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MINOR MINERALS

30.14 LATERITE

(FINAL RELEASE)

GOVERNMENT OF INDIA
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30-14 Laterite

Laterite (from the Latin word later, meaning "brick" or "tile") is a surface formation that is enriched in iron and aluminium. Found mainly in hot, wet tropical areas, it develops by intensive and long-lasting weathering of the underlying parent rock. The mineralogical & chemical composition of laterite depends on their parent rock. Due to the presence of iron oxides, lateritic soils are red in colour ranging from light bright to brown shades. The term 'laterite' was originally used for highly ferruginous deposits first observed in Malabar Region of coastal Kerala and Dakshina Kannada & other parts of Karnataka. It is a highly weathered material, rich in secondary oxides of iron, aluminium or both. It is either hard or capable of hardening on exposure to moisture and drying.

Laterite and bauxite show a tendency to occur together. Aluminous laterites and ferruginous bauxites are quite common. The most common impurity in both is silica. Laterite gradually passes into bauxite with decrease in iron oxide and increase in aluminium oxide. The laterite deposits may be described on the basis of the dominant extractable minerals in it: (i) aluminous laterite (bauxite), (ii) ferruginous laterite (iron ore), (iii) manganiferous laterite (manganese ore), (iv) nickeliferous laterite (nickel ore) and (v) chromiferous laterite (chrome ore). Laterite with Fe_2O_3:Al_2O_3 ratio more than one, and SiO_2:Fe_2O_3 ratio less than 1.33 is termed as ferruginous laterite, while that having Fe_2O_3:Al_2O_3 ratio less than one and SiO_2:Al_2O_3 ratio less than 1.33 is termed as aluminous laterite.

Laterite can be considered as polymetallic ore as it is not only the essential repository for aluminium, but also a source of iron, manganese, cobalt, nickel and chromium. Furthermore, it is the home for several trace elements like gallium and vanadium which can be extracted as by-products.

RESERVES/RESOURCES

Laterite occurrences are widespread in the country. Almost all Indian bauxite deposits are associated with laterite, except those in Jammu & Kashmir. Laterite generally occurs as capping on the hills and plateaus of Madhya Pradesh and in some states of the Deccan peninsula at altitudes ranging from coastal to 2,000 m with thickness up to 60 m.

As per the NMI database based on UNFC System as on 1.04.2015, the total reserves/resources of laterite were estimated at 706 million tonnes. Out of these, 124 million tonnes are placed under Reserves category and 581 million tonnes are under Remaining Resources category. Major share of about 74% resources is located in two states, namely, Madhya Pradesh (55%) and Rajasthan (17%). The remaining 28% of resources are spread over in the States of Andhra Pradesh, Kerala, Gujarat, Maharashtra and Jharkhand. Gradewise and Statewise reserves/ resources are furnished in Table- 1.

EXPLORATION & DEVELOPMENT

The exploration & development details, if any, are given in the review on "Exploration & Development" in "General Reviews".

PRODUCTION & STOCKS

As per Govt. of India Notification S.O. 423(E) dated 10th February 2015, 'laterite' has been declared as 'Minor Mineral', hence, the production data is not available with IBM.

Table – 1 : Reserves/Resources of Laterite as on 1.4.2015
(By Grades/States)

(In '000' tonnes)

Grade/State	Reserves				Remaining Resources								
	Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	Total Resources (A+B)
		STD121	STD122			STD221	STD222						
All India : Total	**98598**	**12527**	**13608**	**124733**	**49655**	**8960**	**22724**	**3532**	**2626**	**243535**	**250787**	**581819**	**706552**
By Grades													
Unclassified	98598	12527	13608	124733	49655	8960	22724	3532	2626	243535	250787	581819	706552
By States													
Andhra Pradesh	13574	680	1710	15964	23238	5107	2244	24	1107	889	-	32608	48572
Gujarat	36019	-	399	36418	8095	-	1467	-	-	-	-	9562	45981
Jharkhand	-	-	-	-	-	-	-	-	-	570	-	570	570
Kerala	-	-	1156	1156	953	-	-	-	-	-	16717	17670	18826
Madhya Pradesh	12534	3355	7917	23807	8715	1631	16077	3189	1519	167527	169678	368336	392143
Maharashtra	-	278	-	278	2215	1393	400	319	-	7577	-	11903	12181
Odisha	-	-	-	-	-	-	-	-	-	-	1227	1227	1227
Rajasthan	-	-	-	-	-	-	-	-	-	60490	62860	123350	123350
Telangana	36471	8213	2426	47110	6439	828	2536	-	-	6483	305	16591	63701

Figures rounded off

USES & SPECIFICATIONS

Indian Standards code IS 3620-1979 provides specifications and standards for laterite masonry construction in India. Unique material properties and regional variations have rendered laterite stone as subject of controversy. The engineering characteristics of laterite from Malabar region of western India are presented based on the doctoral research conducted by the first author of IITM and several other published studies in the literature.

The compact and ferruginous variety of laterite is used widely as a building stone and road metal . Limited capacity to withstand heavy pressure has limited the use of laterites in construction of light structures, partition walls, boundary walls, etc. Laterite as a building stone possesses one advantage that it is soft when quarried and can be easily cut and dressed into blocks and bricks which on exposure to air become hard.

The industrial use of laterite is in the Cement Industry. It is used as an additive for lowering the clinkerisation temperature and supplementing aluminous and iron contents required in the manufacture of cement. It is also reported that laterite is capable of removal of phosphorus from solutions and percolating columns of laterite remove cadmium, chromium and lead to very low concentrations.

FUTURE OUTLOOK

In India, though the resources of laterite are vast and are available in abundance, the work in respect of systematic exploration and estimation of resources have been restricted. There seems to be no major change in the end-use pattern of laterite.

Laterite is widely used as a building stone and road metal. Laterite is a weak stone, but can be used for masonry construction. The property of laterite can be enhanced by suitable water proofing treatments. Long term study is required to find an optimum size for its varied masonry applications.

The consumption of laterite in cement has scaled up due to increased demand of cement in the country. The plausibility of diverse application of laterite in future could well become a viable source for metallic minerals like iron, aluminium, chromite and of trace elements like gallium and vanadium.