

An Overview of Metalliferous Ore Minerals Resources in Myanmar

Shwe Wut Hmon Aye*, Waing Waing Kay Khine Oo**

*Department of Metallurgical Engineering and Materials Science, West Yangon Technological University, Hlaing Thar Yar Township Yangon, Myanmar

**Department of Metallurgical Engineering and Materials Science, West Yangon Technological University, Hlaing Thar Yar Township Yangon, Myanmar

*hmon152@gmail.com

**waingkaykhine@gmail.com

DOI: 10.29322/IJSRP.9.08.2019.p92141

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92142>

Abstract- Myanmar has extensive mineral resources and a well-established centuries old mining industry. The main resources are iron, copper, gold, silver, lead, tin, tungsten, nickel, antimony, petroleum, gas, coal, jade and gemstone. In Myanmar, the mineral sector ranks third after agriculture and forestry products and is regarded as having excellent potential in the development programmes of the country. The aim of this paper is to introduce the explored and unexplored metalliferous ore minerals resources in Myanmar. It is also described the current status of mining and mineral processing industries.

Keywords- mineral, resources, mining, deposits, metalliferous

I. INTRODUCTION

Myanmar, formerly known as Burma, is situated in South East Asia. It is located between 09 degree 32 minutes North and 28 degree 31 Minutes North and longitudes 92 degree 10 minutes East and 101 degree 11 minutes East. It is bounded on the north by Tibet Autonomous Region of China, on the east by Yunnan Province of China, Laos and Thailand, on the south by the Andaman Sea and the Bay of Bengal, Bangladesh and India. Myanmar has an extensive mineral resources and a long history in mining industry. The main richness of the mineral resources in Myanmar are Jade, Ruby, Sapphire and Limestone. The secondly rich resources are Copper, Lead, Zinc, Tin, Tungsten, Gold, Coal and Barite. The fairly rich resources are Antimony, Silver, Nickel, Gypsum, Iron and Manganese. The other resources are Chromite, PGM Minerals, Radioactive Minerals, Diamond, Fertilizer Minerals, Fluorite, Bauxite, Mercury, kaolin, Feldspar, Quartz, Bentonite and Mica. [5]

In the mineral sector, mineral deposits have been worked with the government sector and private sector. The government had partially privatized several state owned productive metallic mines and formed several new joint-venture companies or cooperatives with local and foreign companies for mining and mineral processing.

II. METALLIFEROUS MINERALS DEPOSITS

Among those, significant resources and mines of metalliferous ore minerals will be mentioned in this paper.

A. Iron ore deposits and mining operations

Iron ore deposits are has been found in the following regions.

- 1) Kahaing Taung Deposit: It is situated near Phakhant in Kachin State and is a Lateritic residual type of deposit. In ore reserves given as P-2 rank are 223 million metric tons with average grade of 50.56 % Fe (Iron). However, only 15% is Hematite, 2 % Magnetite and 75% is given as Goethite and Limonite. Mining is not yet started. Some form of beneficiation and pelletization will be required before this material can be used.
- 2) La Maung Deposit: It is near Phakhant also. Total reserves given are P-2 rank 8.9 million metric tons with a grade of 51.54 % Fe. Mining is not yet started.
- 3) Peng Pet Deposit: It is situated near Taunggyi in Southern Shan State. Reserves given as P-2 rank are 10.7 million metric tons of Hematite with 56.4% Fe and 0.019% As (Arsenic). Other 60 million metric tons were shown as Limonite with 42.6% Fe, 0.11% As and 10 million metric tons of Limonite at 43.2% Fe and 0.19% As. Total reserves are 80 million metric tons. A 200,000 tpy capacity ROMELT plant was built near this iron ore deposit. It is in the last phases of construction but presently the project is temporarily stopped and it is under care and maintenance.

- 4) Kya-Twin-Ye Deposit: Another iron ore deposit is Kya-Twin-Ye, which is situated near Pyin-Oo-Lwin. The reserves ad P-2 was given as 8 million metric tons. Fe content 54% and over 60% is Hematite and the rest is Limonite. In this mine, mineral processing method employed ore crushing, screening and washing the ore to get +7mm and -30mm size. A 40,000 tpy Direct Reduction Plant has been operating since 1985, using the iron ore supplied by this mine.
- 5) Kho-Kyun Deposit: It is situated near Bokpyin in Taninthayi Division. Reserves recorded were 7.6 million metric tons as P-2 rank and iron content is 46.05 %.
- 6) Maputae Deposit: It is situated in Taninthayi Division near Kaw Thaug. The reserves recorded was 1 million metric tons, P-2 rank with Fe 42%.
- 7) Taung Nyo Taung Deposit: It is situated near Shwe Gu in Kachin State. The reserves recorded were 18.9 million metric tons. Fe content is 40.67% and said to contain Hematite, Limonite and Magnetite.

