime area of mineral development, they generally require less promotion and exploration is less costly than other minerals. Moreover, with few exceptions (e.g., gypsum) they will remain largely limited to the local markets.

3. New Minerals with Low Potential

2.16 Bauxite. There are frequent reports on the bauxite potential of Lao PDR, with the Bolovens Plateau located in extreme southern Lao PDR being considered the priority target by analogy with the Haut Chlong Plateau of eastern Cambodia, which is known to be covered with a bauxitic laterite. There appears to be little potential for the near-term development of a low-value/high-bulk mineral such as bauxite.

2.17 The bauxite market outlook and supply situation suggests that in the medium term there will be very little possibility for new production centers to enter the market. In order to be viable and find a market niche in the longer term, such production centers would need to be of excellent quality, low cost, and benefit from inexpensive transport to the consumers. There is no indication that the bauxite deposits on the Bolovens Plateau would be exceptionally cost-competitive production centers. Moreover, a large bauxite operation would encounter transport constraints (similar to iron ore) and would be handicapped by high transport costs to the ocean which would exacerbate the effect of international sea freight. Establishment of a domestic aluminum industry making

use of Lao PDR's hydro power potential would require disproportionally large amounts of capital investments. Power requirements for one medium-sized aluminum smelter alone would exceed several times the total installed power capacity of the country. Further reconnaissance and exploration work on bauxite (except for some additional data gathering) thus does not appear justified in the medium term.

2.18 Potash and Other Evaporite Minerals. Extensive deposits of potash are known to exist in the Vientiane area. These deposits are the lateral extension of the evaporite beds of the Khorat group which have been extensively explored in Thailand. The deposits in Lao PDR are reportedly both higher grade (principally sylvite as opposed to mostly carnallite in Thailand) and occur at a shallower depth (150 m). The technical potential of the potash deposits must be rated high but economic constraints (infrastructure, capital costs, markets) make development unlikely in the short to medium term. Similarly large deposits of rock salt and gypsum - more than enough to continue to supply local markets in Lao PDR and Vietnam - have been identified. A potash operation would be small compared to the major export production centers and encounter transport constraints coupled with high surface transport costs which would make its costs uncompetitive. In view of these constraints and the market outlook and supply situation, potash is unlikely to present in the medium term an economically viable development option for the mineral sector and should not be a target for further exploration.

2.19 Iron Ore. While total iron ore reserves in Lao PDR are roughly estimated at 1 billion tonnes, they occur in nine deposits of which only two have been looked at more closely. Although of elevated iron content, the reserves do not appear to be of commercial quality without need for upgrading, which would make production more expensive. The reserves are not particularly large by world standards, and mineable reserves per deposit are not likely to permit a large-scale operation. Infrastructure up to the border (Thailand or Vietnam) would have to be constructed and neither the Thai nor the Vietnamese transport system could easily absorb the additional bulk volumes usually resulting from iron ore operations. In addition, indications are that bulk transport through these countries, particularly Thailand, would be very expensive. The iron ore market outlook shows that any new operation would have to be very high grade, excellent quality, large-scale, and close to reliable and inexpensive transport infrastructure to be economically viable. Even then it may be difficult to find a place in the market. The iron ore deposits of Lao PDR do not appear to combine these favorable features and have thus a very low probability of being economically viable. For the above reasons, it does not seem justified to continue further iron ore exploration.

2.20 Copper Minerals. There are numerous reported occurrences of copper minerals of uncertain origin in Lao PDR. Many of these have been investigated, but all indications to date are that the mineralization of economic interest is limited to lenses only a few meters long. Similar copper occurrences are well documented in Thailand. There is little evidence that copper minerals present an attractive prospect in Lao PDR.

B. Geological Mapping and Mineral Exploration

1. General

2.21 Prior to independence in 1973, Lao PDR received little attention from the French Geological Service, because of both its remoteness and the lack of accurate topographic maps. It was, however, included in the 1:500,000 scale geological map of Indochina in the 1930's and this map still remains the most complete geological map of Lao PDR at this scale. Eastern Lao PDR was surveyed in somewhat more detail on a reconnaissance basis because of its proximity to Vietnam and because of the existence of the Nam Pathene tin mines.

2.22 After independence there was a surge of geological investigations which lasted until the early 1970s at which time activities were curtailed. Programs funded by French aid, the Japan Overseas Technical Cooperation Agency, the UNDP and the Colombo plan were undertaken between 1957 and 1970. Exploration concentrated on known occurrences of minerals such as coal, copper, tin, etc., in relatively small areas with the exception of some limited regional reconnaissance funded by the Colombo Plan and carried out by the British Institute of Geological Sciences.

2. Recent Exploration

2.23 Since liberation, the Department of Geology and Mines (DGM) has, with technical assistance provided by the USSR and Vietnam, carried out relatively small projects in limited areas to better assess already identified mineral deposits. However, several regional reconnaissance programs of widely spaced geochemical sampling have also been undertaken, covering about 20% - 25% of the country. Emphasis was divided between materials for local consumption (construction materials, coal, salt, pyrite, gypsum, etc.) and projects which at least theoretically could have produced minerals for export to generate foreign exchange earnings. Construction material projects included the search for cement plant raw materials such as limestone, gypsum and coal together with brick raw materials. In addition, Vietnamese teams carried out a series of small projects seeking pyrite and salt as well as evaluating lignite reserves in the northeast. Geological work also continued at the tin operations with USSR assistance and in the prospective sapphire area of western Lao PDR with Czechoslovak assistance.

2.24 Two other major projects for the further evaluation of the high grade iron ore and potash deposits to the pre-feasibility stage, indicated that infrastructure constraints and the land-locked nature of Lao PDR made the development of those projects uneconomic at present. On the other hand, exploration for cement raw materials, coal, and brick raw materials was relatively successful and limited exploitation of a coal deposit (Bo Chan) and brick raw materials are already taking place while pre-feasibility work for a small cement plant is under way. There has also been a continuing program of gold exploration by the gold SME since 1982, although not supervised by DGM. Results of this work are not available but the present interest of private investors in gold exploration in Lao PDR may reflect some findings of the group. These private initiatives may also be partly a result of gold exploration activities being carried out on the Thai side of the Mekong River by the DMR.

3. Ongoing Projects

2.25 Ongoing DGM projects can be subdivided into regional work and so-called "projects." Major regional tasks include the revision of the 1:1,000,000 geological map of Indochina which is being carried out as a joint project with the geological surveys of adjacent countries. DGM is currently carrying out field checks of key areas in Lao PDR to verify the draft version of this map. The new map is expected to be produced in the near future. Also, a new "cosmo-geology" map 2/ of Lao PDR at a scale of 1:500,000 is in preparation with the assistance of USSR experts. The draft map is now complete and selected field checks are being carried out prior to finalization. At present, only one "project" team is working in the field carrying out a limited mineral reconnaissance project for an area in southern Lao PDR.

III. INSTITUTIONAL FRAMEWORK OF THE MINERAL SECTOR

3.1 All sector-related institutions are presently owned by the State and have recently undergone major restructuring in line with the policy of new economic management. Institutional responsibilities are divided into two areas: (i) responsibilities for geological services, regulation and monitoring of the sector, and (ii) production, exploitation and commercial exploration.

3.2 The Ministry of Industry and Handicrafts (MIH) sets sector policies in accordance with existing legislation and overall country economic strategies. It also supervises all State-owned sector entities, like the Department of Geology and Mines (DGM) and the State Mining Enterprises (SMEs) for gypsum, tin, coal, sapphires, which are successors of the former SEML, and a gold mining enterprise. In addition, the MIH, assisted by DGM, negotiates mining contracts and serves as the local counterpart in mining and exploration contracts with foreign investors.

3.3 Other government agencies related to the mining sector are the Ministry of Commerce and Foreign Economic Relations (MCFER) and the Ministry of Economics, Planning and Finance (MEPF), which regulate foreign commitments, investments and contracts, and the fiscal regime. All legislation, regulations and foreign contracts are ultimately approved by the Council of Ministers (COM).

A. DGM: The Government Regulatory and Service Agency

3.4 The DGM is entrusted with the regulatory and monitoring function in the sector and is at present drafting under the direction of MIH the Mining Code and will be in charge of its application and supervision. It is also in charge of basic geological services, like preparing the geological map of the country, geological reconnaissance, scout-type exploration, provides supporting services such as analytical laboratories or surveys, and is, as such, dependent on the budget.

2/ A map based on interpretation of data received from satellite mapping.

3.5 In early 1989, DGM underwent a drastic reorganization, which reduced its manpower from 400 to about 130 (of which 24 are professionals). Its budget declined from KN 50 million (US$130,000) in 1988 to KN 25 million (US$45,000) in 1989, just sufficient to meet salary commitments, but no operating or capital investment expenditures. The redundant personnel, mainly engaged in regional or detailed exploration, were attached to the newly formed SMEs. The reduction of staff of DGM is, in principle, a sound measure. However, attaching most of the redundant exploration and geology personnel to some of the recently created SMEs represents an additional burden on these already financially ailing entities.

3.6 Besides a lack of funding, there are several significant constraints to DGM's successful operation. DGM, with a dual role of evaluating the geology of Lao PDR and supervising the mining sector, is largely staffed by young professionals with little or no practical experience especially in economic geology and apparently no regulatory experience. Massive training programs are therefore needed in modern exploration technology, including integration of Lao PDR personnel into "joint-ventures" to gain a better understanding of economic assessment of projects. DGM's physical facilities, including offices and equipment, are also deteriorating and need major refurbishing if DGM is to operate effectively. This will be initiated under a UNDP project now being appraised by UN-DTCD for the rehabilitation of laboratories, together with staff training and the establishment of technical standards. This project will not only provide much-needed support to DGM projects, but also has the potential to generate revenue for the Government by providing services for fees to the private sector. While DGM has a regulating role, it currently does not fulfill this function due to an apparent total absence of regulations. The implementation in the near future of a Mining Code together with associated regulations will provide a framework for the supervision and regulation of the industry but, once again, DGM will be hard pressed to fulfill its mandate without adequate equipment and training, supported by a realistic budget.

3.7 It is important to maintain DGM's role as the government entity in charge of geological services, and as a regulatory and supervisory agency. As such, DGM will continue depending on the budget, although it may sell certain services (e.g., analytical laboratory analyses, publications, professional services) commercially. It should be clearly recognized that - in view of its regulatory task - it has no role in the operational and production area of the sector, which would be a basic conflict of interest.

3.8 A new company, Geo Mining Enterprise (GME), was established, with the objective of providing exploration services, such as drilling, on a commercial basis. The establishment of GME as an autonomous exploration and geological service company is a sound concept. A local exploration services company is generally an important element in promotion of foreign investment in mining since investors do not have to import equipment and materials and hire people in an unfamiliar environment. The expected increase of foreign-financed exploration activity is expected to make increasing use of such local services. However, no measures have been taken to strengthen the technical or managerial capabilities of this entity, or to provide it with modern drilling or other equipment necessary to carry out its function. The Government should seek unilateral or bilateral assistance to achieve these objectives.

B. Operating and Production Entities

3.9 In early 1989, SMLE was reorganized into four autonomous SMEs for gypsum, tin, coal mining, and sapphire exploration. The former gold exploration and mining entity was also converted into a financially autonomous SME. The main objective of this restructuring was to put the companies on a financially independent footing and to isolate the State budget from their losses.

3.10 While it was necessary to break-up rather than structurally reorganize SEML to eliminate a top-heavy organization and increase efficiency, the Government is left without a State-controlled mining entity which could compete with the private sector, and which would take care of State interests on the operational and production side. Such an entity is necessary as long as the Government wants an active role in the functionally operational side of the sector. However, the fragmentation into individual autonomous companies, restricted to their respective minerals without possibility for diversification, has stretched available managerial and technical expertise to the limits and has created administrative and managerial overlaps and duplications. It has also left the new companies without common guidance and direction, shortage of managerial expertise, insufficient working capital, inadequate or obsolete means of production, and little training or guidelines on how to tackle the radically changed working environment. In addition, in order to secure a fair share in possible joint ventures with foreign investors and the gold SME, the latter would require technical and financial strengthening.

3.11 It is recommended to consolidate the SMEs under a holding company, to be financed out of dividends of its subsidiaries, to which it would offer technical, managerial and financial advice. This holding company would also serve as the operational-functional arm of the Government in the sector, assist in negotiations with foreign investors, and serve as a Government counterpart agency in joint ventures and other association contracts, thus being able to re-direct human and other resources from inefficient subsidiaries to new enterprises for optimal productivity. It also would have the mandate to undertake business in the mining sector without restriction to a single mineral, and to establish wholly-owned or mixed subsidiaries. This holding company should be staffed by a small number of highly trained managerial-technical staff. Such a company should be operating in the mining sector only and not be part of a larger general industrial holding company, and be established after the necessary personnel has been selected and trained and all advisory services have been procured.

3.12 Furthermore, although there is a severe shortage of experienced managerial and technical personnel in the sector, there is also a large part of inexperienced young workers, mainly trained in the Eastern Bloc in the geo-sciences. A mining school for technician level personnel has also been established in Vientiane, whose first 20-30 graduates will join the labor force in 1989. The mining sector is currently unable to absorb this trained, but inexperienced pool of talent, and Government should make every effort to ensure good use of this personnel by future joint ventures with foreign investors and in SMEs, and to give priority to their practical training through hands-on experience rather than to purely academic education.

IV. DEVELOPMENT ISSUES AND CONSTRAINTS

4.1 The prospects for Lao's mineral development depend in the first place on its physical mineral potential as determined by its geology. However, since the knowledge of Lao's geological potential is scant and superficial, the country's mineral future will also be determined by the extent to which its geological and exploration services can be strengthened and their activities increased and focussed on high priority targets. Another important factor determining the future of mining, and of other sectors, is the improvement of infrastructure such as roads and electricity supply.

4.2 The exploitation of Lao's mineral potential will depend on specific investments which in the near future will continue to include publicly funded capital expenditures in Government-owned mining operations. Over time, however, these should increasingly consist of private investments so that public funds can be allocated to infrastructure and non-productive sector development. Private mining investments and thus the exploitation of additional mineral resources will be determined by the improvement of government services to the sector, in particular geological and exploration services, and the attractiveness of the legislative framework and of the fiscal regulations governing mining to potential investors.

4.3 While in the long run the Government can strongly influence and enhance the prospects for mining development through actions in the areas mentioned above, the outlook in the short and medium term depends largely on (i) the future of the minerals produced by the existing SMEs, (ii) the feasibility of exploitation of a few deposits which have been partially explored, and (iii) assumptions on priority exploration and mining targets of foreign investors in the short run. The minerals under (i) consist essentially of tin, gypsum and coal. The minerals under (ii) include principally potash, iron ore and lead/zinc as well as limestone and other construction materials. The most likely minerals under (iii) will be precious stones and metals. This category also includes the sapphire operation in the northwest of Lao PDR, since it is still at the exploration stage and since it entered into an association with private investors in 1988.

A. Infrastructure

1. Transport

4.4 Since Lao PDR is a land-locked country, a major challenge for mineral sector development will be ensuring reliable external trade routes, adequate infrastructure for the internal movement of goods and adequate access to natural resources present. At present, an exceptionally small amount of freight transport - less than 0.16 tonne-kilometers (tkm) per dollar of GDP are being used, as compared with 1.67 tkm in India and 3.1 in China.

