

STATE REVIEWS



# Indian Minerals Yearbook 2016



(Part- I)

55<sup>th</sup> Edition

## STATE REVIEWS (Meghalaya)

(FINAL 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](mailto:cme@ibm.gov.in)  
Website: [www.ibm.gov.in](http://www.ibm.gov.in)

February, 2018

**MEGHALAYA****Mineral Resources**

Coal and limestone are the only major minerals mined in the State. **Coal** occurs in Mikir Hills, Khasi Hills, Jaintia Hills and Garo Hills districts. Resources of **limestone** occur in West Garo Hills, East Khasi Hills, West Khasi Hills and Jaintia Hills districts. Other mineral occurrences are **apatite** in Jaintia Hills district; **china clay** in East Garo Hills & West Garo Hills, Jaintia Hills & East Khasi Hills districts; **copper, lead-zinc, silver** and **titanium minerals** in East Khasi Hills district; **felspar** and **rock phosphate** in East Garo Hills & Jaintia Hills districts; **fireclay** in East Khasi Hills & West Garo Hills districts; **granite** in West Khasi Hills district; **iron ore (magnetite)** in East Garo Hills district; **quartz** and **silica sand** in East Garo Hills, West Garo Hills & East Khasi Hills districts; and **sillimanite** in West Khasi Hills district (Table -1). The various coalfields and their reserves/resources in the State are given in Table-2.

**Exploration & Development**

Details of exploration activities conducted

by GSI for bauxite, limestone and titanium/vanadium minerals and MECL for limestone mineral during 2015-16 are furnished in Table - 3.

**Production**

The total estimated value of mineral production (excludes atomic mineral) in Meghalaya at ₹ 2,122 crore in 2015-16 increased by 40% as compared to that in the previous year. About 88% of the total value of mineral production was accrued from coal during the year under review, whereas the remaining was contributed mainly by limestone (Table - 4).

The value of production of minor minerals was estimated at ₹ 721 lakh for the year 2015-16.

There were 16 reporting mines in 2015-16 as against 17 in the previous years.

**Mineral-based Industry**

The present status of each mineral-based industry is not readily available. However, the important mineral-based industries in the organised sector in the State are given in Table - 5.

**Table – 2: Reserves/Resources of Coal as on 1.4.2016: Meghalaya**

(In million tonnes)

Coalfield	Proved	Indicated	Inferred	Total
<b>Total</b>	<b>89.04</b>	<b>16.51</b>	<b>470.93</b>	<b>576.48</b>
West Darangiri	65.40	-	59.60	125.00
East Darangiri	-	-	34.19	34.19
Balphakram-Pendenguru	-	-	107.03	107.03
Siju	-	-	125.00	125.00
Langrin	10.46	16.51	106.19	133.16
Mawtong Shelia	2.17	-	3.83	6.00
Khasi Hills	-	-	10.10	10.10
Bapung	11.01	-	22.65	33.66
Jaintia Hills	-	-	2.34	2.34

Source: Coal Directory of India, 2015-16.

## STATE REVIEWS

Table – 1: Reserves/Resources of Minerals as on 01-04-2015: Meghalaya

Mineral	Unit	Reserves				Remaining resources				Total resources (A+B)	
		Proved STD111	Probable		Total (A)	Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334		Total (B)
			STD121	STD122							
Apatite	tonne	-	-	-	-	-	1300000	-	1300000	1300000	
China clay#	'000 tonnes	-	-	-	1200	6266	76242	5167	88875	88875	
Copper											
Ore	'000 tonnes	-	-	-	-	880	-	-	880	880	
Metal	'000 tonnes	-	-	-	-	9	-	-	9	9	
Feldspar#	tonne	-	-	-	-	-	37449	-	37449	37449	
Fire clay#	'000 tonnes	-	-	-	-	-	10999	-	10999	10999	
Granite##											
(Dimension Stone)	'000 cum	-	-	-	-	-	-	286467	286467	286467	
Iron ore											
(Haematite)	'000 tonnes	-	-	-	-	-	225	-	225	225	
Iron ore											
(Magnetite)	'000 tonnes	-	-	-	-	-	3380	-	3380	3380	
Lead-Zinc											
Ore	'000 tonnes	-	-	-	-	-	-	-	-	-	
Lead metal	'000 tonnes	-	-	-	-	880	-	-	880	880	
Zinc metal	'000 tonnes	-	-	-	-	16.5	-	-	16.5	16.5	
Limestone	'000 tonnes	87904	1822	225562	39289	46200	14048758	-	17478553	17704116	
Quartz-											
Silica sand#	'000 tonnes	-	-	-	-	177	6906	-	7083	7083	
Rock											
Phosphate	tonne	-	-	-	-	-	1311035	-	1311035	1311035	
Sillimanite	tonne	-	-	-	-	-	55807	-	55807	55807	
Silver											
Ore	tonne	-	-	-	-	880000	-	-	880000	880000	
Metal	tonne	-	-	-	-	19.8	-	-	19.8	19.8	
Titanium minerals	tonne	-	-	-	-	3345000	-	-	3345000	3345000	