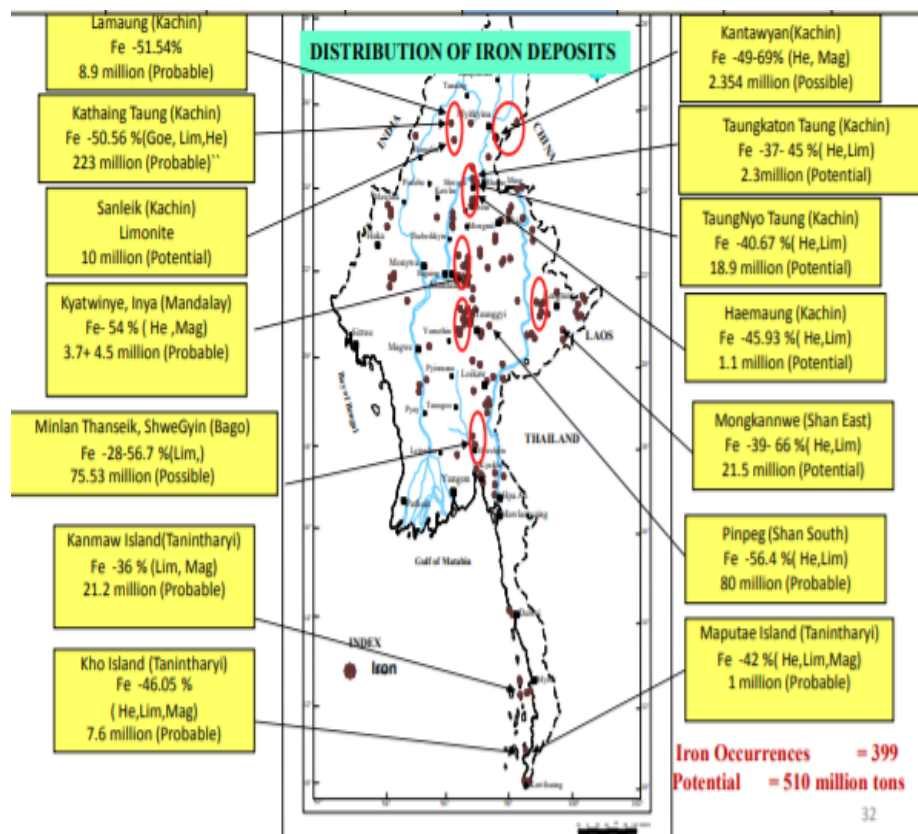


Figure 1. Distribution of Iron Ore Deposits [2]

B. Coal Deposits

After iron deposits, it is worthwhile to describe about the coal deposits as iron ore needs coal to go into iron and steel business. Myanmar does have over 490 occurrences of coal with a potential of 490 million tons. However most of the coal resources are of low grades, low tonnage and are located in remote areas far away from the iron ore resources. Properties and resource sizes of some coal deposits are presented in Table 1.

Table 1. Chemical Analysis of Coal [9]

No	Location			Chemical Analysis					
	Region	Township	State Division	Fried Carbon %	Volatile %	Moisture %	Ash %	Calorific Values Btu lb	Sulfur %
1	Kalewa	Sagaing	Sagaing	52.51	38.62	9.7	8.87	11720	
2	Darthwekyauk	Tamu	Sagaing	50.00			1.00	12000	Less than 1
3	Palizawe	Mawlike	Sagaing	41.47	45.32				