4.5 There being no railroads, the major mode of transportation in Lao PDR is road, which accounts for 85% of total traffic; the remaining 15% is carried by river. The total road network is estimated at about 6,200 km, which translates into a very low network density (26 km/1,000 km^2). In addition, there exists about 1,500 km of waterways, bringing the total network density to

30 km/1,000 km^2, which is extremely low for a country of this size. Moreover, the existing network is not fully usable due to advanced deterioration and inadequate maintenance. It is widely recognized in Lao PDR that transport is crucial to economic development, and a strategic plan for road development is being followed. However, there are major constraints stemming from insufficient financial resources.

4.6 Since river transport depends on seasonal fluctuations of waterways which have only limited capacity and infrastructure, the most practical transport mode for bulk minerals is by road. However, weight restrictions prevent the use of large capacity trucks, and transport of large volumes of mineral commodities like iron ore would be severely restricted due to limited overall road capacity.

4.7 As a consequence, transport costs are high. Reportedly, and depending on routes and distances, the cost of inland transportation varies between US$0.07 and 0.06 per tkm. International freight on Vietnamese roads to the port of Da Nang costs about US$0.05 per tkm, and truck transport through Thailand to the port of Bangkok about US$0.07. Of the latter, about 50% is for fees like custom licenses, security etc., levied by the Thai Government. Although Thailand permits the transport of minerals through its territory, this has to be carried out by Thai companies. Handling international transit traffic is the prerogative of the Express Transport Organization (ETO), a Thai parastatal carrier. For mineral exports from Lao PDR this would imply additional transshipping charges at the border. Thus, with the existing transport infrastructure, freight charges to export ports would vary between US$45 and US$90/t, exceeding FOB value of most bulk mineral commodities (e.g., iron ore, bauxite, or most industrial minerals).

b. Electric Power

4.8 Although Lao PDR has good hydroelectric potential, and 150 MW, or 90% of total power, is generated by hydro, only the small but relatively densely populated area around the Vientiane Plain is adequately served by a transmission system, and 80% of hydropower is exported to Thailand. For the mineral sector this means that, depending on mine location and with few exceptions, heavy investments are required either for auto-generation or extensive transmission systems, thus increasing capital and operating costs.

B. Government Policy and Strategies

4.9 In line with its new economic strategy (para. 1.4), the Government has already undertaken a major restructuring of all State institutions related to the mineral sector (paras. 3.5. 3.9). In addition, it has developed a policy for the period to the year 2000 of trying to stimulate development of small- and medium-scale mineral projects which would require relatively low investment and provide a rapid cash flow. Basically, it is anticipated that such projects would provide minerals for local consumption (coal, salt, lime, etc.) or for export (gold, tin, precious stones, etc.). Priority for major projects with large capital and infrastructure requirements such as potash and iron ore has

been downgraded, because of their doubtful viability. It is the intention of the Government that existing mining ventures be self-financing and that new projects should be developed with a minimum of capital investment from the public sector. Private sector investment should provide the necessary funds for development. This policy has already resulted in agreements with foreign investors for development of minerals. However these developments are presently taking place on an ad hoc basis and there is an urgent need for the Government to institute both a legal and a technical framework within which new investors may explore and exploit the mineral resources of Lao PDR. To stimulate private investment, the Government has already put in place an Investment Code and is presently preparing a Mining Code, which together with their associated implementation regulations will form the basis for future mining sector investments. Attention is also being focussed on the development of guidelines for association agreements between foreign investors and the Government. Issues related to legislation and regulations are reviewed in detail in Chapter V.

4.10 In line with the new Government policy to provide adequate support to the sector, DGM is planning to strengthen the technical framework by acquiring and collating the geo-data for Lao PDR from all available sources both foreign and local, expanding this data in prospective areas by additional fieldwork, and upgrading its technical support facilities such as the laboratory. In practice, the priority task for DGM will be to prepare the geology/mineral resource maps at scales of 1:500,000 (for the whole country) and 1:200,000 (for areas in the northeast where prospects are good and data more plentiful and for the Vientiane Plain). These maps will incorporate all existing data from all available sources. Based on this analysis, DGM intends to carry out additional fieldwork on the more attractive prospects to further upgrade the data base. It is anticipated that a better presentation of the geology and mineral potential will enable investors to better assess the potential of Lao PDR. DGM also plans to acquire additional mineral economic data (including prices and markets) for minerals known to occur in Lao PDR to better assist in the prioritization of targets. The present policy, which has been agreed in principle with MIH, MEPF and MCFER, is to seek assistance on a grant basis for all the planned preliminary work and training but they would then be prepared to utilize loan funding or seek foreign investments for projects which are advanced to the "semi-detailed or detailed" exploration stage.

C. Resource Mobilization

4.11 Mining development in Lao PDR will in the future depend primarily on private investments in exploration and production facilities and require less mobilization of public funds.

4.12 In order to facilitate this development and attract private investment, a solid legal and regulatory framework (Chapter V) has to be established by the Government and some assistance for creating the right framework and negotiating mining agreements with private investors, and for promoting the sector, may have to be obtained from aid sources and to promote the sector. However, the Government should minimize the expenses from its own budget (or from aid sources) for productive activities which can be financed by private investors.

4.13 This policy does not mean that no public funds will be needed to help develop the sector. The priority area in which public funds will be required is the strengthening of the institutions which provide services to the mineral sector, i.e., the DGM and the exploration company GME, although the latter, after initial investments, should become financially autonomous and could even have private participation. Furthermore, some of the SME's, particularly the gold SME, could attract private investors, provided they can be financially and technically strengthened in order to receive a fair share in a joint venture. Since there are no immediate returns from institutional strengthening, it would be desirable to find bilateral or multilateral grant funding for this purpose.

4.14 Public investments in the sector, for equipment and technical assistance, preferably on a grant basis, are required in priority areas, as follows:

(i) For the DGM to upgrade its physical facilities, including laboratory, and establishment of a geological data-base, and for advanced training of key technical personnel (para. 3.6), and to carry out additional geological surveys. Part of these activities are already included in a UNDP project now under preparation, which should receive priority from the Government;

(ii) Initial investment in GME for exploration equipment (drills, vehicles, etc.) and advanced training of personnel, to enable it to provide adequate exploration services to private investors and to the public sector (para. 3.8). An exploration contract between the Coal Mining Co. and GME, financed by Australian aid funds, is proof of demand for its services;

(iii) Stengthening of the Gold SME to enable it to receive a fair share in a joint venture proposal by foreign investors;

(iv) Advanced training for the management team of the proposed holding company for the public SMEs, together with management assistance and advisory services for exploration or mining contracts with private investors (para. 3.12);

(v) For the tin mines, a pre-feasibility study followed by a full feasibility study (para. 2.4) to prove the viability of rehabilitation of the mines and to justify new investments, either by the private or the public sector; and

(vi) Preparation of documents for and carrying out of promotional activities for the sector (para. 6.1).

4.15 The total cost of these investments is estimated at between US$4.3 to US$5.5 million.

4.16 For the SMEs, a good start has already been made in reducing the burden on the national budget by the re-organization of the former SEML. Furthermore, both for gold and sapphire exploration, foreign private investors are already participating. There also appear to be good chances to attract private capital to participate in the Coal Mining Co., and the Tin SME, provided its future potential can be demonstrated, would be a prime candidate for private investments. For the Gypsum SME, however, because of its vital relationship with the sole customer, State ownership should be retained, unless there is a radical shift in the market.

4.17 This reinforces the argument for the proposed holding company, which, as a sectorial government counterpart agency should, inter alia, coordinate all transactions and contractual arrangements and act as the managerial, financial and policy advisor to the Government.

4.18 Overall, the requirements for public funding of mining sector development will not be very important in the future and for some activities, such as institutional strengthening, it is likely that multilateral or bilateral funding can be secured without much problem. Recently, the Australian Government has agreed to provide funds for the exploration of the Bo Chan anthracite deposit and for the strengthening of the Coal Mining Co. Also, UNDP has an assistance project for DGM under consideration, and the Asian Development Bank (ADB) has sent an exploratory mission and is in principle interested in financing such activities. For the uncovered requirements, the International Development Association (IDA) could conceivably play an important role in assisting the Government to approach interested financiers and mobilize additional resources, and to coordinate sector assistance.

D. Environmental Considerations

4.19 The major environmental impact caused by mining is land surface disturbance and associated resettlement of affected persons, possible pollution of ground and surface waters and air pollution. Land disturbance, mainly caused by open-pit mining and overburden or tailings disposal sites, requires subsequent reclamation in order to restore the land to a usable condition after mining. Resettlement programs for people dislocated by mining should make adequate provisions for compensation and minimize the adverse socio-economic impact on the affected population.

4.20 Water contamination is mainly caused by silting, increasing the suspended solid content, pH and other characteristics of the affected waterways. Chemical treatments and settling ponds can prevent this. Other forms of pollution can result from substances employed in the treatment of ore (e.g. mercury for gold amalgamation, cyanide for leaching, brines from salt mining), and stringent measure have to be taken to prevent these contaminants from entering surface or ground water. Air pollution results from fugitive dust during mining operations or from the burning of fossil fuels. However, the latter problem in the case of anthracite is minimized, because of its clean burning characteristics and low sulphur content. Furthermore, as a substitute for fuel wood, its use would reduce de-forestation and land erosion elsewhere.

4.21 So far, due to the small size of mining production on Lao PDR, no major environmental impact has been registered. However, future legislation should address the environmental side, possible as regulations following the mining code. The enforcing agency, in this case, could be the DGM.

V. LEGAL, FISCAL AND CONTRACTUAL FRAMEWORK

A. Legal Framework

5.1 The Lao legislative environment is perhaps unique. Legislation in existence prior to independence and liberation has apparently been abrogated and is being replaced piece-meal. The country lacks a constitution, a draft of which has been under consideration for at least ten years. Only a law on the powers of the Council of Ministers provides a bare outline of an administrative framework.

5.2 In line with the Government's recent adoption of the new system of economic management, and recognizing the importance of an appropriate legal and regulatory framework to encourage private sector economic participation and to attract foreign investors, the Government has promulgated various legislative enactments reflecting the new liberal economic philosophy. A major example is the legislation relating to foreign investments. Other decrees dealing with pricing, trading, foreign exchange, banking and taxation also reflect this change in strategy.

5.3 While the investment legislation and the other commercial enactments discussed below reflect a useful and attractive base from which to begin to fashion a legal regime applicable to the mining sector, considerable additional work remains to be done in this regard. The preparation and promulgation of a Mining Code, hopefully reflecting the basic framework of the investment legislation, remains to be completed. In a more general context, the basic framework of the legal system, notably as may be established by the constitution, remains to be enacted, and more specific legislation in commercial areas of particular importance to a potential investor must likewise be issued. The latter particularly relates to accounting, customs, labor and social security matters, exchange control and banking.

5.4 One major obstacle to dissemination of these legal enactments to the public is a lack of their general availability to the interested public. Legal enactments are not published in an organized manner by the Government, and English language translations of the legislation discussed below are either not available or must be obtained from a variety of non-Government sources, thus leaving unconfirmed the accuracy of some of these translations. While the promulgating authority is centralized in the Council of Ministers, and indeed individual ministers appear to have very little authority to enact regulations, the actual organization and dissemination of legislation remains to be developed.

5.5 In addition to the legislative constraints discussed above, administrative constraints in the regulation of mining investments may result in major impediments. Authorizations may be required from other ministries or regional authorities in addition to those of the Minister of Industry and Handicrafts. These may, for example, relate to water, forestry, infrastructure and other construction, labor, transport and exports and imports. The difficulty in obtaining such permissions may be a substantial barrier to private investment.

1. Sector-Related Legal Framework

5.6 Administration. The law on the Council of Ministers (A1)3/ is apparently the only legislative enactment relating to government administration. It sets out in detail the administrative framework and powers of the Council of Ministers, its subsidiary bodies and its officers. The law thus constitutes part of the legislative framework under which the Government operates. This enactment and other legislation promulgated to date by the Government lack the basic legal foundation of a constitution. The extent to which this uncertainty will have a dissuading effect on private investment remains to be seen.

5.7 Investment. The Investment Code (A2) and its implementing decree (A2.a), being the most important legislation relating to foreign investment affecting the mineral sector, was established in 1988. Generally, the Code and its regulations establish a relatively liberal framework which should attract foreign investment. Its scope appears very broad in nature and encompasses many types of investment activities, including mining exploration and production. Thus, the eventual Mining Code should reflect and set out in detail the provisions of the investment legislation, notably its tax, labor and customs provisions.

5.8 MIH and MEPF were made aware of the relation between and the possible impact of this Code on mining activities. The primary focus should be on the appropriate contractual, economic and fiscal terms and the policy choices relating thereto which must be made by Government.

5.9 While the investment legislation should tend to encourage private investment, several of its general provisions might be clarified or completed. First, the three potential forms of investment are mislabelled, although this may be a translation problem. "Business by contract" is in reality a contractual joint venture, and what the Code calls a "joint venture" is in effect a distinct legal entity to be formed under Lao law. This entity has some attributes of a limited liability company, although it is also implied that each of the participants may have liability for certain actions.4/ Also, the "fully

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3/ Numbers in brackets refer to documents available in the project file, listed in Annex III.

4/ See article 7 of the Investment Code.

foreign enterprise" is likewise a distinct legal entity apparently to be formed under local law; whether that entity is a limited liability company form or also has liability attributes of a general partnership remains to be clarified.

5.10 Provisions related to taxation are discussed in Section B, Fiscal Provisions. Other provisions related to accounting, exchange control, banking, tax, customs, labor, social security and disputes settlement, while favorably stated as general principles, remain to be developed.

5.11 Vague areas should be detailed in order to avoid a perception of potential uncertainty to the private investor. For example,5/ some potential investments are disqualified from treatment under the legislation. While the principles evoked in that provision are legitimate, the parameters defining nonconformity to economic and social development projects, serious damage to the environment, overwhelming debts and activities which are forbidden or not promoted, to cite a few examples, must be further clarified. In addition, unanimity requirements 6/ could be perceived as a blocking mechanism applicable to too wide a range of matters and thus a dissuading factor for a "joint venture" investment form. More importantly, the grounds for termination of the investment status are somewhat unclear, like references7/ to environmental problems which cannot be rectified and the inability to perform obligations. It also mentions liability for losses for failure to meet contracted responsibilities.

5.12 While the provisions of the implementing decree regarding the transfer of technology are quite broad, clarification is needed on whether the intellectual property protection in its Article 59 covers only patents or extends to trademarks, copyrights, know-how and other intellectual property.

5.13 A variety of administrative, regulatory and other matters, which impact substantially on mining investments, are also covered by the Code and decree. These relate, notably to:

- the potential business form of the investment, its management, participants and potential liabilities;
- factors determining whether an investment qualifies or is excluded and the standards by which it must be operated, including safety and environmental regulations and transfer of technology;
- employment of local nationals and foreigners and the rules relating thereto, employee unions and the entry and stay of foreigners and their dependents in the country;

5/ Article 6 of the implementing decree.

6/ Article 36 of the implementing decree.

7/ Article 41 of the implementing decree.

- foreign exchange matters, including bank accounts, remittances and exchange rates; and

- dispute settlement and arbitration.

5.14 Each of the above elements must, like the components of the fiscal regime, be reviewed for their appropriateness in the eventual mining legislation and related investment agreements. Many of the provisions in the investment legislation must be clarified and detailed in order to be acceptable to potential foreign investors.

5.15 Other Relevant Legislation. Other commercial legislation relevant to the mineral sector cover banking, economic sectors, pricing, state-private enterprises, taxation and trade. Further legislation is in preparation, notably on taxation and accounting. This legislation (Category A of Sector File - Annex III) and its impact on the mining sector are summarized in Annex IV.

