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Minerals Potential of the Lao PDR
Minerals Potential of the Lao PDR

- The geology of Lao PDR is not well known in detail and much modern coverage is the result of satellite image interpretation and basic geological maps scale 1:200,000.

- Lao PDR has a high potential for metallic and bulk minerals.

- The geological evidence is favorable and at least more than 500 mineral occurrences have been reported.

- Lao PDR is recognized as one of the most resource rich countries in South East Asia. Over 500 mineral deposits have been identified, including gold, copper, zinc and lead (which comprise 47% of all identified deposits).

- All of these some are being the process of exploration and mining operation.
MINERAL RESOURCES IN THE COUNTRY

- Metamorphic rocks believed to be Proterozoic outcrop in northwest and astern Laos
- Paleozoic and Mesozoic continental fluvial and shallow to deep marine sediments.
- Permo-Triassic acid extrusive rocks
- Intense folding took place during the Early Paleozoic, mid-to late Paleozoic and Triassic periods.
**Mineral Occurrences**

**Major fold belt**

1. Sukhothai fold belt
2. Louei – Louangprabang volcanic-magmatic Arc
3. Troungson volcanic-magmatic Arc
I. Minerals Potential

1. General Geology of Laos

*Geological Map of Lao People's Democratic Republic after ESCAP (1990)*
Based on the geological setting, Laos has good potential for:

- Metallic Minerals: Gold, Copper, Iron, Silver, Aluminium, Tin, Lead-Zinc, etc.

- Non-metallic minerals: coal, lignite, graphite, phosphate, sapphire, beryl, mica, feldspar, quartz sand, dolomite, topaz, zircon, monazite, garnet, clays and amber occurrences.
- Gold: Sediment host and others,
- Copper: chalcocite & others,
- Lead-Zinc: skarn & others,
- Silver: associated with gold and base metal mineralisation,
- Tin-wolfram: sulphide & residual,
- Aluminium: bauxite,
- Iron: hematite-magnetite etc..
1). Gold (Au):

- Gold deposits and prospects are also widely distributed in three fold belts:
  - Sukhothai fold belt
  - Louei-Louangprabang fold belt
  - Troungson fold belt
- Gold deposits in Laos are distributed around Granitic rock of the Late Paleozoic era and the deposits are belong to Porphyry, epithermal, Carline and placer types.
2). Copper (Cu):

- Copper deposits and prospects are widely distributed in three fold belts:
  - Sukhothai fold belt
  - Louei-Louangprabang fold belt
  - Troungson fold belt
- Copper mineralization types:
  - Porphyry.
  - Copper skarn.
  - Epithermal.
  - VMS.
  - Magmatic.
  - Sediment copper.
- At present, copper metal in Laos account for 1.7 mil.t and resources account for 3 mil.t.
- Three copper mines are operating (Sepon, Phoukham & Houay Mo).
- Copper metal products are (62,000 - 63,000) t/year and copper concentrate are (0.1-0.3) mil. t/year.
3). Alumina (Al).

- Al is found in two plateaux (Bolaven and Sanxay plateaux) with the weathering alkaline basalt.
- Al deposit in Bolaven plateau has an estimated resources about one billion tons.
- Al deposit in Sanxay plateau is the second deposit has an estimated resources about 0.7 billion tons.
4). Potash (KCl):

- KCl is found in two sub-basins in the Vientiane and Khammoune areas.

- Resource estimation: 50 million tons with grades up to 15 percent K₂O for Vientiane basin and 450 million tons of Sylvinitite - Carnallite in Khammoune basin.