4	Mawlike	Mawlike	Sagaing	49.70	43.85	8.6	6.40	11800	1.12
5	Kyopyin	Kawlin	Sagaing	31.00	34.40	8.3	34.40	9174	1.48
6	Lweji	Bamoh	Kachin	17.59	38.90	14.36	43.49	6396	0.69
7	Kawrapyin	Tanintharyi	Tanintharyi	36.66	34.82	5.51	21.25	9977	2.00
8	Mewtaung	Tanintharyi	Tanintharyi	43.59				9754	2.24
9	Karathiri	Bokpyin	Tanintharyi	37.60				9810	0.32
10	Wungychaung	Stikphyu	Magwe	31.71	41.80		26.40	8365	3.60
11	Tasuletperhla	Peuk	Magwe	34.60	48.40		16.90	8349	2.50
12	Kyesi-Marsan	Kyesi	Shan(South)	35.60	48.98	13.29	15.36	10153	2.56
13	Kholan	Naman	Shan(South)	14.77	56.26	21.32	28.80	7355	
14	Tigyit	Punlaung	Shan(South)	33.81	34.40	18.51	13.27	9169	
15	Makyaning	Tayang	Shan(North)	26.86	50.86	12.65	22.27	9187	1.08
16	Marpan	Tayang	Shan(North)	35.58	55.00	19.45	9.33	9889	0.80
17	Harpu	Tayang	Shan(North)	27.57	56.26	28.40	13.16	8244	0.99
18	Sale	Lasio	Shan(North)	33.00	54.02	15.98	12.98	9881	1.40
19	Sanya	Lasio	Shan(North)	35.47	58.32	17.77	6.21	10420	0.64
20	Sataung	Lasio	Shan(North)	33.67	96.99	28.28	9.21	8770	2.56
21	Namma	Lasio	Shan(North)	34.54	44.31	8.64	20.69	10083	1.44
22	Narkee	Lasio	Shan(North)	38.01	59.49	15.98	2.52	11080	0.64
23	Narlan	Lasio	Shan(North)	33.42	41.83	16.57	17.14	9370	6.97
24	Namlinhkam	Lasio	Shan(North)	35.71	52.97	13.25	11.32	10440	4.69
25	Sarlaung	Thipaw	Shan(North)	30.52	51.36	12.16	18.06	9772	5.82
26	Mahlaw	Thipaw	Shan(North)	35.26	61.30	19.88	6.43	10430	0.64
27	Wankyan	Kyzington	Shan(North)	23.00	23.00	40.00	8.50	5890	0.40
28	Hoko	Kyzington	Shan(North)	44.45	56.50		15.41	11233	1.17
29	Mainghkok	Maington	Shan(North)	45.00			1.86	10185	
30	Narpariaw	Maington	Shan(North)	25.93-28.07	26.31-31.89		14.83-15.39	7720-8370	0.96
31	Kywein	Ingapu	Ayeyawadi	41.10	18.24	1.16	40.70	8163	0.93
32	Kari	Dawai	Tanintharyi	42.30	48.80		9.51	8885	0.74
33	Banchaung	Dawai	Tanintharyi	40.87	38.95	7.49	20.05	11345	1.47
34	Thepyuchammt	Kyainnykgyi	Kawlin	39.90	33.56	8.2	19.77	10390	1.35

The highest grade is sub-bituminous and all of them are non-coking grades. The one, Namma Coal is used for a direction reduction plant (40,000 tpy) which is 230 km far away from Namma. Also, coal at Kyesi Mansan is allocated for Peng Pat iron smelter (ROMELT Process, 200,000 tpy) and these two facilities are 250 km apart.

C. Copper Ore Deposits

The Monywa copper district is 115 km west northwest of Mandalay in an elevated flood plain west of the Chindwin River in western Myanmar. The district is on the northern margin of Myanmar's dry zone; annual rainfall is about 800 mm confined to the May–October period. Maximum daily temperatures from March to June can exceed 45°C. Four major high sulfidation deposits of Miocene age define the district: the almost contiguous Sabetaung, Sabetaung South and Kyisintaung deposits and the much larger Letpadaung 7 km to the southeast, combined resources totaling 2 billion tonnes ore with over 7 million tonnes contained copper. Initially flotation was used to concentrate the ore containing 0.7-1.0% copper, the recovery was about 70-75%, when the new technique solvent extraction-electrowinning (SX-EW) method was employed cut-off grade of ore that could be treated was 0.08% copper, with increased recovery of 80% and producing 99.99% purity copper metal. [1]

D. Gold Ore Deposits

In Myanmar, total gold reserves of the country have not been fully estimated. The ore reserves of the evaluated prospects are estimated at 5.6 million tones and possible gold reserves associated with these are calculated at 18.2 metric tons. Gold reserves has been found in Khan Tee in Chin State, Myitgyinar, Shwe Gu Nanmar, Intawgyi in Kchin State, Kaw Lin, Shwe Bo, Kyaukpahto in Sagaing Division, Phayaung Taung in Mandalay Division, Myese Taung near Latpatan, Shwe Kyin, Madauk in Pago Division, Maeyonegyi, Maeyonekalay near Thantone in Mon State. Among those, the Kyaukpato gold project is located 40 km east of the Kawlin township in the Sagaing State. A potential economic area of 470m by 70m has been identified with ore reserves (1.0 g/ton

cutoff grade) of 3.46 million tones averaging 4.02 g/ton of gold. A 40 ton/day pilot plant was in operation producing 1800 troy oz (87kg) of gold per year. Mineral processing of gold ore employed are gravity concentration method by using sluice or spiral concentrator. And then, cyanidation process is carried out to recover the gold metal. [8]