2. The Mining Code

5.16 One of the most urgent sector priorities is the enactment of a Mining Code to provide a sector-specific set of regulations. The Code is presently under preparation by Government personnel with a technical rather than a legal background, using legislation of Thailand and Australia as models. Thus this draft (B1), while providing a basic framework from which a revised final document may be prepared, has substantial defects and reflects legislative precedents which are probably not the most appropriate.

5.17 In order to enhance the attractiveness of mining investments in Lao PDR several additions and clarifications are required. For instance, an investor, when being granted an exploration permit, has to be assured that, if successful, he also will have the first right to commercial exploitation of the discovered minerals. Also, administrative procedures need simplification and should be centralized. Other parts of the Code, such as rights to the utilization of water, forests, land and infrastructure, have to be clarified. Most important, the Code has to address the fiscal regime, supplementing and expanding the dispositions of the Investment Code in mineral-sector-related matters.

5.18 The Bank has commented in detail on this draft (B1.a) and also advised the Lao authorities about relevant legislation from several other jurisdictions (B2), on which they might draw in preparing the revised draft Code. Furthermore, the Bank prepared for the Government's consideration and discussed with the Government a model draft Code. It remains for the Government to complete its review of this draft, approve and promulgate it. It should also review the possible steps that may be taken to alleviate the potential constraints on mining investments that may be posed by other legislation (Annex IV).

5.19 The mining legislation forms the cornerstone of the mining legal regime, and is intended to strike a balance between a stable and detailed regime with attractive mining investment incentives and adequate and appropriate

protection for the Government and its revenue through fiscal and other provisions. A detailed commentary to the draft mining legislation has been finalized and provided to the Government.

5.20 After adoption of the mining legislation, additional documentation should be considered, including ministerial regulations, or orders, which elaborate further on technical and administrative matters covered in summary fashion by the draft mining legislation. These orders might cover, for example, environmental, health and safety and other matters. Further documents to consider would include model agreements, similar to those provided to Government during the Bank's two Mineral Sector Assessment missions in April and July 1989. The use of this type of model agreements would assure a common starting point in negotiations with private investors in order to foster uniformity. In addition, Government should obtain legislative, contractual and other legal materials in order to constitute a library for reference purposes.

5.21 Other steps to be considered relate to education and training of Government personnel in the legal, financial and technical aspects of mining investments, in order to enable such personnel to effectively deal with potential and actual private investors and to protect the Government's interest. Participation by such officials in seminars and other courses offered by a variety of institutions would be helpful. Involvement in the preparation of regulations and model agreements would likewise give such personnel an understanding of the approaches and considerations underlying the content of such documents. Involvement in actual negotiations with investors, perhaps with outside assistance, should also supplement the knowledge of such officials.

B. Fiscal Provisions

5.22 The fiscal regime for mining projects is frequently distinct from general industrial taxation because of specific features, such as valuation of the initial exploration costs, distribution of the rewards for high risks taken, and remuneration of the Government/country for making available a non-renewable resource for exploitation. However, the taxation of mining is also guided by general principles for the taxation of other economic activities; on the one hand, making a smooth and constant income stream available to the Government, to facilitate budgetary planning, and, on the other hand, making planning of economic activities more efficient by sharing economic benefits when they occur, i.e., on the basis of income taxes if the activity is profitable.

5.23 In practice, taxation regimes for mineral activities consist in many countries of the following basic elements which take the above mentioned aspects into account: (i) an income tax somewhere between 30% and 50% depending on deductions and general income tax levels; (ii) royalties anywhere between 1% and 5% of the gross value (sometimes volume) of the product either at mine mouth or at some intermediate point of delivery (e.g. at the border); this is the main tax which assures a constant revenue flow for the Government but which also creates risks for mineral projects in times of low net income since it may drain cash from the project and affect its capital structure negatively; (iii) a free

Government participation between 0% and 10% to take into account the value of the deposit and past exploration expenses (additional equity may frequently be acquired and may be carried by the foreign partner initially); this participation provides an additional source of profit-based income; (iv) filing fees and surface rentals to compensate Government for services; (v) exemptions on imported equipment and export duties (because of royalties); (vi) dividend withholding taxes; and (vii) reinvestment provisions (depletion allowances) of 5%-15% of gross revenues which are tax deductible if reinvested in the deposit within a given period. A more detailed discussion of mining regulations in different countries is included in Document No. (B2).

5.24 In accordance with the Foreign Investment Code, the essential revenue element is an income tax on corporate profits, ranging between 20% and 50%, depending on the sector, and modified by exemptions and other provisions. The income tax rates applicable for the mineral industry are 25% (mineral exploitation and processing) and 40% (exploitation and processing of precious stones and metals). The principal regulations modifying and complementing the income tax are not sector-specific and are summarized below:

(i) Complete exemption from income taxes for 2-4 years, depending on the project and decided upon by the Council of Ministers' foreign investment management organ;

(ii) 50% exemption for 2 additional years in specific cases;

(iii) A general reduction of the applicable income tax rate by 2-5% if 3 out of 6 specific criteria are fulfilled, including production principally for exports and use of mainly local inputs;

(iv) Complete exemption from taxes on income generated from reinvested business profits of at least three years;

(v) Tax carry forward of business losses up to 5 years;

(vi) Obligation to pay land rents and fees for water and forest use, as well as social security for workers;

(vii) Mandatory financial reserve from profits after taxes;

(viii) Income tax on expatriate salaries of generally 10%;

(ix) Unrestricted transfer of after-tax business profits, foreign debt service and personal income.

5.25 The fiscal regime as laid out in the Investment Code is, at least for mining, quite generous to foreign investors compared to mining regulations in other countries. As the development of the mineral industry is likely to be

based at least for the short and medium term on small investments in precious stones and metals with a relatively short life span, the basic 2-4 year exemption, additional exemptions and reductions, tax-free profits from reinvested income and losses carried forward could limit the benefits for the country from these projects to (fairly insignificant) import taxes, a few years of income taxes at the end of the life cycle and employment and social benefits. A weakness of the regulations is that they do not specify depreciation rules and do not provide for accelerated depreciation. The accounting principles, in particular for determination of income and permissible deductions, are not well enough defined. It would therefore be important to complement the general regulations with specific additional provisions. These would principally include royalties, and possibly a dividend tax now contained in the new tax law (Annex IV). Filing fees and surface rentals, equity participation of the Government if so desired, a depletion allowance, and clarification of accounting principles and depreciation rules, would be included in the accounting annex of the Mining Code.

5.26 The two- to four-year tax holiday8/ should be, to the Government's advantage, replaced with a provision for accelerated depreciation, and the tax-free status of reinvested profits might be replaced by a reinvestment deduction provision. Certain tax rates applicable to various activities, including petroleum exploration and production, are perhaps needlessly generous to the potential private investor, and have been modified in the proposed Mining Code.

5.27 The suggested additions to the fiscal provisions of the Investment Code would not require changes of existing decrees and would not contradict the Investment Code which represents a basic framework that for sectors better known to the authorities has already been defined in more detail in the Application Decree. The Mining Code currently under preparation would be the place to define more clearly the fiscal provisions specific to mineral projects. It would also be the appropriate place to clarify depreciation rules for mineral projects, if different from general depreciation rules in the country, and the accounting system with particular emphasis on definition of income and permissible deductions.

5.28 In the definition of a fiscal regime for mining, it has to be kept in mind that, whatever the detailed provisions, the basic guiding principle has to be the joint impact of all measures combined. The fiscal regime should assure the investor acceptable returns on his investment, which in a country with little infrastructure, sparse geological data, and limited business experience and supporting services may have to be higher than in typical mining countries where these elements are better developed. However, the fiscal regime should also provide a fair share of the projects' benefits for the country in exchange for the investor's right to exploit its mineral resources, use its infrastructure and rely on its services. The fiscal regime should also be balanced in profit-related income for the country (income tax and dividends) and non-profit related income (royalties and fees) to achieve an acceptable compromise between the Government's desire for a predictable income stream and the need to maintain the project competitive even in periods of low income. In

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8/ Article 22 of the Investment Code.

order to make these recommendations more specific, the main features of a fiscal regime in mining, including the ranges of different taxes and other provisions, have been included in the accounting annex to the draft Mining Code.

C. Contractual Arrangements

5.29 Status. The Government's liberal policy of economic management and the enactment of the Investment Code have already attracted foreign venture capital to the mining sector. Several contracts with foreign firms have been signed, among which are contracts with two Thai firms, Tien Hong Co. for sapphire exploration and Kumpu Siam Co. for gold, as well as two Australian junior mining companies, Century Metal and Mining NL and Hanuman Resources Pty., both for gold exploration and possible exploitation. The latter two contracts are reviewed in Annex V.

5.30 Possible Impact. It can be assumed that, if the positive investment climate prevails, 10-15 exploration ventures could be implemented over a short period. If eventually 2-3 of those were successful (a high ratio because of the country's untouched potential), the country could reap substantial benefits which would exceed by far those of its mining sector in the past. Under the same assumptions as in the simulations in Annex V, gross foreign exchange generation would amount to US$13-19 million/year (compared with US$1.2 million from mining in 1988). This would be equivalent to a 20%-30% increase in gross export earnings. Net foreign exchange generated would range around US$6-8.5 million/year. Government revenues from these projects would be about US$1.9-2.8 million/year, an increase of 3%-5% over 1987 total budget revenues.

5.31 Employment creation would be relatively small, at several hundred people, but the training and technology transfer aspects would be important. Some infrastructure provided (e.g., access roads, houses, schools, water supply) may also have positive effects beyond these projects. If, in addition to 2-3 medium sized gold projects, with average production of 500 kg/year, some small precious stones projects and possibly a lead/zinc/silver project were carried out, the economic impact of mining development could take on sizeable proportions and result in considerable multiplier effects.9/

5.32 Model Agreements. The Government would be well advised to consider and formulate a more balanced model agreement which may be used as the starting point in future negotiations with other investors. The Bank has provided the Government with a draft for such a model (B5), including an investment agreement, a model investor's contract and a form of by-laws for a limited liability entity. Also, extensive explanatory comments on these three documents were provided (B5a). The model investment agreement between the Government, on the one hand, and its parastatal entity and the private investor, on the other hand, sets forth the basic contractual, fiscal and regulatory framework under which the investment will be carried out. The joint venture/shareholders agreement between the Government parastatal entity and the private investor details the basis of their relationship, first as a non-incorporated joint

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9/ Since little mineral exploration has been carried out in Laos, the estimates on possible economic benefits are purely indicative. They are not based on any specific mineral potential assessment.

venture during the prospecting and pre-operation period and then, as shareholders in a local limited liability entity if the project is developed. The draft articles (statutes) are for the joint venture entity which could be formed during the development and production period.

VI. PROMOTION OF THE MINERAL SECTOR

6.1 In order to foster foreign investment in the mining sector it is necessary to actively promote it. Other countries have been very successful with a variety of approaches, and an active promotional policy would certainly help Lao PDR accelerate mineral development and thus export revenues and Government income. The three key activities of a promotional program for Lao PDR are set out below:

(i) Preparation of promotional material. This material would consist essentially of a concise brochure which first gives a brief description of the country, its geography, political and economic institutions, international links and infrastructure. It then would give an overview of the country's geology, its potential, the known mineral resources and reserves and the major mineral indications. It would describe the institutions mainly responsible for mining, the services for mining companies available in the country and useful contacts for interested investors who want to establish a first communication or visit the country. The brochure would then summarize the investment rules, the fiscal regime, regulations for obtaining exploration permits and mining concessions, the Government's policy on direct participation in mining ventures and other provisions of the Mining Code. It would also provide a summary of other relevant regulations, e.g., labor laws, basic company laws, export and foreign exchange rules or interest rate and local credit policies. The brochure would be available to interested investors upon request and would be the basic document for visiting representatives of such investors;

(ii) Promotional activities. For Lao PDR, which is not yet well known as a mining country, it would be necessary to actively promote mineral development. For this purpose, a promotional capacity has to be built up through either creation of a separate promotional office or the inclusion of promotional activities in the responsibilities of the Government's institution for geology and mining. This office would be the first and main contact point for foreign investors and would facilitate their stay and visits in the country and make necessary arrangements for meetings with other institutions. Initially, this would probably be sufficient, and experience would have to be gained and evaluated on the appropriateness of the approach. As a next step, active promotion should be initiated outside the country through contacts with mining associations in major mining countries, presentations and seminars abroad, and contacts with international or bilateral financing institutions; and

(iii) Increase of knowledge and documentation. A relatively unexplored country like Laos should aim at increasing the knowledge of its geology and documenting it effectively. Geological knowledge is created by exploration and mining ventures and by specific programs for cartography and regional or detailed geology. Since the Government's resources are small, mobilization of funds for cartographic and geological activities is essential. Multilateral and bilateral financing institutions would be logical sources of funds since they frequently include these activities in their priority programs. This type of program has been quite successful in many African countries which one to two decades ago had very little knowledge of their mineral resources but are now exploiting some of them and are actively promoting others. Such financial assistance can also be used to increase the knowledge of certain priority areas with high indicated potential through more detailed exploration or to increase the knowledge of and actively promote certain well defined mineral prospects. It would be desirable to establish a comprehensive data bank where the detailed mineral knowledge of the country is documented. This data bank has to be easily accessible to investors who, after an initial review with the promotional offices of the prospectus and of the overall situation, want to analyze the potential of certain areas or certain minerals in more detail. It would also be essential to train local staff in administrative, contractual, legal and fiscal matters as well as project evaluation methods, to establish a library covering such subject areas and to provide appropriate office equipment to deal effectively with these matters.

VII. CONCLUSIONS

7.1 The recommendations given and conclusions made throughout the report are summarized below:

Mineral Resources and Production

(i) As to resources and mineral development in general, priority should be given to the exploration and development of high-value, low-bulk minerals (e.g., gold, precious stones, tin, lead/zinc/silver). These require minimal infrastructure, minimal investment, short project implementation times and consequently fast cash flows and paybacks (Chapter II and para. 4.9). Industrial minerals, in general should be developed only for local consumption (with the exception of gypsum, which is exported, and possibly coal);

(ii) For the tin mines, a pre-feasibility study should generate the information required for a full feasibility study (including detailed exploration and metallurgical tests), which should be carried out to justify the viability of a rehabilitation program (paras. 2.4, 4.14). The rehabilitated

mines should be competitive in the context of expected market developments (para. 2.5);

(iii) At the gypsum mine, there is room for cost savings. All efforts should be made to increase cost-efficiency in order to make the mine more competitive (paras. 2.7);

(iv) The coal mining project now under implementation will have sufficient production capacity for the domestic market, but could not supply possible exports if the planned cement project goes ahead. If an export demand is realized, foreign investors should be attracted to explore for coal and develop additional mines (paras. 2.8-2.9);

(v) Promotion of gold and gemstone exploration should be given high priority since these minerals are most likely to attract foreign investors (para. 2.12, 4.9). The gold SME should be strengthened to enable it to enter into joint ventures with foreign investors; and

(vi) For iron ore, potash, bauxite and copper, no investments for exploration or development should be made in the short- to medium-term (paras. 2.16-2.20, 4.9).

Sector Institutions

(i) The role of the Department of Geology and Mines as a regulatory and service organization should be maintained and strengthened, and funds should be made available to upgrade its facilities and technical assistance (para. 3.6). It should, however, have no direct involvement in mineral production or commercial exploration (para. 3.7). Also, environmental regulations should be prepared and monitored by the DGM (para. 4.21);

(ii) For Geo Mining Enterprises, funds for exploration equipment and technical assistance should be made available to enable it to function as a commercially-oriented sector service organization (para. 3.8); and

(iii) The Government should study and consider the establishment of a holding company over the State Mining Enterprises, which would also act as the Government arm when dealing with investors in commercial exploration and development, and serve as counterpart for joint ventures and other associations. Technical assistance, training and advisory services will be required for the establishment of such an entity (para. 3.11).