- *Potash deposits is presently being explored by Chinese and Vietnamese companies.*
5). Tin (Sn)
- Tin deposits and prospects are distributed in the northern and southern of Troungson fold belt.
- Tin deposits are related to granitic rocks of Late Paleozoic era.
- Cassiterite-bearing quartz veins type.
- Placer type.
- Quartz network type.
- Tin resources in Laos amount to 45 million T.
- The Tin products are 500 to 1,000 T/year with a grade of 60% cassiterite
1. Prospecting: 69 companies/91 projects
2. Exploration: 83 companies/138 projects
Total: 148 companies/273 projects.
Major Targets for Mineral Exploration and Mining Project

1. Muong Fouang - Nam La  
   - Gold and Base metals 
   - Replacement in limestone

2. Sanakham  
   - Gold and Base metal; 
   - Granitoid associated

3. Nam Met  
   - Gold Eluvials and Alluvials

4. Vang Vieng - Kasi  
   - Base metals, polymetallic 
   - Replacement in limestone

5. Louang Phabang  
   - Gold - volcanogenic environment; Placers

6. Nam Ou  
   - Gold - volcanogenic environment; Placers
Major Targets for Mineral Exploration and Mining Project

7. Pak Beng
   - Gold; Placer

8. Oudomxay
   - Base metals - copper occurrences

9. Xieng Khouang
   - Gold and Base metals

10. Sam Neua - Ban Done
    - Gems/ Beryllium

11. Sam Neua
    - Chromite/platinum; Ultramafites

12. Pha Lek
    - Iron - Cu/Au ; Skarns

13. Lak Xiao
    - Gold ; Placers

14. Upper Xekong basin
    - Gold / Silver ; Placers
Major Targets for Mineral Exploration and Mining Project

15. Upper Xe Kaman
   - Gold; Placers

16. Champasak
   - Base metals
   - Volcanogenic environment
FUEL MINERALS POTENTIAL

- **COAL**
  - Anthracite
    - VIENTIANE BASIN
    - SARAVAN BASIN
    - PHONGSALY
  - LIGNITE
    - HONGSA BASIN
    - LUANGNAMTHA
    - XIENGKHOUANG

- **OIL AND GAS**
  - VIENTIANE
  - SAVANNAKHET
  - CHAMPASACK
The (Revised) Law on Minerals is promulgated on December 2011.

This law repeals the Law on Minerals No. 04/NA, dated 8 December 2008.

The Law on Minerals is composed of 12 Parts and 102 Articles.

- Part III  → Mineral activities
- Part IV  → Mineral Business
- Part V  → safety and Environment
- Part VI  → Rights, duties and obligations of the Mineral Business Operators
- Part VII  → Government’s share
- Part X  → Management, Monitoring and Inspection of Mineral and Mining Activities.
The Law on Minerals defines the principles, regulations and measures regarding the management, protection, utilization of minerals and mineral resources, and the inspection of minerals activities, with the aim of ensuring that prospecting, exploration, mining and processing of minerals are highly efficient in conjunction with environmental protection and are consistent with the National Socio-Economic Development Plan in order to create conditions for gradual economic growth, industrialization, progressive modernization, sustainable mineral development and to improve the standard of living of all ethnic groups.
Law on Minerals

- Individuals, legal entities or organizations that have received authorization to operate or undertake activities related to minerals by contract, which is previously effective, shall be entitled to continue to operate their minerals activities in accordance to conditions and contents of concerned contracts.

- In the case that license holders undertaking mineral activities pursuant to contract in the past and wish to continue their activities in compliance with this revised Law, they must propose to the concerned sectors within one hundred and twenty days from the date this law comes into force.

- All regulations and provisions in conflict with this law are cancelled.
The overall conduct of the mineral activity is governed primarily by the Law on Minerals, though other laws apply as relevant such as the Law on Environmental Protection.
Mining Related Laws

- Mineral Law;
- Investment promotion Law;
- Land Use Law;
- Environmental Law;
- Forestry Law;
- Taxation Law;
- Transportation Law;
- Construction Law…
How to invest in the Lao PDR

In the Lao PDR, an individual or entity that wishes to undertake prospecting, exploration or mining of minerals will be required, depending on the stage of activity,

- to set up a business, apply for a concession and licenses and to negotiate a concession and investment agreement with the LPDR government

- pursuant to the Law on Investment Promotion, Law on Enterprise and Law on Minerals.
Term of Mineral Activities

- Prospecting: 2 y + 1 y
- Exploration: 3 y + 2 y
- Preliminary FS: 1 y + 1 y
- Detailed FS: 1 y + 1 y
- Mining Construction: 2 y + 1 y
- Mining and Mineral Prod.: 20 y + 5 y

Concession Area:

✓ Max: 300 sq.km
Reconnaissance (Article 30)

- An individual or legal entity who has the objective to undertake a mineral business shall apply for a reconnaissance permit for a specific mineral from the designated Natural Resources and Environment sector (DGM).