E. Lead, Zinc and Silver Deposits

The mineral deposit of lead, zinc and silver has been found in Bawdwin Mine and Yandanatheingi Mine in Shan State, Bawsaing mine in Kayah State. For example, ore reserves of Bawdwin Mine are 5 million tones with average grade of Ag 4.58 oz per ton, Pb 7.46 %, Zn 3.17% and Cu 0.14% in underground Mine and open pit Mine ore reserve is 9 million tones with average grade of Pb 5.17% and Zn 4%. Mineral dressings of lead, zinc and silver ores have been carried out by crushing, grinding, sizing and conventional flotation method.

F. Tin and Tungsten Deposits

The mineral deposits of tin and tungsten can be found in Mawchi Mine in Phasaung Township, Hermyingyi Mine which is located about 40 km north-east of Tawel, Kanbouk which is located 90 km north of Tawel. In Mawchi Mine, the reserve 712540 ton of ore of 3.02 % (Sn+W). Annual production of tin is about 50 tons and tungsten is 100 tones. All tin and tungsten mines have been privatized and at present there is no state operated tin tungsten mine apart from one tin smelter in Thanlyin. Gravity concentration method has been used in mineral dressing.

G. Nickel and Chromium Deposits

The mineral deposits of nickel are found in Tagaung Taung in Kyauksel township, Thabeikkyin Township and Mwe Taung in Chin State. Potential ore reserves of the Tagaung Taung area was 1.1 to 1.3 million tons with nickel content above 1.5 percent, but more recent estimates have far exceeded these reserves. Gravity concentration method has been used in mineral dressing. And then, pyro metallurgical processes are used to produce ferronickel. Mwe Taung deposit is a nickel laterite ore deposit. Probably reserves in Mwe Taung have 10 million tons with 1.19 above percent nickel. The chromium deposits are Mwe Taung, Webula Taung, Hakhalay, Nat Hill, Bopibun, Muwelut, Maungtaw-Hnamataw and Falam.

III. CONCLUSION

The Union of Myanmar has a promising potential of mineral resources. But, comparison with other mines in the world most Myanmar Mines can be classified as small- scale mines. Most of the mineral processing methods are gravity concentration and flotation. Some private mines have been used artisanal methods. The mineral exploration, mining and metallurgical sectors play a dominant role in the economic development of the country. As the government is at the present allowing more foreign investors to invest in the mineral industry, it is certain that this industry will fast grow with momentum and be very promising in the near future in Myanmar.

REFERENCES

- [1] Andrew H.G. Mitchell, Win Myint, Kyi Lynn, Maw Oo, thein Zaw, Geology of the High Sulidation Copper Deposits, Monywa mine, Myanmar, Resource Geology Vol.61.No.1,2010, pp.1-29.
- [2] Dr Ye Myint Swe, Mineral Wealth and Future Aspects of Myanmar Mineral Industry, May 2006.
- [3] John C. Wu, The Mineral Industry of Burma !(Myanmar), 1997.
- [4] Ko Ko Myint, Mineral belts and epochs in Myanmar: Resource Geology, v. 44, n0.4, 1994, pp.1.
- [5] Kyaw Kyaw Ohn, Geology and Mineral resources of Myanmar.
- [6] Myint Thein , Thoughts on Future Trends for Myanmar Iron and Steel Industry, 2009.
- [7] San Nyunt, Review on the Current Practices for Minerals Project Development in Myanmar.
- [8] Anonymous, Engineering and Mining Journal, Myanmar- First Dynasty Mine Ltd. Has encoured Gold Mineralization: Engineering and Mining Journal, v.198, no 8, 1997.
- [9] Report on Data Collection Survey on Coal Fired Thermal Power Generation, Japan International Cooperation Agency, Japan Coal Energy Center, January 2013.

AUTHORS

First Author – Shwe Wut Hmon Aye, Professor and Head, Department of Metallurgical Engineering and Materials Science, West Yangon Technological University, hmon152@gmail.com.

Second Author – Waing Waing Kay Khine Oo, Professor, Department of Metallurgical Engineering and Materials Science, West Yangon Technological University, waingkaykhine@gmail.com.