Legal, Fiscal, Contractual and Promotional

(i) Review and adapt the fiscal regime and provisions of the Investment Code to suit the peculiarities of the mineral sector (paras. 5.14, 5.25);

(ii) Re-draft and promulgate a definitive Mining Code, including the fiscal provisions mentioned above (paras. 5.16 to 5.20);

(iii) Establish model contract agreements to serve as guidelines when negotiating mining agreements with foreign investors (para. 5.32). Technical assistance will be required, especially for review and appraisal of investment proposals; and

(iv) Promote the sector internationally by establishing a promotional and information office, and prepare promotional documents (para. 6.1). For this, technical assistance may be required.

ANNEX I
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LAO PEOPLE'S DEMOCRATIC REPUBLIC

MINERAL SECTOR ASSESSMENT

MINERAL PRODUCTION

1. In spite of the good mineral potential existing in Lao PDR, mineral production is relatively modest. This is mainly due to lack of infrastructure and insufficient venture capital for both exploration and development.

2. On a commercial basis, only relatively small quantities of tin, gypsum and, to a certain extent, coal are presently mined in Lao PDR, in addition to salt and construction materials. The State Mining Enterprise SEML operated these mines with a staff of about 1,100 persons before it was reorganized and divided into four State Mining Enterprises (SME's) for tin, gypsum, coal and sapphires. SEML is involved in sapphire exploration and pilot mining, and a separate entity explored for gold and carried out limited pilot mining activities. Historical and projected mineral production is summarized below:

Table 1: Mineral Production and Export Value, 1981-93 a/

	Tin				Gypsum			Sapphire		Coal	
	Production,t		Export		Prod.	Export		Export		Prod.	Value
Year	Metal	Conc.	Conc.t	US$mln b/	'000 t	'000 t	US$ mln c/	Carat	US'000	t	US'000
1981	76	255	na.		na.	na.	na.	na.	na.	na.	na.
1982	95	302	381	1.26	35	25	na.	na.	na.	na.	na.
1987	105	359	276	0.85	62	45	na.	na.	na.	750	na.
1984	131	430	371	1.13	70	87	na.	na.	na.	830	na.
1985	145	520	417	1.06	85	83	na.	na.	na.	1,000	na.
1986	149	558	552	0.53	77	78	na.	na.	na.	1,556	31
1987	150	500	558	0.77	57	49	0.39	9,500	50	1,505	30
1988	98	245	330	0.73	80	59	0.50	na.	na.	600	12
1989	160	400	400	1.10	100	120	1.08	na.	na.	1,000	48
1990	210	460	460	1.59	130	140	1.33	na.	na.	3,500	171
1991	225	500	500	1.86	150	150	1.43	na.	na.	5,000	244
1992	240	540	540	2.14	150	150	1.43	na.	na.	5,000	244
1993	270	600	600	2.52	180	180	1.71	na.	na.	5,000	244

a/ Societe d'Exploitation Miniere Lao (SEML) Output.
b/ Concentrate value after smelter charges according to New York Dealer tin prices.
c/ Value in accordance with FOB Thailand export prices.

3. The economically most significant mineral, tin in the form of concentrates, is exported to the USSR, and most of the gypsum (about 98%) is exported to Vietnam in countertrade on a ruble basis which makes it difficult and inaccurate to convert into a dollar basis. The values in the table above are, therefore, estimates based on international comparator prices for these commodities.

a. Tin Production

4. Although tin has been mined for centuries, commercial production in Khammouane Province started in the 1920's and, in 1972, reached production levels as high as 1900 tpy of concentrate. In 1978/79 the mines were re-equipped and a processing plant was built with the assistance of the USSR. After an extensive exploration program, which was concluded in 1985, reserves in the lateritic alluvial deposit were determined at 10 million t of ore with a grade of 0.24% tin.

5. In 1980 SEML was formed and operated the mines until March 1989, when the Tin SME was established. Historical production has been as follows:

Table 2: Tin Production and Exports, 1981-88
(tonnes)

Year	1981	1982	1983	1984	1985	1986	1987	1988
Concentrate	255	302	359	430	520	558	500	245
Grade, % a/	30%	31%	29%	30%	28%	27%	30%	40%
Metal Cont.	76 a/	95	105	131	145	149	150 a/	98 a/
Exports(Con.)	na.	381	276	371	417	552	558	330

a/ Estimate

6. Mining was by truck and shovel open-pit methods, with following gravity concentration in three plants at the Pon Thiou, Boneng and Nong Sun mine sites. However, during operations it became clear that the head grades at the concentrators were consistently lower by about 25% than those predicted by the exploration results (0.18% vs. 0.25% Sn/t), either because of geological over-estimates or inappropriate mining methods causing excessive dilution. Metal losses from tne concentrators became as high as 70% of metal contained in the ore (vs. specifications of 40 to 45%), and concentrate grades produced were in the 28-30% Sn/t range, significantly below the expected 45% metal content. These fundamental problems resulted in extremely high operating costs, reportedly exceeding the selling price by about 40% in some years.

7. All tin concentrates were exported to the USSR through Lao Import-Export Corporation (LIEC). In 1988, smelter and transport charges of US$700 per tonne of concentrate were levied, which for the low-grade 30% material translates into US$1.14/lb of metal (vs. US$0.76/lb for the 45% specification). In 1988 the company received KN 521,400 per tonne of 30% concentrate, or about US$2.10/lb.1/ The overall cost of Lao tin ex-USSR smelter would have been around

1/ Exchange rate used throughout: 1 US$ = KN 550 (1989), KN 380 (1988), KN 95 (1987,1986.)

US$3.22/lb, comparing fairly well with an international average tin price (New York Dealer) of US$3.31/lb in 1988.

8. By mid-1988, all mechanized mining and concentrator operations came to a standstill, since during a prolonged period of losses the mines were unable to raise working capital and lack of foreign exchange for operating inputs, such as production materials and spare parts. Of the 700 employees (which subsequently were further increased by a geological exploration team in line with the restructuring of DGM, para. 3.36) 400 persons were allowed to work the deposit manually by artisanal methods (hand excavation, hand panning) on a contract basis, while the remaining 300 (retained by the Tin SME - which still appears to be an excessively high number) are operating infrastructure and handling administration. Furthermore, a major capital project, the construction of a 75 km power line to replace diesel generation of electricity for the concentrators was abandoned at 75% completion.

9. The switch to artisanal production has resulted in a better concentrate grade (45%) and a considerable reduction of operating costs, which are still 10% above the selling price which has remained unchanged in KN terms but severely deteriorated in US$ terms (US$1370/t for 30% concentrate in 1988 vs. US$950 during the first quarter of 1989). During the first four months of 1989 the average international tin price was US$3.91/lb, which would have translated after smelter charges to a realized price for 30% concentrate of about US$1,830/t (approx. KN 1 million/t) if sold on the international market. Under this scenario, if sales had been realized in freely exchangeable currencies, the mine would have been profitable.

10. During the first quarter of 1989, 65 t of 45% concentrate was produced, which makes the planned production of 160 t of metal in 1989 a credible target. Further projections, however, appear to be optimistic, and are summarized below:

Table 3: Projected Tin Production, 1989-93
(tonnes)

Year	1989	1990	1991	1992	1993
Concentrate	400	460	500	540	600
Grade,%	40%	45%	45%	45%	45%
Metal Content	160	210	225	240	270

11. In order to obtain these production levels, which exceed recent historical production by mechanized means, at least some kind of mechanization (loading and hauling) will have to be introduced and only selected, shallow parts of the deposit can be mined. The artisanal methods currently applied are most likely to result in high-grading the deposit and thus in rapid depletion of reserves and waste of mineral.

12. No major investments should be made in the tin mines at the present time until a solution can be found to the fundamental questions: reliability of ore reserve data, adequacy of mining methods and metallurgical problems in the concentrator process resulting in excessively low metal recoveries. For this purpose, it is recommended to undertake a pre-feasibility study based on available data and known technologies. The results of this pre-feasibility study, if positive, should provide the basis for proceeding with a full feasibility study which would include detailed exploration drilling to re-define reserves, re-assessment of mining methods and bulk metallurgical tests to determine an optimal concentration technology. It should be borne in mind that the most critical parameters for a viable mining operation are the metal content of the concentrator feed and, most importantly, the metal recoveries during mineral processing.

b. Gypsum Production

13. The gypsum mine, operated by the Gypsum SME, is located about 60 km east of Savannakhet and started pilot operations in 1980 after three years of exploration, aided by Vietnamese technical assistance. Defined reserves are 150 million tonnes, and total possible reserves could be as high as 5 billion t. Mining is by open-pit method with a low overburden ratio of 1.5 : 1 bank cubic meters per tonne (bm^3/t). Domestic consumption is insignificant (small quantities for clinker milling and chalk manufacture), and almost 100% of production is exported to Vietnam. Historic production is shown in the table below:

Table 4: Gypsum Production and Exports, 1982-89
('000 tonnes)

Year	82	83	84	85	86	87	88	89 a/
Production	35	62	70	85	77	57	80	100
Export	25	45	87	83	78	49	59	120
App.Stock	+10	+27	+10	+12	+11	+17	+31	+11

a/ Estimate (optimistic)

14. The enterprise expects to invest the equivalent of US$0.8 million over the next two years to increase production capacity to 150,000 tpy. This is in line with the increase in demand anticipated from expansion projects planned by the customer (Vietnam). However, given its past off-take performance (see apparent stock variations on the table above), firm delivery assurances should be sought before mine investments are carried out. Ultimately, a production volume close to 200,000 tpa is envisaged by the mid-nineties.

15. Total operating costs, including depreciation, were KN 3,500 (US$9.20/t) in 1988. This appears to be high when compared to similar mines in southern Thailand were production costs are in the US$4-6/t range. Possible causes for the high cost would be inefficient equipment use and overstaffing (present staffing about 290, including 8 professionals, while internationally a comparable operation would require between 25 and 30 persons at most), indicating that there exists room for cost savings and more efficient operation.

16. Marketing is done through LIEC, which exported the product in countertrade to Vietnam. The realized selling price in 1988 was about US$10/t at mine mouth, or the equivalent of Rubles 17.50/t.2/ The material is shipped by truck 500 km to the port of Da Nang and then about 800 km by rail or sea to cement works near Haiphong, the customer bearing the freight charges. Freight to Da Nang alone is reported to amount to US$25/t (which appears to be too high since most material is transported on back-haul). Prices are negotiated on an annual basis.

17. Although the customer's involvement during exploration, construction and operation of the mine and his willingness to absorb freight charges indicates a long-term commitment to take the product, the inland location of the operation with high freight costs to the sea port make it vulnerable to outside competition under a possible future scenario of regionally liberalized trade policies. Gypsum for export in southern Thailand is priced in the US$8.00 to 9.50/t FOB range, which translates into a range of US$18.50 to US$25.50 CIF Indonesia, and conceivably could be shipped to Vietnam at less cost by an all-sea route from Thailand than from Lao PDR, if Vietnam were willing to pay for the product in freely convertible currency.

18. The best defense for the gypsum enterprise is to cut costs to remain cost-competitive under market conditions, and to seek closer markets. While cost-cutting is feasible, it is doubtful whether new markets can be found in the short- to medium-term. This would happen only if a domestic cement industry, now under study, is developed, and if Thailand decides to build new cement capacity in the Northeastern part of the country in the future.

2/ Exchange rate used throughout: 1989: 1 Ruble=KN 300; 1988: 1 Ruble=KN 218 (avg.); 1987: 1 Ruble=KN 191.

c. Coal Production

19. Artisanal mining had been carried out intermittently at the Bo Chan anthracite deposit (located in Vientiane Province) since the early 1970s. From 1982 to 1985, a detailed exploration campaign was conducted with assistance from the USSR, outlining about 5 million t of reserves in irregular, steeply dipping seams. However, and depending on ground water conditions, only 200-700,000 t are mineable from an open-pit operation from the thickest seam (average 5.6 m thickness). Since 1985, SEML has been conducting a pilot mining operation on the deposit employing about 40 people, which, because of outmoded and unserviceable equipment and lack of investment capital, came to a halt in 1988. Historical production was as follows:

Table 5: Coal Production, 1983-87
(tonnes)

Year	1983	1984	1985a/	1986	1987
Production	750	830	1,000	1,556	1,505

a/ Start of SEML pilot operation

20. The coal reserves are of truly anthracitic characteristics, and quality of in-situ material is about 8,200 kcal/kg calorific value, 5% volatiles and has a low average sulphur content of about 1.5 %. However, after dilution a run-of-mine (ROM) quality of about 6,000 kcal/kg with 25-35 % ash with a sulphur content of slightly over 1.0 % can be expected. This quality is considered to be adequate for the envisaged domestic end users and also for a possible cement industry.

21. The market for the Bo Chan Mine lies mainly in the industrialized area of metropolitan Vientiane,mainly for foundries, brick factories, tobacco curing and other small industrial consumers. Supply from the pilot project so far has been sporadic because of inadequate and unserviceable mining equipment, but over 4,200 t have been sold to those industries by SEML. Demand estimations are summarized below.

Table 6: Possible and Anticipated Coal Demand
(Tonnes)

Year	1989	1990	1991	1993
Demand, possible	3155	3820	5420	12220
Demand, anticipated	1450	3520	4920	6070
Supply	1000	3500	5000	5000
Anticipated Supply Gap	-450	-20	+80	-1070

22. In line with the principle that consumers should pay prices reflecting the real value of a product and consistent with the economic reform policy, the anthracite price has been increased by 130% in mid-1988 from US$20.2 equivalent to US$48.9 per tonne. Furthermore, it is the intention of the Government to let this base price float with inflation in order not to erode its level in real terms.

23. The domestic price is close to, but does not as yet equal, the border price of anthracite in Lao PDR, which is estimated at US$55.5/t.3/ It is, however, in part designed to make anthracite use competitive with firewood burning to reduce deforestation, since consumers like brick factories are not captive and have the opportunity of using alternative fuel (wood). As the price of firewood increases because of longer transport hauls, it is anticipated that the domestic price would approach the economic price in the longer term.

24. In order to satisfy the domestic demand (including the possibility of diverting demand from firewood to coal), the Coal Mining Co. (CMC) was established in 1989 and obtained a US$500,000 loan from the State Bank of Lao funded through an IDA Industrial Credit (No. 1947-LAO) for the purchase of equipment to expand the mine to a capacity of 5,000 tpa. This equipment is on order and resumption of production is expected during the third quarter of 1989. The projected production levels as shown in the table below appear to be realistic production targets.

Table 7: Projected Coal Production
(tonnes)

Year	1989	1990	1991	1992	1993	1994	1995
Production	1,000	3,500	5,000	5,000	5,000	5,000	5,000

25. At this production level, mine life would exceed 30 years. The financial and economic rates or return for this project are estimated at 15.6% and 26%, respectively. However, demand projections do not take into consideration the possibility of a domestic cement plant at a limestone deposit at Vang Vieng, about 60 km to the north. If a feasibility study following a pre-feasibility now being carried out proves the viability of a domestic cement plant, firm demand would be increased to about 15,000 tpy and mine production would have to be expanded. CMC, with technical assistance from the Australian International Development Assistance Bureau (AIDAB) is now carrying out a detailed exploration program and mine planning exercises to prove the feasibility of such a future expansion. Furthermore, there are export possibilities for high-grade coal to Thailand.