Figures rounded off.

# Declared as minor mineral vide Gazette notification dated 10.02.2015.

##: Minor minerals before Notification.

## STATE REVIEWS

**Table – 3: Details of Exploration Activities in Meghalaya, 2015-16**

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
<b>GSI</b>							
<b>Bauxite</b>							
West Khasi Hills	SW of Nongstoin area	1: 12500	50.0	-	-	105	G-4 stage preliminary investigation for bauxite by reconnaissance survey and large-scale mapping has been carried out in this area. Laterisation is extensive over biotite gneiss, while lateritic bauxite capping occurs over garnetiferous sillimanite gneiss and sillimanite gneiss. Extensive bauxitisation occurs in sillimanite gneiss and the rock has become white having friable nature. Limonitisation and clay pockets are also observed within the lateritic profiles. Al <sub>2</sub> O <sub>3</sub> varies from 51.43% to 30.10% (average 36.20%), maximum being over the sillimanite gneiss. Petrographic study of the garnetiferous sillimanite gneiss reveals extensive alteration of the long sillimanite needles, occurrence of ramifying veins of ferruginous materials and sinistral rotation of garnet porphyroblasts due to shearing. Sillimanite gneiss extends towards western part of the mapped area. Ga content varies from 41 ppm to 93 ppm (average 58 ppm, background value 15 ppm), which indicates potentiality of this strategic metal in lateritic bauxite capping.
	Rambrai area	1: 12500	1.55	15	417.65	-	G-3 stage investigation of lateritic bauxite around Rambrai area has been covered by detailed mapping and drilling. The lateritic bauxite observed in the area is buff and brick red in colour. Pisolitic structure is also observed at many places. Three main bodies of laterite were identified in the area having the dimensions (600 m × 100-400 m), (400 m × 100-200 m) and 100 m × 50-100 m. Besides these three main bodies, one small patch was also identified near body-5 of the area. All the three major bauxite bodies are developed over granite gneiss, norite/ metanorite and sheared amphibolites. Thickness of the complete profile of lateritic bauxite is about 8-10 m. All the fifteen boreholes intersected significant mineralised zones. Thickness of ore bodies in boreholes varies from a minimum of 6.90 m (BR-17) to a maximum of 14.50 m (BR-2), the average thickness being 10.61 m. Analytical result shows that Al <sub>2</sub> O <sub>3</sub> content varies from 41.34 wt% to 58.99 wt%. Cr, Sc and Ga also show encouraging values with an average value of 1083 ppm, 83 ppm and 64 ppm, respectively.

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## STATE REVIEWS

Table-3 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
<b>Limestone</b>							
East Jainta Hills	Shyrwang block Litang Valley	-	3.0	-	1816.75	-	G-2 stage detailed investigation of limestone in Shyrwang Block has been covered by detailed mapping and drilled till the end of March, 2016. The area under investigation exposes huge thickness of Prang Limestone of cement grade classified as Cement (Blendable/ Beneficial), Cement (Portland) and SMS (OH) grade. The Upper Sylhet Limestone which is the most important limestone horizon, from the point of view of thickness and economic potentiality, varies in thickness from 14.45 to 120.40 m as intersected in the boreholes with average thickness of 94.57 m.
Jaintia Hills	Um-Maju block west of Litang River	-	1.5	-	918.0	-	G-2 stage detailed investigation of limestone in Um-Maju Block has been covered by detailed mapping and drilling. The Upper Sylhet Limestone (Prang Limestone) which is the most important limestone horizon varies in thickness from 52.00 m to 69.70 m with an average thickness of 58.64 m as intersected in ten boreholes. Additionally, Middle Sylhet Limestone (Umlatdoh Limestone) underlying Upper Sylhet Limestone (Prang Limestone) varies in thickness from 11.65 m to 15.55 m with an average thickness of 13.74 m. The Upper Sylhet Limestone (Prang Limestone) is classified into Cement (Portland), SMS (OH), Chemical and SMS (LD) grades and the Middle Sylhet Limestone (Umlatdoh Limestone) is classified into Cement (Portland), and SMS (OH) grades.

