Indian Minerals Yearbook 2022

(Part- I)

61st Edition

STATE REVIEWS
(Manipur)

(ADVANCE RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

Indira Bhavan, Civil Lines,
NAGPUR – 440 001

PHONE/FAX NO. (0712) 2565471
PBX : (0712) 2562649, 2560544, 2560648
E-MAIL : cme@ibm.gov.in
Website: www.ibm.gov.in

July, 2024

MANIPUR

Mineral Resources

Important mineral occurences in Manipur are Chromite and Limestone. Total resources of the Chromite and Limestone in the state are 6.65 million tonnes and 46 million tonnes respectively (Table-1).

Exploration & Development

The details of exploration activities conducted by GSI for Chromite and Nickel during the year 2021-22 are furnished in Table - 2.

Production

No mineral production (except minor minerals) was reported from Manipur in 2021-22. The value of minor minerals' production was estimated at ₹ 29 lakh for the year 2021-22.

Table– 1: Reserves/Resources of Mineral as on 1.4.2020 : Manipur

Mineral	Unit	Reserves				Remaining resources								Total resources (A+B)
		Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	
			STD121	STD122			STD221	STD222						
Chromite	000 Tonnes	-	-	-	-	3	21	52	-	504	6077	-	6657	6657
Limestone	000 Tonnes	-	-	-	-	-	-	-	10197	2138	33718	-	46053	46053

Figures rounded off

Table –2 : Details of Exploration Activities in Manipur, 2021-22

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Nickel-Ni-Cr-PGE/Cr-Ni-PGE							
	Naga-Manipur Hills Ophiolite around Champhai-Hermon area	1:2000	3	-	-	-	Detailed geological mapping on 1:2000 scale covering 3 sq km around Champhai-Hermon-Seivangkho areas in parts of SoI TS 83L/07 was carried out to assess the potential source supergene Ni deposits. Ni-rich laterite deposits of about 1.6 sq km with an average thickness of 4.5 m around Champhai, Hermon and Seivangkhowere delineated as potential supergene Ni-laterite deposits. Laterites are observed to occupy the crest and slope of gently sloping ridges and flat top plateau, typical of accretionary deposit. The deposit can be classified as both oxide and saprolite type (boulder ore) and the laterite profile have been subdivided into various weathering zones. A total of five horizons have been recognised (bottom to top) that have been described in other Ni laterite deposits of the world: (i) Saprolite, (ii) ferruginous saprolite (yellow limonite) (iii) Oxidised Zone (iv) Plasmic Zone and (v) duricrust. The ore-bearing laterite is derived from the weathering of the spinel harzburgitic rocks. Lateritic regoliths are confined to peridotite, with varying thicknesses. Trench profile and soil section indicate at least two distinguishable weathering mantles with subdivision in each zone. The upper oxide zone is usually dark brownish-reddish in colour containing granules, pisolite (±secondary silica vein), locally hardened ferruginous granular, porous concretionary aggregate having colloidal or colloform texture. The round to ellipsoidal goethite granules is held together

(Contd)

Table-2 (Contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							by ferruginous limonitic materials. Goethites are the main host for Ni in the oxide zone. The lower zone called saprolite zone is composed of weathered and decomposed rock which is light yellowish to soft pale greenish in colour. Remnants of protolith are visible. In the saprolite zone, hydrous material of serpentine-like, talc-like and chlorite-like (hydrous Mg-Ni silicate; garnierite) precipitates and occurs as slickenside coating, sigmoidal and fracture filling and veins. This indicates a complex supergene syn-tectonic evolution. The chemical data indicated an encouraging value of Ni in the saprolite zone (Ni – 15,822 ppm), of ultramafic-derived regolith. The concentrations of other trace elements in the saprolite/saprocks are Cr (4472 ppm), Cu (32 ppm), Co (268 ppm), Pb (8 ppm) and Sc (5 ppm).The limonitic layer of the laterite contains high value of Fe_2O_3 (T) (19.95-51.42 %), Al_2O_3 (4.22-19.74 %) and low MgO (1.20-4.98 %). The limonitic laterite analysed Ni (1962-7992 ppm) with associated Co (110-336 ppm), Cr (3693-12380 ppm), Cu (66-90 ppm), Pb (<2-15 ppm), Sc (23-29 ppm) and V (64-262 ppm). Within the laterite profile, an abrupt decrease in MgO and gradual increases of TiO_2 and a drastic increase in Fe_2O_3 and Al_2O_3 from the protolith towards the oxidized lateritic soil were observed. The high content of iron in the lateritic soil is attributed to the release of FeO during the process of serpentinisation and weathering of olivine and pyroxene-rich rocks. The high SiO_2 content in the oxide zone may be due to the presence of localized thin silica veins within the oxide zone. Mno is fairly uniform in both limonite

(Contd)

Table-2 (Contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							and saprolite. CaO and Na_2O are fairly constant. While Cr content gradually increases from bedrock to the limonite, on average, the concentration of Ni is higher in saprock. This pattern is in good agreement with the principle of weathering or lateritisation process during which elements such as Mg and Si become leached and others such Ni, Co, Y and Mn are secondarily enriched, while Fe, Cr, Al and Ti are residually concentrated within the laterite profile.
Tengnoupal	Manipur-Nagaland Ophiolite Belt, Chalwa-Kwatha area	1:5000	6.3	-	-	-	Detailed mapping on 1:5000 scale was carried out in parts of Kamjong District for delineating the mineralised zone within nickeliferous laterite and associated base metal covering 6.3 sq.km area. The study area forms a part of the southern extension of the Manipur-Nagaland Ophiolite Belt and exposes the Ophiolite suite of rocks and Paleogene sediments. Ophiolite suite of rocks is mainly represented by the dunite, pyroxenite, harzburgite and volcanics. The cumulate ultramafic peridotite host massive chromitite as discontinuous lenses and pods of varying dimension along the strike continuity. The lateritic soil capping developed above the mafic-ultramafic peridotite shows varying exposed thickness (1 to 8m). The well-developed lateritic soil capping shows six distinct lateritic soil profile horizons i.e., saprock mixed with saprolite, saprolite, oxidised zone rich in goethite nodules, plasmic and ferric duricrust. The lateritic soil samples in the studied area are characterised by the relative enrichment of Fe_2O_3 (14.60% to 46.75%), Ni (2505ppm to

(Contd)

Table-2 (Concld)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							14494ppm), Cr (2466ppm to 10236ppm) and Co (92ppm to 405ppm). The higher values of Ni correspond to the saprolite lateritic soil horizon. The significant depletion of MgO in the top lateritic profile (MgO - 1.15%) and relative enrichment at the base (22.63%) indicates the leaching effect induces by the meteoric water. The UMIA values for the lateritic soil range from 27.67 to 69.46, which indicates high degree of weathering of the protolith mafic-ultramafic peridotite (UMIA value of fresh bedrock peridotite ranges from 8.51 to 36.0). The index of laterisation (IoL) values for the lateritic soil mostly range between 30.52 to 65.33 indicating middle stage of advanced leaching, resulting from re-distribution of Ni, Si, and Mg from the limonite towards the saprolite horizon. Ternary plot of SiO_2-Al_2O_3-Fe_2O_3 for lateritic soil shows clustering of plots in the three field of medium to low laterisation and kaolinisation, indicating less advanced stage of laterisation.