3/ Border price cif Bangkok, inland transportation and quality adjustments considered.

d. Precious Minerals

26. Gemstones have been produced in Lao PDR on an artisanal basis, but it was not until 1981 that a reconnaissance and exploration program for sapphires was carried out in Bokeo Province near Ban Houei Say close to the Thai border. This program was carried out by DGM with technical assistance from Czechoslovakia (CSSR). An area of 17 km^2 was delineated, but reserves were not definitively defined. Test and pilot mining and processing facilities (screening, jigging) were erected and operated from 1983 to 1986.

27. In 1986, after departure of the CSSR partners, the operation was turned over to SEML, which operated it for about three months and shut down for lack of foreign exchange for materials and spare parts. In 1987, a total of 9,500 carats were sold to an Australian party for US$50,000 (US$5.26 per carat). Reportedly, total production had amounted to 15,000 carats involving 14,600 stones.

28. In 1988, SEML signed an exploration and pilot mining agreement for two years with a Thai company (Tien Hong), which will contribute about US$750,000 for this program. The agreement can be extended after this period, or a production option can be exercised for a joint venture if exploration results warrant. Proceeds from the pilot mine will be shared on a 50:50 basis.

29. Gold is produced by artisanal methods in Lao PDR from alluvial (placer) deposits. The State-owned Gold SME has traditionally operated independently of SEML and is engaged mainly in exploration and small-scale pilot mining operations. Foreign investors have expressed interest in forming joint ventures for gold exploration and exploitation. Moreover, in order to secure a fair share in such ventures, it is necessary to financially and technically strengthen this SME.

e. Other Minerals

30. Other minerals exploited in small pits and quarries are limestone, marble, kaolin, some glass-grade silica sand, and sand and gravel for construction purposes. Small quantities of hand-cobbed lead/zinc/silver ore reportedly have been exported from an exploration project near Vang Vieng in Vientiane Province to Thailand. Also near Vang Vieng, a feasibility study on a sizeable limestone deposit is being carried out to determine the viability of a small cement plant (65,000 tpa) for domestic consumption.

LAO PEOPLE'S DEMOCRATIC REPUBLIC

MINERAL SECTOR ASSESSMENT

PROSPECTS FOR MINERAL DEVELOPMENT

a. Outlook for Tin

1. After a long period of oversupplies, artificially maintained by the international tin council, the tin market collapsed and the tin price dropped by more than half in October, 1985. Since then, production has been drastically curtailed, partially because of closure of marginal operations due to financial difficulties, partially because of voluntary restraint of major producers such as Brazil, Malaysia, Indonesia and Thailand. As a reaction to low prices and as a result of worldwide economic growth, consumption has increased slightly. The discrepancy between production and consumption has resulted in a rapid reduction of overhanging stocks which now amount to only about 25,000 tonnes or 12% of annual consumption. A normal market and inventory situation is thus expected to be restored at latest during 1990.

2. Despite the closure of part of the worldwide tin production capacity following the market collapse there is still sufficient low-cost capacity available to fully meet consumption requirements which are forecast to continue decreasing in the 1990's. While in 1986 about 70% of existing capacity was estimated to have production costs below US$3/lb of tin, the closure of marginal capacity and the additions of low-cost capacity in some countries, particularly Brazil, are estimated to have brought down average production costs still further; substantially more than 70% of total production is now estimated at costs of US$3/lb or below, with spare capacity available and low-cost reserves as possible additions. It is therefore unlikely that the average price in the 1990's will go much beyond this level for extended periods of time. This is reflected in the Bank's price projections which predict price levels of tin (in constant 1989 terms) of US$3.9/lb in 1990, increasing to US$4.2/lb in 1995. While short upward swings beyond these levels are likely because of delays of production or consumption responses, production capacity with costs significantly above US$3/lb of metal is thus likely to be uneconomic and encounter financial difficulties in the longer term.

3. The Tin SME has over the recent past encountered increasing problems (Annex I). Tin production consequently resulted in increasing financial losses which were borne directly by the Government. While production continues on an artisanal basis, the tin operation requires a completely new start and substantial investments in order to continue as a commercial entity and become financially viable. At this time the reserves and appropriate operational

methods need to be re-evaluated to permit definition of an appropriate investment program, taking into consideration, inter alia, capital costs, interest, mine development and appropriate levels of re-investment and maintenance, and an action plan to restart industrial tin production. It would in fact be necessary to do a thorough evaluation of the operation including a pre-feasibility study followed by, if justified, a full feasibility study, and launch a rehabilitation program only if proven viable. The operation's viability will depend on the market outlook and on the operation's capacity to produce tin concentrate in the long run at costs not exceeding substantially US$2.0-2.5/lb (in constant 1989 terms) for tin metal in concentrate after deductions for smelting and international transport charges. The financial viability and cost-competitiveness is the crucial issue since the market for tin concentrate in South-East Asia is promising due to smelter over-capacity and concentrate shortages following the 1985 tin market collapse.

b. Outlook for Gypsum

4. Gypsum is a low value bulk mineral with application mainly in cement production and thus in the construction industry. As a low value product it is very sensitive to transport costs and is thus in most cases suitable for use in areas close to the production center. Current gypsum production levels are around 80,000 tpy which is to be increased in steps to about 180,000 tpy in 1993. The local market is and will remain very limited. About 1,500 tpy is now absorbed an existing clinker operation and not more than an additional 2,000-3,000 tpy are expected to be required for the planned Vang Vieng cement plant. The bulk of production is sold by LIEC which markets the product to Vietnam which uses it in a large cement plant in Haiphong. Vietnam is expected to remain the principal and also an assured market outlet since it does not have any major own source of gypsum for this cement operation.

5. On the basis of current economic parameters the outlook for gypsum in the medium- and long-term appear favorable only if the customer is willing to absorb the transportation costs. Current total production costs amount to about US$9/tonne at the mine mouth, which is high compared with other operations, e.g., in Thailand. In addition, transport costs to Haiphong, partially by road and requiring transhipping from truck to boat or rail, are high. The 1988 sales price amounted to the equivalent of US$10/tonne. At that level of sales price and transport costs, the gypsum company retained a profit margin. It remains to be seen if gypsum shipments from Lao PDR can remain competitive with shipments from Thailand which could conceivably offer competitive freight charges on an all-sea route. In addition, the gypsum company expects costs to rise in 1989, principally as a result of new investments. Moreover, a longer term increase in wages in real terms as well as rising transport costs should probably be anticipated in the strategic planning scenarios. This would require determined efforts by the company to reduce costs and increase efficiency in order to stay competitive. The planned expansion would most likely help achieve this objective but will depend on the implementation of additional investments at Haiphong's cement plant.

c. Outlook for Coal

6. Anthracite is a clean and hot burning coal with a high carbon and therefore high energy content, eminently suited for domestic consumption. Most fuel burning industries in Lao PDR at present are burning either imported fuel oil or firewood. For some industries, like metal foundries and cement plants, anthracite is a highly desirable fuel which cannot be substituted with any other domestic energy source and would therefore constitute a captive market. Furthermore, substitution of fuel wood with anthracite is highly desirable in order to prevent deforestation. In addition, as nearby sources of wood become exhausted and transport costs increase, the price competitiveness of coal will also increase.

7. Domestic market projections indicate a ready demand for about 5,000 tpy. If the cement project at Van Vieng, now under study, will be built, this market would triple. There are also possibilities of exports to neighboring Thailand for industrial uses. However, the desired contract volumes (6-12,000 tpy) could not be satisfied from the Bo Chan mine, and exploration efforts should be increased to find larger coal deposits elsewhere, for which there are good prospects. The Coal SME should undertake this in association with foreign venture capital. An interesting market could develop with Thai cement manufacturers for whom anthracite would be an ideal fuel to blend with Thai low-quality lignite in order to improve combustion characteristics.

d. Outlook for Precious Metals and Stones

8. Lao's geology indicates potential for the occurrence of precious stones and precious metals. In addition to some selected minerals discussed above (tin, gypsum, coal, lead/zinc) this is where the prospects for short and medium term development are best in the sector. The reasons for this are principally (i) dispersed and fragmented markets with many small producers, permitting relatively easy access to additional marginal volumes; (ii) probability of encountering a larger number of generally small economic occurrences than is usually the case with base metals; (iii) because of the higher number of occurrences also the likelihood to find some which are high-grade and low-cost; (iv) little dependence on infrastructure, in particular for transporting the investment costs and short pay-back periods. For the above reasons it is much easier to attract foreign investment in precious stones and precious metals than in base metals or other bulk minerals. The number of possible investors is much larger, risk capital is more readily available, the planning is easier and shorter, and in most cases the Government effort and contribution involved is minimal, and so is the risk the Government is taking.

e. Outlook for Industrial Minerals

9. Industrial minerals are likely to follow economic growth. The most important growth area is construction materials including limestone, gypsum, clays and sands. The construction sector could grow rapidly as a consequence of the new system of economic management both in private housing and in production related buildings. While construction materials are a prime area of mineral development, they generally require less promotion and exploration is less costly than other minerals. Moreover, with few exceptions (e.g. gypsum) they will remain largely limited to the local markets.

f. Outlook for Iron Ore

10. The slowdown of steel demand growth since the mid-1970's has resulted in excess iron ore capacity and many iron ore projects have been cancelled, postponed, or delayed. The result has been the build-up of considerable overcapacity in iron ore which is forecast to persist and estimated to amount even in the year 2000 to nearly 12% of annual consumption. World iron ore demand is expected to grow by 1.7% p.a. during the 1987-2000 period. The low growth expected for iron ore demand is directly related to the low growth expected to steel production, to the increased use of scrap-based and to improvements in yield in steel making.

11. World iron ore capacity is expected to increase by 121.8 million tonnes (in Fe content) during the 1987-2000 period, reaching 738 million tonnes (in Fe content). Australia, Brazil, and China are expected to increase their annual iron ore production by 105.7 million tonnes during the forecast period. Most of this increase is expected to come from expansions of existing capacity of these low-cost producers. New capacity is expected to come from China. By the year 2000 China is expected to be the second largest producer (after the USSR) and the largest consumer of iron ore in the world. Sustained iron ore capacity increases by major producers and slow iron ore demand growth are likely to keep iron ore prices under downward pressure and profit margins at lower levels to the year 2000 than historically. While sinter fine cif prices are forecast to grow at 4.3% p.a. in current terms, their value in real terms is forecast to remain unaltered on average through the year 2000.

12. The main iron ore exporting countries, Brazil and Australia, are also on average the lowest cost producers with production cost fob in 1987 estimated to range around US$11.5/tonne of sinter feed. Production in these countries is based iron ore grades and quality at favorable geographic locations, and comes from both medium-sized, largely depreciated operations with favorable energy supply and transport conditions, or very large operations benefitting from substantial scale economies.

13. This short review of the main features of the iron ore market shows that any new operation would have to be very high grade, excellent quality, large-scale, and close to reliable and inexpensive transport infrastructure to be economically viable. Even then it may be difficult to find a place in the market. The iron ore deposits of Lao PDR do not appear to combine these favorable features and have thus a low probability of being economically viable. While total reserves are roughly estimated at 1 billion tonnes, they occur in nine deposits of which only two have been looked at more closely. Although of elevated iron content, it does not appear high enough to be of commercial quality without need for upgrading, which would make production more expensive. The reserves are not particularly large for world standards and mineable reserves per deposit would be very unlikely to permit a large-scale operation. Infrastructure up to the border (Thailand or Vietnam) would have to be constructed and neither the Thai nor the Vietnamese transport system could easily absorb additional bulk volumes usually resulting from iron ore operations. In addition, indications are that bulk transport through these countries, particularly Thailand, would be very expensive. For the above reasons it would not seem justified to continue exploring the iron ore deposits, and therefore the Government's policy has, at least for the time being, excluded iron ore from mineral sector planning.

g. Outlook for Lead/Zinc

14. Weak demand and depressed prices early in the 1980's resulted in a generally poor perception of lead's prospects over the medium and long terms. From the standpoint of the producer, lead was viewed as one of the least attractive base metals. A modest recovery in lead demand since 1982 and supply curtailments have permitted lead prices to increase significantly since 1985. However, the longer-term view remains basically pessimistic. Prices are expected to decline from their current high levels in line with long-term cost trends. Moreover, demand will remain sluggish as material substitution and environmental concerns continue to erode the lead markets. Lead consumption will increasingly depend on the lead battery market, and the risks associated with the loss of this market will increase. While no substitute for the lead-acid battery is currently in sight, technological development may eventually lead in this direction and result in severe overcapacity. Lead consumption over the 1987-2000 period is expected to grow by a modest 0.8% p.a.. Because of continued expansion of the secondary (recycled) lead sector, lead mine production is forecast to increase by a mere 0.2% p.a.

15. The performance of the world zinc industry during the mid- and late 1980's has been reasonably good. World consumption in 1986 (6.68 million tonnes) surpassed the previous high attained in 1973. Prices soared in 1984 and remained strong thereafter. In the latter part of 1987 the market became increasingly tight and zinc prices rose dramatically in 1988. While they have come down in early 1989 they remain at relatively high levels. The tight supply

situation along with low inventory levels is the result of several factors. The generally poor markets and excess capacity which typified much of the late 1970's and early 1980's curtailed investment spending; world smelting capacity stagnated during the 1980's, and utilization rates increased. In addition, demand has been unexpectedly strong, particularly in some developing countries.

16. During the 1987-2000 period, total consumption of zinc is expected to increase by 1.5% p.a., and zinc production by about 1.4%. Zinc mine capacity is expected to expand by approximately 900,000 tonnes to 7.7 million tpy. While a large proportion of the additions to capacity during the early and mid-1980's consisted of mine expansions, greenfield projects will be the preferred type of investment through the 1990's. Most of these new mines are ploymetallic, frequently with high zinc content, mixed with lead, and by-products such as silver. These trends reflec the more sanguine outlook for zinc vis-a-vis lead and are illustrated particularly by investment activities in Australia and Canada. The Red Dog deposit in Alaska is a good example for these trends with metal contents of 17.1% zinc, 5% lead and 84 grams of silver per tonne.

17. Although there is no explored deposit of lead or zinc in Lao PDR, various lead-zinc occurrences have been discovered. From the indications available the most interesting occurrences appear to be in north-central Lao PDR where samples have yielded considerable silver contents as by-product. As the market outlook suggests, the prospects of deposits with high zinc content and additional by-products are favorable although lead is likely to play only a minor role in the deposit's economics. Lead will, however, in many cases be associated with zinc and silver, thereby adding to the deposit's return. A follow-up on lead-zinc occurrences appears for the above reasons worthwhile and will have a better chance of resulting in a viable deposit than other base metals. Moreover, as zinc is a higher-value product than for instance iron ore or bauxite, its demands on transport infrastructure are lower and economies of scale (i.e., large volumes) are less important, particularly if there is a considerable percentage of by-products, especially silver.

h. Outlook for Bauxite

18. Bauxite is the raw material for alumina and aluminum and as such ultimately dependent on the development of aluminum markets. However, because of the different locations of mines, alumina plants and aluminum production facilities, the three products go through different market fluctuations and in general the bauxite market is less cyclical than that of the final product. Bauxite production gradually shifted in the 1950's and 1960's from industrial countries to the Caribbean, Oceania, South America, and Africa. In 1987, these regions accounted for 70% of world capacity. Australia accounts for approximately one third of world capacity. Guinea is second in world bauxite production its output being primarily destined for exports. Most of this output is refined domestically to alumina. Brazil's capacity has increased gradually

as the result of expansion of expansions. The newest and most likely the last entirely new mine for some time has recently come on-stream in Venezuela. Its capacity is expected to reach 3 million tpy by 1990.