- Work under a reconnaissance permit may be undertaken by desk study (ies) in the office and site visit(s) in order to study outcrops and possible mineralization, environmental circumstances, and to sample from the surface only for analysis.
After reconnaissance work, and if there is sufficient data, domestic and foreign investors who wish to invest in minerals activities shall submit an investment application to the concerned sector for consideration in accordance to the process as provided in the Investment Promotion Law.
Licenses Procedures
The Department of Geology and Minerals (DGM)

- is under the Ministry of Natural Resources and Environment (MONRE)
- has duty in indicate of prospecting, exploration minerals and pre-feasibility study by state and private investment,
- included a secretariat for the Committee on Ministry to research, planning to survey mapping, geology - minerals, prospecting, survey minerals system with grid line and other scale;
- great requirements, procedures relating to the management of the prospecting, exploration minerals in the country;
- managing investments phase prospecting, exploration and pre-feasibly study with domestic and oversea companies.
Rights and Duties of the Ministry of Natural Resources/DGM

- To participate in the negotiation and the signing of investment agreements on minerals prospecting and exploration as assigned by the Government;

- To issue and extend licenses for prospecting, exploration and permits to undertake pre-feasibility studies to investors;
The Department of Geology and Minerals is structured in 6 divisions and 3 Geological and Minerals Survey Units as follows:

1. Administration and Planning Division
2. Geological and Minerals Survey Division
3. Agreement and Concession Management Division
4. Technical Geology Division
5. Database and Information Division
6. Laboratory Division
7. Central Part Geological and Minerals Survey Unit
8. Southern Part Geological and Minerals Survey Unit
9. Northern Part Geological and Minerals Survey Unit
Department of Mines (DOM)

is a state authority and belongs to the Ministry of Energy and Mines (MEM)

which is in charge of management and promotion of mining, mineral further processing and export and import of mineral products.
Organization of Department of Mines (DOM)

Director General

Deputy Director General

Deputy Director General

Deputy Director General

Administration Division

Mining Title and Policy Division

Mining and Metallurgy Technology Division

Mining Economics and Community Development Division

Mine Safety, Health and Environment Division

Mining Information and Evaluation Division
Rights and Duties of the Ministry of Energy and Mines/DOM

- To participate in the negotiation and signing of agreements on mining [and] development as assigned by the Government;

- To issue and extend licenses for mining, processing and smelting plants, and certificates for buying, selling and transportation of concentrates
III. Mining activities
III. Mining activities

1. Overview Situation of Mining Investment

- In 2001
  - 48 companies invested in the mining sector

- Until December 2012 the central Government issued licenses for
  - 65 Mining operation projects
**Important Mines in Lao PDR**

Pan Australian

*Phu Kham copper-gold mine*

200 mt @ 0.65% Cu, 0.25 g/t Au, 0.25 g/t Ag

China MinMetals (MMG)

*Sepon copper-gold mine*

Gold: 60 mt @ 1.7 g/t Au, 6.4 g/t Ag

Copper: 68 mt @ 2.3% Cu, 0.2 g/t Au, 12 g/t Ag
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Potash Mining in Lao PDR

- **Sino-Lao Potash Mining**
  - 50,000 KCl/y

- **Sino-Hydro Potash Mining**
  - 250,000 KCl/y

- **Lao Khaiyuan Potash Mining**
  - 500,000 KCl/y

- **Sino-Agri Potash Mining**
  - 150,000 KCl/y
V. Conclusion

1. Mineral development in the LAO PDR is rapidly becoming an important source of economic growth and poverty reduction supporting sustainable development

2. There are 65 companies conducted to mining and mineral processing.
   - MMG : Sepon gold-copper mine
   - PhuBia Mining Ltd. : Phukham Copper mine and Houei Xay Gold Mines
   - Potash Mining in Vientiane and Khammouane

3. The Government encourages investors to join existing / new licenses
Thank you for your attention!