19. Although bauxite production is expected to increase 2.2% p.a. during the 1987-2000 period, the continued trend toward local processing of bauxite will result in a -0.9% p.a. decrease in exports. No major changes are expected in the pattern of bauxite production. Bauxite is likely to remain in ample supply through the 1990's. Spare capacity is available - utilization rates are currently around 0.8 - and incremental expansion of existing mines should remain relatively easy.

20. The above market outlook and supply situation suggests that in the medium term there will be very little possibility for new production centers to enter the market. In order to be viable and find a market niche in the longer term, such production centers would need to be of excellent quality, low cost, and benefit from inexpensive transport to the consumers. While Lao PDR has indications of possible bauxite deposits on the Bolovens Plateau in the south, there is no indication that they would be exceptionally cost competitive production centers. Moreover, a large bauxite operation would encounter transport constraints (similar to iron ore) and would be handicapped by high transport costs to the ocean which would exacerbate the effect of international sea freight. Establishment of a domestic aluminum industry making use of Lao PDR's hydro power potential would require disproportionally large amounts of capital investments. Power requirements for one medium-sized aluminum smelter alone would exceed several times the total installed power capacity of the country. Further reconnaissance and exploration work on bauxite thus does not appear justified in the medium term.

i. Outlook for Potash

21. Exports of Potash fertilizers are concentrated in a few countries. With the development of large potash resources in Canada since the early 1960's there has been a rapid increase in exports from Canada. The Canadian share in world exports reached 39% in 1986 and is forecast to increase to 44% by 2000. World consumption of potash fertilizer is forecast to grow at 2.5% p.a. during the 1987-2000 period, considerably slower than the 4.5% growth of the preceding 15 years. In response to the anticipated slower demand growth world production of potash fertilizer is expected to grow at only 2.1% p.a.

22. In Lao PDR salt and industrial minerals resources are mostly concentrated in the Vientiane Plain. The potash resources have been partially explored and represent a considerable mineral potential. However, a potash operation would be small compared to the major export production centers and encounter transport constraints coupled with high surface transport costs which would make its costs uncompetitive. In view of these constraints and the market

outlook and supply situation, potash is unlikely to present in the medium term an economically viable development option for the mineral sector and should not be a target for further exploration.

LAO PDR - MINERAL SECTOR ASSESSMENT

List of Relevant Documents Available in the Sector File

CATEGORY A: Related Legal Background Documents.

(a) Index to Lao Legislation received to 18 July 1989:

1. Law on the Council of Ministers, Lao People's Democratic Republic, No.1/82/SPC, 20 July 1982. No.1 of July 20, 1982.
2. Decree No.9/CCM on State Tax Policy, 12 March 1988.
3. Decree No.10/CCM on conversion to plans, 12 March 1988.
4. Decree No.11/CCM on conversion of banking system into a socialistic business system, 12 March 1988.
5. Decree No.12/CCM on direct directives and measures to increase circulation of commodities and commerces, 12 March 1988.
6. Decree No.13/CCM on State monopoly of import-export management, 12 March 1988.
7. Decree No. 14/CCM on State price policy, 12 March 1988.
8. Decree No.15/CCM on organization of trade business system, 12 March 1988.
9. Decree No.16/CCM on policy towards individual and private economic sectors, 12 March 1988.
10. Decree No.17/CCM on policy towards State private enterprises, 12 March 1988.
11. Decree No.18/CCM on import-export of strategic goods, 12 March 1988.
12. Decree No.19/CCM on autonomy in business, 12 March 1988.
13. Law on Foreign Investment in the Lao People's Democratic Republic, Law 17/PSA of 19 March 1988 promulgated by Decree 44/PR of 25 August 1988 (?).
14. Decree No.20/CCM on the application of the Foreign Investment Code, 12 March 1989.

15. Decree No.27/CCM on establishment of the Foreign Investment Board, 17 April 1989.

16. Decree No.28/CCM on establishment of conversion to plans supervisory board.

17. Decree No.--/CCM on the tax code, -- July 1989.

(b) Trade and Transit

1. Thai/Lao Agreement re delivery of goods across the border, 1 June 1978.

2. Thai/Lao Trade Agreement, 1 June 1978.

3. Lao Agreement on 3 trading points along border. 18 May 1978.

4. Guarantee Agreement between ETO and Customs Department re transport of goods across border, 16 October 1979 (for term of one year).

(c) Other

Joint Communique between Thailand and Laos, 25 November 1988, issued on the occasion of Prime Minister Charthai's visit to Laos 24-25 November 1988.

CATEGORY B: Directly Mining Sector Related Documents

1. Provisional Regulations about the Preservation, Management and Utilization of Mineral Resources in Lao PDR. Translation of fragmentary Mining Code;
1a. Comments on the draft Mining Code of Lao PDR, prepared by the mission to assist Government in the revision of their draft;

2. Regimes Miniers d'Autres Pays. Basic Working Document, containing a discussion of Mining Codes worldwide, fiscal regimes and contractual arrangements, prepared by the Mission;

3. Exploration and Mining Contract between Government and Century K;
3a. Written comments on this contract, prepared by the mission;

4. Exploration and Mining Contract between Government and Huneman, on which the mission commented verbally;

5. Model Mining Investment Contract, with Model Association Contract and Model Statutes; left behind by the mission as a model for future contracts;
5a. Comments and observations on these models for clarification, prepared by the mission.

LAO PEOPLE'S DEMOCRATIC REPUBLIC

Mineral Sector Assessment

Overview of Relevant Legislation

1. The effectiveness of an eventual legal regime for the Lao PDR mining sector could be affected by general legislation that is either lacking of has been promulgated without due consideration of the specific requirements of mining operations. Administrative constraints may also impair the effective functioning of mining investments.

A. Missing Legislation

2. The primary component presently missing from the Lao PDR legal system is a constitution, normally the foundation of a country's legal system. Without it, legal guarantees regarding the right of persons and property are precarious, and the validity, weight and hierarchial rank of other legislation are uncertain.

Existing Legislation

3. Regulations on the banking system (Aa4) divide the financial sector into a State Bank and private commercial banks. The State Bank's authority covers the issuance and circulation of currency and the establishment of policies relating thereto. It will thus act as the regulator of local currency, exchange transactions with other currencies and inter-Bank transactions between commercial banks. This decree foreshadows additional legislation in each of these areas. Commercial banks, in contrast, will be authorized to take deposits, make loans and operate as merchant banks, taking equity in other businesses. However, uncertainties relating to commercial bank activities, such as mandatory deposits with the State Bank, reserve funds, certain lending obligations and the allocation of commercial profits to the State Bank as well as other credit policies remain to be clarified.

4. The regulation concerning the distribution of goods and commodities (Aa5) liberalizes but also tends to restrict certain activities and requires the individuals or entities dealing in such commodities to be licensed. Again, this legislation states very general principles which remain to be clarified in subsequent enactments.

5. The regulation concerning the distribution of goods (Aa6) also adopts the goal of simplifying the distribution network for goods and addresses the issue of the establishment of foreign and private entities in domestic trade. Thus, foreign suppliers may now apparently deal with individual Government and other economic units rather than with a central purchasing organization. However, permits for the import and export of goods are required pursuant to this decree and certain goods are restricted in other ways. Further regulations relating to the import, export and internal distribution of goods remain to be promulgated.

6. The regulations on pricing policies (Aa7) state certain general principles regarding the fixing of retail and wholesale prices, and provide that the Council of Ministers may fix the price for certain, presumably basic, commodities and public services. The scope of coverage of such authority remains to be determined, as well as the freedom of the private sector to determine prices on unregulated items.

7. The regulations on State Trading Companies (Aa8) abolishes central Trading Companies and the interdependent relationships among several of the State companies. However, it reorganizes some of companies into regional or municipal units with regard to certain foodstuffs. Again, the scope and details of such regulations remain to be clarified.

8. A General Regulation states several principles (Aa9), including the confirmation of secure land tenure, the right of individual ownership and possession of wealth, as well as the freedom to operate independent businesses. The basis of land tenure is variable, with the State also having the authority to rent land to private enterprises. Individuals and entities are also given the right to employ individuals and to retain profits after payment of taxes. However, businesses are required to obtain a license prior to commencing operations and to comply with certain regulations in their operations, including rules on the treatment of polluting substances. Additional rights granted in principle under this decree are to purchase and sell materials, equipment and products, to import and sell products within the country through certain specified distribution channels and to borrow local and foreign currencies and to establish bank accounts.

9. Regulations exist on the establishment and operation of state-private or mixed economy enterprises (Aa10). Such entities appear to be in the nature of a limited liability company through some uncertainty remains as to the liability of each participant. Other rights are also conferred on mixed economic entities. In addition, such entities may carry out direct import/export business if so authorized. As with the other enactments summarized above, this decree sets forth general principles which remain to be clarified in subsequent legislation.

10. The basic rules of taxation of Laotian companies are laid down in the "Decree of the Council of Ministers on State Tax Policy" (Aa2). The principle is that wherever feasible taxes will be levied on net income rather than sales or other tax bases. For the mineral industry, the income tax is 40% and exemptions of 1-5 years (in exceptional cases more) can be granted for starting businesses or businesses in temporary difficulties. Additional taxes are levied on exports. There is a range of import taxes between 1% and 70%. The essential categories for the mining industries would be (i) taxes on machines and spare parts: 1%; (ii) taxes on office supplies and vehicles: 10%; and (iii) taxes on four-wheel drive vehicles, motorbikes and construction materials: 20%. Income taxes for foreign companies as well as their agents have been set a 50%. The existing uncertainty with regard to the determination of taxable income is expected to be clarified by accounting rules to be promulgated. In addition, a substantial revision of this legislation is under consideration, which would probably follow the structure and philosophy of the francophone system of taxation.

C. Comments on Existing Legislation

11. The potential constraints and uncertainties on mining investments presented by existing legislation may dictate that a mining investment take a particular form or may call into question or limit the ability of the investor to function effectively, thus discouraging his interest in committing appropriate resources for an investment.

12. The major problems presented by current legislation, in chronological order, are listed below:

(1) The scope of application and implications of article 8 of decree No. 10/CCM on the conversion to plans and its provisions concerning State-private businesses, workers' powers and licensing are uncertain.

(2) The impact of articles 3 through 8 of decree No. 12/CCM/88 relating to control of imports and exports by Government organizations and political subdivisions, the requirements for authorizations and licenses and limitations on pricing and on precious metals could be adverse.

(3) The limitations imposed under articles 2,6,7 and 13 of decree No. 17/CCM/88 regarding management and taxation of State-private businesses and their handling of explosives may result in private investors avoiding the use of and participation in such entities to carry out mining.

(4) The possible prohibition of exports of minerals and the uncertainty concerning their mandatory sale to the Government pursuant to articles 1,2 and 4 of decree No. 18/CCM/88 on strategic imports-exports may have a deterring effect on private investment.

(5) While many provisions of law No. 17/88 and decree No. 20/CCM/89 on foreign investment substantially encourage such investment, others do not.

a. The 15- and 20-year investment duration limits under articles 10 and 14 of the law and 50 of the decree may be too short for mining investments, even though the possibility of extension is provided in articles 17, 18 and 39 of the decree.

b. The unanimity required for certain management decisions of a joint venture company pursuant to articles 12 of the law and 36 of the decree may result in private investors refusing to participate in this business form, instead insisting upon using a contractual association for such investments with Government.

c. The foreign exchange regulations mentioned in article 19 of the law and 64 of the decree remain to be elaborated.

d. The resolution of disputes pursuant to articles 26 of the law and 48 of the decree, and the Government's adherence generally to international arbitration organizations must be clarified.

e. The investment qualifications and disqualifications, pursuant to articles 2 of the law and 5 and 6 of the decree, and grounds for suspension or for termination of an investment, pursuant to articles 10 of the law and 18, 41 and 42 of the decree, raise some uncertainties because of their discretionary nature.

f. The fiscal benefits provided in articles 22 and 28 of the law and 72, 73 and 74 of the decree are inappropriate to mining, as they may encourage improper production. Such benefits may also be of lesser interest to investors (who may be taxed in their home countries during an exemption period) than other benefits which, such as accelerated depreciation, would be of greater advantage to the Government. Thus the fiscal benefits and obligations relating to mining have been addressed specifically in the accounting procedure annex of the draft mining legislation.

g. The general principles and potential uncertainties regarding labor and social security rules and worker powers under articles 16 and 27 of the law and 66 through 70 of the decree must be detailed and clarified.

h. The rights and obligations regarding exports and imports and the taxation thereof, pursuant to articles 11 and 24 of the law and 63, 64, 78 and 92 of the decree, particularly in light of the potential limitations contained in the prior legislation discussed above and the tax decree discussed below, must be clarified. The fiscal provisions in the draft mining legislation attempt to address these issues.

i. The obligation to provide a financial analysis in connection with an investment application, pursuant to articles 9, 21, 22 and 23 of the decree, will be impossible for mining investors to meet during the prospecting and exploration stages of their activities, even though such investors who undertake substantial expenditure commitments are likely to insist upon the negotiation and signature of an investment agreement prior to or during the early stages of their activities.

(6) Articles 4 of decree No. 27/CCM/89 provides for approvals by officers of the Investment Board. Whether the past practice of approving mining investment agreements by the Council of Ministers will continue must thus be confirmed.

(7) Decree No. 47/CCM/89 on the tax system contains several provisions that are probably inappropriate for a fiscal regime applicable to mining investments. It also omits other dispositions, the absence of which may create uncertainty as to the treatment of certain aspects of such investments. Many of these issues have been addressed in the fiscal provisions of the draft mining legislation and in its accounting procedure annex.

a. The provisions for imposition of customs tax and related formalities in articles 19 through 40 do not grant any duty exemptions to mining, and indeed may even impose export taxes on minerals. Such taxes would, in effect, constitute a supplemental royalty in addition to that imposed under article 16, an aggregate inflexible economic burden that some investments may not be able to support. The customs formalities, particularly the requirement of an authorization to transport goods under article 38, may result in a considerable constraining burden on the Government and the investor.

b. The potential imposition of the business turnover tax at the rates specified in article 63 may result in the elimination of a local industry to work previous metals and stones, in the discouragement of local minerals trading and in the imposition of a heavy and perhaps unsupportable financial burden on the extraction and domestic sale of low-value minerals. This is particularly true in the latter case if this tax is added to the royalty imposed under article 16. The manner of imposition, application and collection of this tax is also unclear. Likewise uncertain is its potential application to revenues arising from certain non-resident or temporary services, leases, licenses and loans to mining investments. These services are specified below, and this issue has been addressed in the accounting procedure annex of the draft mining legislation.

c. The basis of calculation and the imposition of income taxes, pursuant to artciles 69 through 74 pose certain problems and may be inappropriate for mining. The exemption for new investments under article 70 is an inappropriate benefit, as discussed above regarding the investment legislation. The unclear basis of calculation of taxable income under article 72 is another problem. The quarterly computation and payment of taxes will also considerably increase the administrative burden of the Government and the taxpayer.

d. The omission of a tax on retained earnings of a company that has a contractual association with the Government, akin to the dividends tax under article 73 (2) of the decree, is an oversight that should be rectified.

e. The scope of application of the tax on interest, while apparently intended to apply only to loans under articles 72, 73 and 74 from individuals and not financial institutions, also requires clarification. If imposed on foreign or domestic loans from such institutions, the debt service burden may be unsupportable, thus precluding investment.

f. The income tax treatment of revenues arising from certain non-resident or temporary technical, administrative and other services, leases of moveables, licensing of intellectual property and loans to mining investments must be clarified. As mentioned above, these have been addressed in the accounting annex of the draft mining legislation.

C. Administrative Constraints

13. In addition to the legislative constraints discussed above, administrative constraints in the regulation of mining investments may result in major impediments. Authorizations may be required from other ministries or regional authorities in addition to those of the Minister of Industry and Handicrafts. These may, for example, relate to water, forestry, infrastructure and other construction, labor, transport and exports and imports. The difficulty in obtaining such permissions may be a substantial barrier to private investment.

LAO PEOPLE'S DEMOCRATIC REPUBLIC

Mining Sector Assessment

Financial Analysis of Mining Contracts

1. Recent Agreements with Foreign Investors

1. These agreements lack a common framework, which still needs to be defined by the Mining Code, and have taken a different approach from that of the Investment Code. They are based on production-sharing without royalties or taxes. Although this type of agreement can simplify the administrative requirements for government institutions and reduce the risks of disagreements on distribution of the benefits, it does not let the Government, i.e., its specialized institutions, fulfill this role as partner in a venture, and thus reduces the possibility of transfer of technological and managerial knowledge, which is an important, albeit not quantifiable, benefit of mining (and other) investments. Production-sharing agreements also need to be very specific and detailed in order to avoid possible disadvantages to the country, because of lack of clarity and loopholes. The major disadvantage is probably that the variety of production-sharing arrangements and their flexibility, while attracting great interest of investors in the short-term, may be counterproductive in the long-term since unequal treatment of investors may prove to be an overall disincentive to investment promotion. The definition of a clear legal and fiscal framework through the Mining Code and model mining agreements with clear rules for determination and distribution of benefits will, in the long run, be a more effective mechanism to promote foreign investments, than ad hoc agreements with widely diverging and frequently unclear rules.

2. Agreement with Century Metals and Mining (B3, B3a). Under this contract, two unusually extensive exploration areas and "first right" to a third very large area were granted. The conditions under which this right may be exercised are uncertain. The duration of the concession is somewhat above the norm and no provisions are provided for relinquishment during the period. The minerals covered, while essentially gold, may in certain unspecified circumstances include others.

3. The definition of "net profits" and the provision for sharing of profits with the Government are unclear, as is the provision for deferral of payments to the Government for two years. A tax exemption, coupled with a royalty exemption, provides no minimum revenue stream to the Government before the investor has completely recouped his capital and operating

costs. The overhead provision of 10% allocated to head-office charges of the foreign investor is also higher than usual, and the contract, which provides that the production sharing does not begin until the investor has recouped all costs, gives no incentive to the investor to limit such costs. In addition, the agreement foresees that the investor may apply for additional benefits under the foreign investment law, which may be overly generous in light of the fiscal regime provided, and which have not been specified. Whether the undertakings of the Government in this regard are on a "best efforts" basis or something more which constitutes an implied duty, is uncertain. While the investor must provide the Government with periodic reports, the Government appears to have little authority to supervise the investment work or approve aspects of it.

4. Notwithstanding the favorable provisions in this agreement, some provisions appear slightly inequitable to the investor. These includes its interpretation clause, in case of dispute, imposing Lao legislation, which could, because of the absence of contract stability provisions, be used to impose a less favorable fiscal and contractual regime on the investor. Also, there are provisions for a more complete, hopefully more balanced, subsequent agreement pursuant to which the Government might seek to correct some of the imbalances and anomalies of the current contract. Overall, the advantages for the investor are balanced by the high Government share in production (50%) which results in a substantial participation in the project's benefits.

5. Agreement with Hanuman Resources (B4). In contrast to the very brief document which constitutes the Century agreement, the "contract of work" with Hanuman is quite lengthy. Many of its provisions are unnecessarily detailed. While the agreement also appears to be an after-tax production-sharing arrangement, its fiscal provisions appear far less favorable to the foreign investor. The investor appears to be required to finance all capital and operating expenses from its portion of the production. Thus the Government production share appears to be based on the entire production without any deductions for expenses, in striking contrast to the Century agreement. Under this arrangement, the investor would have an incentive to develop and produce only from very high grade deposits, thus avoiding the broader development of mixed or lower grade deposits.

2. Financial Analysis of Contracts

. The two agreements reviewed above were analyzed by a financial simulation. Since no data are available yet, certain assumptions were made on the principal parameters. Investments costs were assumed at US$6.0 million, production at 500 kg/year over 6.5 years, the gold price at US$400/oz, operating costs (without depreciation and financial charges) at

US$200/oz, interest at 11%, a debt/equity ratio of 65:35, depreciation, where applicable, over 6 years straight line, repayment of loans over 5 years with a one year grace period, and opportunity costs of capital of 15%. Since both cases analyzed required no Government participation in cash, a rate of return calculation was only possible for the investor's cash flows. In order to compare the benefits of both sides, the net present values (NPV) were determined and the simulations showed the relative changes in benefits on the basis of shifts in NPV. The overall rate of return of the project has been calculated at 47%.

7. The purpose of these simulations has principally been to show the relative benefits of the two sides and not the attractiveness or competitiveness of the project as such for which no data exist. It can be assumed that the investor will require a fairly high rate of return (probably more than 30%) because of the reasons detailed above. Depending on the technical parameters of the deposit, the expected operating costs and forecast prices, the model investor will then go forward if he can achieve the desired profitability. For this case, the conclusions on distribution of benefits would be applicable. Otherwise the project would not go ahead. If the deposit were exceptionally rich or low-cost, or prices exceptionally high, the investor's rate of return may be considerably higher than the one calculated, but the distribution of benefits between investor and Government would remain largely unchanged in a given model. What is thus essential in the simulations is the distribution of benefits and not the profitability as such. The results of these simulations are presented in the tables to this Annex.

8. Cases 1 and 2 are based on the Century Metals and Mining agreements. The essential elements are production sharing 50%-50% between the Government and the investor after deduction of all operating costs and capital recovery. Since it was not clear from the agreement whether interest on foreign loans was deductible, Case 1 assumed that interest was and Case 2 that it was not deductible. In Case 1, the investor's rate of return under given assumptions was 68% and the NPV of the Government's cash flow was 28% higher than that of the investor. In Case 2, because higher deductions are permitted before production sharing starts, the investor's rate of return has been calculated at 74% and the NPV of the Government's cash flow is 5% lower than that of the investor. If the venture operated as a joint-venture company, with Laos getting a 25% carried interest, and 4% royalty and 25% income tax are paid (Case 3), the investor's rate of return would be 55% and the NPV of the Government's cash flow about 31% higher than that of the investor. Cases 4, 5 and 6 present additional benefits for the Government in the form of higher income taxes, a higher carried interest, and an additional dividend tax. These cases bring the rate of return of the investor down to and below the overall project's rate of return and result in an increasingly uneven distribution in favor of the Government, which would (at least for Cases 5 and 6) probably not be acceptable to the investor. Case 7 is based on Case 3 and shows that a 25%

reduction in the gold price results in an unprofitable project with little interest for the Government and an unattractive rate of return for the investor. In summary, the negotiated conditions for this contract are quite favorable for the Government. However, a change in the structure of the venture to a company with a modest carried interest for the Government and royalties and income taxes as described above would have been a clearer solution, and could even have resulted in higher benefits for the country while still being acceptable to the investor. The results are summarized in the table below:

Table: Financial Simulation of Mining Contracts

		IRR [a]	NPV Ratio [b]
Case 1:	50/50 Production-Sharing (Interest not deductible)	68%	128%
Case 2:	50/50 Production-Sharing (Interest Deductible)	74%	95%
Case 3:	Joint Venture Company (Lao 25%, 4% Royalty, 25% Income Tax)	55%	131%
Case 4:	Joint Venture Company (Lao 25%, 4% Royalty, 35% Income Tax)	49%	178%
Case 5:	Joint Venture Company (Lao 40%, 4% Royalty, 35% Income Tax)	41%	276%
Case 6:	Joint Venture Company (Lao 40%, 4% Royalty, 35% Income Tax, Carried Interest)	40%	358%
Case 7:	Joint Venture Company (Lao 25%, 4% Royalty, 25% Income Tax, Gold Price = US$300)	9%	n.a.

a/ Financial Rate of Return to Investor
b/ Government's Net Present Value/Investor's Net Present Value

9. The second agreement analyzed (Hanuman) is based on straight production sharing whereby the Government gets 40% and the investor 60% without any possibility of deductions before determination of this share. Because of this arrangement, the contract appears very favorable to the Government. It is presented in Cases 8 and 9. Case 8 is based on the assumption that the project operates as a company which determines its net profit first and whose foreign shareholder is subject to a dividend withholding tax on his part of this profit, in addition to paying the Government's 40% production share. Case 9 supposes that the Government's share is paid up-front and that there is no dividend tax. Case 8 results in a negative rate of return and Case 9 in a zero rate of return for the investor. As a consequence, the NPV of the Government's cash flow is in both cases very high. The project could, however, be profitable and attractive to the investor if the cash operating costs were not US$200 but US$100-150/oz of gold, which would mean either a very rich deposit or high-grading. Nevertheless, this would not change the basic balance of distribution of benefits of the project.

ANNEX V
Table 1

Case 1

LAO PDR: SMALL GOLD PROJECT

(US$ '000)

50%:50% Production Sharing
(After deduction of operating and capital costs)

Year	0	1	2	3	4	5	6	7
Sharing Account								
Investment	3,000	3,000						
Production (kg)		200	500	500	500	500	500	500
Price (US$/oz)	400	400	400	400	400	400	400	400
Sales Revenues	0	2,572	6,430	6,430	6,430	6,430	6,430	6,430
Operating Costs (without Deprec.)	0	1,286	3,215	3,215	3,215	3,215	3,215	3,215
Capital Recovery	0	1,286	3,215	1,499	0	0	0	0
Capital Recov.(Cum.)	0	1,286	4,501	6,000	6,000	6,000	6,000	6,000
Production to Share	0	0	0	1,716	3,215	3,215	3,215	3,215
Lao PDR Share (50%)	0	0	0	858	1,608	1,608	1,608	1,608
Investor Share (50%)	0	0	0	858	1,608	1,608	1,608	1,608
Cumul. Loan	1,950	3,900	3,900	3,900	3,900	3,900	3,900	3,900
Cumul. Repayment	0	0	780	1,560	2,340	3,120	3,900	3,900
Outstanding Balance	1,950	3,900	3,120	2,340	1,560	780	0	0
Interest Base	975	2,925	3,510	2,730	1,950	1,170	390	0
Interest (11%)	107	322	386	300	215	129	43	0
Investor's Cash Flow								
1. Cash Inflow								
Sales Revenues	0	2,572	6,430	6,430	6,430	6,430	6,430	6,430
minus: Lao PDR Share	0	0	0	858	1,608	1,608	1,608	1,608
Investor's Revenues	0	2,572	6,430	5,572	4,823	4,823	4,823	4,823
Investor's Loan(65%)	1,950	1,950	0	0	0	0	0	0
Total Inflow	1,950	4,522	6,430	5,572	4,823	4,823	4,823	4,823
2. Cash Outflow								
Operating Costs	0	1,286	3,215	3,215	3,215	3,215	3,215	3,215
Loan Repayment			780	780	780	780	780	
Interest (11%)	107	322	386	300	215	129	43	0
Investment	3,000	3,000	0	0	0	0	0	0
Total Outflow	3,107	4,608	4,381	4,295	4,210	4,124	4,038	3,215
3. Net Cash Flow	(1,157)	(86)	2,049	1,277	613	699	785	1,608

Internal Rate of Return (Investor)	67.7%	Net Pres.Value at 15%: INVESTOR	2,434
		GOVERMENT LAO PDR	3,115

Annex V
Table 2

Case 2

LAO PDR: SMALL GOLD PROJECT
(US$ '000)

50%:50% Production Sharing
(After deduction of operating and capital costs and interest)

Year	0	1	2	3	4	5	6	7
Sharing Account								
Investment	3,000	3,000						
Production (kg)		200	500	500	500	500	500	500
Price (US$/oz)	400	400	400	400	400	400	400	400
Sales Revenues	0	2,572	6,430	6,430	6,430	6,430	6,430	6,430
Operating Costs (without Deprec.)	0	1,286	3,215	3,215	3,215	3,215	3,215	3,215
Interest	107	322	386	300	215	129	43	0
Capital Recovery	0	857	2,829	2,314	0	0	0	0
Cap. Recovery (cum.)	0	857	3,686	6,000	6,000	6,000	6,000	6,000
Production to Share	0	0	0	601	3,001	3,086	3,172	3,215
Lao PDR Share (50%)	0	0	0	300	1,500	1,543	1,586	1,608
Investor Share (50%)	0	0	0	300	1,500	1,543	1,586	1,608
Cumul. Loan	1,950	3,900	3,900	3,900	3,900	3,900	3,900	3,900
Cumul. Repayment	0	0	780	1,560	2,340	3,120	3,900	3,900
Outstanding Balance	1,950	3,900	3,120	2,340	1,560	780	0	0
Interest Base	975	2,925	3,510	2,730	1,950	1,170	390	0
Interest (11%)	107	322	386	300	215	129	43	0
Investor's Cash Flow								
1. Cash Inflow								
Sales Revenues	0	2,572	6,430	6,430	6,430	6,430	6,430	6,430
minus: Lao PDR Share	0	0	0	300	1,500	1,543	1,586	1,608
Investor's Revenues	0	2,572	6,430	6,130	4,930	4,887	4,844	4,823
Investor's Loan(65%)	1,950	1,950	0	0	0	0	0	0
Total Inflow	1,950	4,522	6,430	6,130	4,930	4,887	4,844	4,823
2. Cash Outflow								
Operating Costs	0	1,286	3,215	3,215	3,215	3,215	3,215	3,215
Loan Repayment			780	780	780	780	780	
Interest (11%)	107	322	386	300	215	129	43	0
Investment	3,000	3,000	0	0	0	0	0	0
Total Outflow	3,107	4,608	4,381	4,295	4,210	4,124	4,038	3,215
3. Net Cash Flow	(1,157)	(86)	2,049	1,834	720	763	806	1,608

Internal Rate of Return (Investor): 74.4%

Net Present Value at 15%

INVESTOR	2,842
GOVERNMENT LAO PDR	2,707

Annex V
Table 3

Case 8

LAO PDR: SMALL GOLD PROJECT

(US$ '000)

Joint Venture Company, Lao PDR 25%, Investor 75%
(4% Royalty, 25% Income Tax)

Year	0	1	2	3	4	5	6	7
Investments	3,000	3,000						
1. Income Statement								
Production (kg)	0	200	500	500	500	500	500	500
Price (US$/oz)	400	400	400	400	400	400	400	400
Sales Revenues	0	2,572	6,430	6,430	6,430	6,430	6,430	6,430
Operating Costs	0	1,286	3,215	3,215	3,215	3,215	3,215	3,215
Depreciation	0	500	1,000	1,000	1,000	1,000	1,000	500
Interest (11%)	107	322	386	300	215	129	43	0
Income before Royalty	0	357	1,829	1,915	2,000	2,086	2,172	2,715
Royalty (4%)	0	103	257	257	257	257	257	257
Income before Tax	0	254	1,572	1,658	1,743	1,829	1,915	2,458
Income Tax (25%)	0	64	393	414	436	457	479	614
Net Income	0	191	1,179	1,243	1,307	1,372	1,436	1,843
Dividend Lao PDR	0	48	295	311	327	343	359	461
Dividend Investor	0	143	884	933	980	1,029	1,077	1,383
Net Revenues Lao PDR Roy., Inc.Tax, Div.	0	214	945	983	1,020	1,057	1,095	1,333
Net Present Value at 15%:		3,158						
2. Investor's Cash Flow								
a. Cash Inflow								
Net Income	0	191	1,179	1,243	1,307	1,372	1,436	1,843
Depreciation	0	500	1,000	1,000	1,000	1,000	1,000	500
Loan (65%)	1,950	1,950	0	0	0	0	0	0
Total Inflow	1,950	2,641	2,179	2,243	2,307	2,372	2,436	2,343
b. Cash Outflow								
Investment	3,000	3,000	0	0	0	0	0	0
Lao PDR Dividend	0	48	295	311	327	343	359	461
Loan Repayment	0	0	780	780	780	780	780	0
Total Outflow	3,000	3,048	1,075	1,091	1,107	1,123	1,139	461
c. Net Cash Flow	(1,050)	(407)	1,104	1,153	1,200	1,249	1,297	1,883
Internal Rate of Return (Investor)		54.6%		Net Present Value (Investor)		2,404		

Annex V
Table 4

Case 4

LAO PDR: SMALL GOLD PROJECT

(US$ '000)

Joint Venture Company, Lao PDR 25%, Investor 75%
(4% Royalty, 35% Income Tax)

Year	0	1	2	3	4	5	6	7
Investments	3,000	3,000						
1. Income Statement								
Production (kg)	0	200	500	500	500	500	500	500
Price (US$/oz)	400	400	400	400	400	400	400	400
Sales Revenues	0	2,572	6,430	6,430	6,430	6,430	6,430	6,430
Operating Costs	0	1,286	3,215	3,215	3,215	3,215	3,215	3,215
Depreciation	0	500	1,000	1,000	1,000	1,000	1,000	500
Interest (11%)	107	322	386	300	215	129	43	0
Income before Royalty	0	357	1,829	1,915	2,000	2,086	2,172	2,715
Royalty (4%)	0	103	257	257	257	257	257	257
Income before Tax	0	254	1,572	1,658	1,743	1,829	1,915	2,458
Income Tax (35%)	0	89	550	580	610	640	670	860
Net Income	0	165	1,022	1,078	1,133	1,189	1,245	1,598
Dividend Lao PDR	0	41	255	269	283	297	311	399
Dividend Investor	0	124	766	808	850	892	934	1,198
Net Revenues Lao PDR	0	238	1,068	1,107	1,150	1,195	1,239	1,517
Roy., Inc.Tax, Div.								
Net Present Value at 15%:		3,558						
2. Investor's Cash Flow								
a. Cash Inflow								
Net Income	0	165	1,022	1,078	1,133	1,189	1,245	1,598
Depreciation	0	500	1,000	1,000	1,000	1,000	1,000	500
Loan (65%)	1,950	1,950	0	0	0	0	0	0
Total Inflow	1,950	2,615	2,022	2,078	2,133	2,189	2,245	2,098
b. Cash Outflow								
Investment	3,000	3,000	0	0	0	0	0	0
Lao PDR Dividend	0	41	255	269	283	297	311	399
Loan Repayment	0	0	780	780	780	780	780	0
Total Outflow	3,000	3,041	1,035	1,049	1,063	1,077	1,091	399
c. Net Cash Flow	(1,050)	(426)	986	1,028	1,070	1,112	1,154	1,698

Internal Rate of Return: 48.9%
(Investor)

Net Present Value at 15%: 2,002
(Investor)

Annex V
Table 5

Case 6

LAO PDR: SMALL GOLD PROJECT
(US$ '000)

Joint Venture Company, Lao PDR 40%, Investor 60%
(4% Royalty, 35% Income Tax)

Year	0	1	2	3	4	5	6	7
Investments	3,000	3,000						
1. Income Statement								
Production (kg)	0	200	500	500	500	500	500	500
Price (US$/oz)	400	400	400	400	400	400	400	400
Sales Revenues	0	2,572	6,430	6,430	6,430	6,430	6,430	6,430
Operating Costs	0	1,286	3,215	3,215	3,215	3,215	3,215	3,215
Depreciation	0	500	1,000	1,000	1,000	1,000	1,000	500
Interest (11%)	107	322	386	300	215	129	43	0
Income before Royalty	0	357	1,829	1,915	2,000	2,086	2,172	2,715
Royalty (4%)	0	103	257	257	257	257	257	257
Income before Tax	0	254	1,572	1,658	1,743	1,829	1,915	2,458
Income Tax (35%)	0	89	550	580	610	640	670	860
Net Income	0	165	1,022	1,078	1,133	1,189	1,245	1,598
Dividend Lao PDR	0	66	409	431	453	476	498	639
Dividend Investor	0	99	613	647	680	713	747	959
Net Revenues Lao PDR Roy., Inc.Tax, Div.	0	258	1,216	1,269	1,320	1,378	1,425	1,757
Net Present Value at 15%:		4,080						
2. Invest.Cash Flow	0	1	2	3	4	5	6	7
a. Cash Inflow								
Net Income	0	165	1,022	1,078	1,133	1,189	1,245	1,598
Depreciation	0	500	1,000	1,000	1,000	1,000	1,000	500
Loan (65%)	1,950	1,950	0	0	0	0	0	0
Total Inflow	1,950	2,615	2,022	2,078	2,133	2,189	2,245	2,098
b. Cash Outflow								
Investment	3,000	3,000	0	0	0	0	0	0
Lao PDR Dividend	0	66	409	431	453	476	498	639
Loan Repayment	0	0	780	780	780	780	780	0
Total Outflow	3,000	3,066	1,189	1,211	1,233	1,256	1,278	639
c. Net Cash Flow	(1,050)	(451)	833	867	900	933	967	1,459

Internal Rate of Return: (Investor) 41.2%

Net Present Value at 15%: (Investor) 1,480

Annex V
Table 6

Case 6

LAO PDR: SMALL GOLD PROJECT
(US$ '000)

Joint Venture Company, Lao PDR 40%, Investor 60%
(4% Royalty, 35% Income Tax)
[Carried interest (US$0.84 Mio.) earned through 20% Dividend Tax)

Year	0	1	2	3	4	5	6	7
Investments	3,000	3,000						
1. Income Statement								
Production (kg)	0	200	500	500	500	500	500	500
Price (US$/oz)	400	400	400	400	400	400	400	400
Sales Revenues	0	2,572	6,430	6,430	6,430	6,430	6,430	6,430
Operating Costs	0	1,286	3,215	3,215	3,215	3,215	3,215	3,215
Depreciation	0	500	1,000	1,000	1,000	1,000	1,000	500
Interest (11%)	107	322	386	300	215	129	43	0
Income before Royalt	0	357	1,829	1,915	2,000	2,086	2,172	2,715
Royalty (4%)	0	103	257	257	257	257	257	257
Income before Tax	0	254	1,572	1,658	1,743	1,829	1,915	2,458
Income Tax (35%)	0	89	550	580	610	640	670	860
Net Income	0	165	1,022	1,078	1,133	1,189	1,245	1,598
Dividend Lao PDR	0	0	0	293	566	594	622	799
Dividend Investor	0	165	1,022	785	566	594	622	799
Dividend Tax	0	33	204	157	113	119	124	160
Net Revenues Lao PDR Roy, Inc.Tax, Div, Div Tax	0	225	1,012	1,287	1,547	1,611	1,674	2,076
Net Present Value at 15%	4,345							
2. Invest.Cash Flow								
a. Cash Inflow								
Net Income	0	165	1,022	1,078	1,133	1,189	1,245	1,598
Depreciation	0	500	1,000	1,000	1,000	1,000	1,000	500
Loan (65%)	1,950	1,950	0	0	0	0	0	0
Total Inflow	1,950	2,615	2,022	2,078	2,133	2,189	2,245	2,098
b. Cash Outflow								
Investment	3,000	3,000	0	0	0	0	0	0
Lao PDR Dividend	0	0	0	293	566	594	622	799
Dividend Tax	0	33	204	157	113	119	124	160
Loan Repayment	0	0	780	780	780	780	780	0
Total Outflow	3,000	3,033	984	1,230	1,460	1,493	1,527	959
c. Net Cash Flow	(1,050)	(418)	1,037	848	673	696	718	1,139
Internal Rate of Return (Investor)		39.9%		Net Present Value (Investor)		1,215		

Annex V
Table 7

Case 7

LAO PDR: SMALL GOLD PROJECT

(US$ '000)

Joint Venture Company, Lao PDR 25%, Investor 75%
(4% Royalty, 25% Income Tax)
Gold Price reduced from US$ 400/oz to US$ 300/oz

Year	0	1	2	3	4	5	6	7
Investments	3,000	3,000						
1. Income Statement								
Production (kg)	0	200	500	500	500	500	500	500
Price (US$/oz)	300	300	300	300	300	300	300	300
Sales Revenues	0	1,929	4,823	4,823	4,823	4,823	4,823	4,823
Operating Costs	0	1,286	3,215	3,215	3,215	3,215	3,215	3,215
Depreciation	0	500	1,000	1,000	1,000	1,000	1,000	500
Interest (11%)	107	322	386	300	215	129	43	0
Income before Royalty	(107)	(179)	222	308	393	479	565	1,108
Royalty (4%)	0	77	193	193	193	193	193	193
Income before Tax	(107)	(256)	29	115	200	286	372	915
Taxable Inc.(Losses	0	0	0	0	0	267	372	915
Income Tax (25%)	0	0	0	0	0	67	93	229
Net Income	0	0	0	0	0	200	279	686
Dividend Lao PDR	0	0	0	0	0	50	70	171
Dividend Investor	0	0	0	0	0	150	209	514
Net Revenues Lao PDR	0	77	193	193	193	310	356	593
Roy., Inc.Tax, Div. Net Present Value at 15%:		853						
2. Invest.Cash Flow								
a. Cash Inflow								
Net Income	0	0	0	0	0	200	279	686
Depreciation	0	500	1,000	1,000	1,000	1,000	1,000	500
Loan (65%)	1,950	1,950	0	0	0	0	0	0
Total Inflow	1,950	2,450	1,000	1,000	1,000	1,200	1,279	1,186
b. Cash Outflow								
Investment	3,000	3,000	0	0	0	0	0	0
Lao PDR Dividend	0	0	0	0	0	50	70	171
Loan Repayment	0	0	780	780	780	780	780	0
Total Outflow	3,000	3,000	780	780	780	830	850	171
c. Net Cash Flow	(1,050)	(550)	220	220	220	370	429	1,014

Internal Rate of Return (Investor) 9.1%

Net Present Value (Investor) (296)

Annex V
Table 8

Case 8

LAO PDR SMALL GOLD PROJECT

(US$ '000)

Investment Company, Lao PDR 0%, Investor 100%
(No Royalty, No Income Tax)
Production Sharing, Lao PDR 40%, Investor 60%
(Assumption: Lao PDR Share paid after Determination of Dividends)

Year	0	1	2	3	4	5	6	7
Investments	3,000	3,000						
1. Income Statement								
Production (kg)	0	200	500	500	500	500	500	500
Price (US$/oz)	400	400	400	400	400	400	400	400
Sales Revenues	0	2,572	6,430	6,430	6,430	6,430	6,430	6,430
Operating Costs	0	1,286	3,215	3,215	3,215	3,215	3,215	3,215
Depreciation	0	500	1,000	1,000	1,000	1,000	1,000	500
Interest (11%)	107	322	386	300	215	129	43	0
Income from Operation	(107)	464	1,829	1,915	2,000	2,086	2,172	2,715
Interest Withhold. Tax	5	16	19	15	11	6	2	0
Net Income	(112)	448	1,810	1,900	1,989	2,080	2,170	2,715
Dividend Income	0	336	1,810	1,900	1,989	2,080	2,170	2,715
Divid. Withhold. Tax	0	50	271	285	298	312	325	407
Dividend Transferred	0	286	1,538	1,615	1,691	1,768	1,844	2,308
2. Net Revenues Lao								
40% Sales Revenues	0	1,029	2,572	2,572	2,572	2,572	2,572	2,572
Interest Withhld. Tax	5	16	19	15	11	6	2	0
Div. Withhld. Tax	0	50	271	285	298	312	325	407
Total Net Revenues	5	1,095	2,863	2,872	2,881	2,890	2,900	2,979
Net Present Value at 15%		9,104						
3. Invest. Cash Flow								
a. Cash Inflow								
Dividends Transferred	0	286	1,538	1,615	1,691	1,768	1,844	2,308
Depreciation	0	500	1,000	1,000	1,000	1,000	1,000	500
Loan (65%)	1,950	1,950	0	0	0	0	0	0
Total Inflow	1,950	2,736	2,538	2,615	2,691	2,768	2,844	2,808
b. Cash Outflow								
Investment	3,000	3,000	0	0	0	0	0	0
Lao PDR Share	0	1,029	2,572	2,572	2,572	2,572	2,572	2,572
Loan Repayment	0	0	780	780	780	780	780	0
Total Outflow	3,000	4,029	3,352	3,352	3,352	3,352	3,352	2,572
c. Net Cash Flow	(1,050)	(1,293)	(814)	(737)	(661)	(584)	(508)	236
Internal Rate of Return (Investor)		69.6%		Net Present Value (Investor)		(3,542)		

Annex V
Table 9

Case 9

LAO PDR: SMALL GOLD PROJECT

(US$ '000)

Investment Company, Lao PDR 0%, Investor 100%
(No Royalty, No Income Tax)
Production Sharing, Lao PDR 40%, Investor 60%
(Assumption: Lao PDR Share paid before Determination of Dividends)

Year	0	1	2	3	4	5	6	7
Investments	3,000	3,000						
1. Income Statement								
Production (kg)	0	200	500	500	500	500	500	500
Price (US$/oz)	400	400	400	400	400	400	400	400
Sales Revenues (Total)	0	2,572	6,430	6,430	6,430	6,430	6,430	6,430
Sales Revenues Lao	0	1,029	2,572	2,572	2,572	2,572	2,572	2,572
Sales Rev. Investor	0	1,543	3,858	3,858	3,858	3,858	3,858	3,858
Operating Costs	0	1,286	3,215	3,215	3,215	3,215	3,215	3,215
Depreciation	0	500	1,000	1,000	1,000	1,000	1,000	500
Interest (11%)	107	322	386	300	215	129	43	0
Income from Operation	(107)	(565)	(743)	(657)	(572)	(486)	(400)	143
Interest Withhold. Tax	5	16	19	15	11	6	2	0
Net Income	(112)	(581)	(762)	(672)	(583)	(492)	(402)	143
Dividend Income	(112)	(581)	(762)	(672)	(583)	(492)	(402)	143
Divid. Withhold. Tax	0	0	0	0	0	0	0	0
Dividend Transferred	0	0	0	0	0	0	0	0
2. Net Revenues Lao								
40% Sales Revenues	0	1,029	2,572	2,572	2,572	2,572	2,572	2,572
Interest Withhold. Tax	5	16	19	15	11	6	2	0
Div. Withhold. Tax	0	0	0	0	0	0	0	0
Total Net Revenues	5	1,045	2,591	2,587	2,583	2,579	2,574	2,572
Net Present Value at 15%		8,185						
3. Invest. Cash Flow								
a. Cash Inflow								
Dividends Transferred	0	0	0	0	0	0	0	0
Depreciation	0	500	1,000	1,000	1,000	1,000	1,000	500
Loan (65%)	1,950	1,950	0	0	0	0	0	0
Total Inflow	1,950	2,450	1,000	1,000	1,000	1,000	1,000	500
b. Cash Outflow								
Investment	3,000	3,000	0	0	0	0	0	0
Loan Repayment	0	0	780	780	780	780	780	0
Total Outflow	3,000	3,000	780	780	780	780	780	0
c. Net Cash Flow	(1,050)	(550)	220	220	220	220	220	500
Internal Rate of Return (Investor)		0.0%		Net Present Value (Investor)		(608)		