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## STATE REVIEWS

Table-3 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Jaintia Hills	Jalaphet block, Litang river	-	1.5	-	902.0	-	G-2 stage detailed investigation of limestone in Jalaphet Block, has been covered by detailed mapping & drilling. The area under investigation exposes huge thickness of Prang Limestone; the thickness varies from 23.70 m to 111.50 m with an average thickness of 70.57 m. According to the 'End user classification' the limestone was classified as Cement (Portland) grade, Cement (Blendable) grade, SMS (OH) grade.
<b>REE/RM</b>							
Jaintia Hills & Ri-Bhoi	Bhoilymbong & area between Mynsynghat-Nartiang	-	50.0	-	-	-	G-4 stage reconnaissance investigation for evaluation of potentiality of REE has been carried out by large-scale mapping till March, 2016. On the basis of available analytical results, REE enrichment is shown by megacrystic hornblende biotite as well as two-mica leucogranite. The REE results of the samples are awaited.
<b>Titanium &amp; Vanadium</b>							
West Khasi Hills	Around Myniar area	1: 12500	51.0	-	-	-	G-4 stage investigation of titaniferous-vanadiferous magnetite has been carried out by large-scale mapping. Three main types of lithounits which were noticed in the area are granitic gneisses, porphyritic granite, norite, metanorite and granite.

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STATE REVIEWS

Table-3 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							<p>The five magnetite bodies delineated in the area were developed over granite gneiss and one over porphyritic granite. The outcrops of magnetite are bouldery in nature, strewn along hilltops and hill slopes. Six magnetite bodies of different dimensions were delineated by large scale mapping:</p> <p>I-(100 m × 70 m),                      II-(80 m × 50 m),                      III-(15 m × 12 m),                      IV-(8 m × 11 m),                      V-(7 m × 8 m) and                      VI-(350 m × 200 m).</p> <p>Analytical results of BRS samples received so far indicate the following results: I-Fe<sub>2</sub>O<sub>3</sub>: (67.83% average), TiO<sub>2</sub>: (15.21% average), Vanadium: (6101.84 ppm average), Cr: (11093.8 ppm average). II-Fe<sub>2</sub>O<sub>3</sub>: (65.76 % average), TiO<sub>2</sub>: (17.03% average), Vanadium: (6902.5 ppm average), Cr: (6947.25 ppm average). III-Fe<sub>2</sub>O<sub>3</sub>: (65.41average), TiO<sub>2</sub>: (15.23% average), Vanadium: (5848 ppm average), Cr: (9974 ppm average). IV-Fe<sub>2</sub>O<sub>3</sub>: (64.70 % average), TiO<sub>2</sub>: (16.80% average), Vanadium: (6794.2 ppm average), Cr: (6440 ppm average) V-Fe<sub>2</sub>O<sub>3</sub>: (65.53average), TiO<sub>2</sub>: (17.46% average, Cr: (5417 ppm average) VI- Fe<sub>2</sub>O<sub>3</sub>: (65.06%average), TiO<sub>2</sub>: (15.54% average), Vanadium: (6484 ppm average), Cr: (7479 ppm average).</p>

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## STATE REVIEWS

Table-3 (Concl.d.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
<b>MECL</b>							
<b>Limestone</b>							
Meghalaya Jaintia Hills	West of Litang RiverValley	1:5000	3.00	10	1348.00	969	Objective of exploration was i)To delineate the depth continuity by drilling boreholes at 300 m x 200 m grid interval. ii) To estimate category-wise geological resources & quality to bring the deposit from 332 to 331. iii)Technological/beneficiation, characteristic of limestone. The block is covered by rock types of Kopili formaion and prang limestone of Jaitia group of Tertiary age. The outcrop of this formation were observed in the western and north western part of the block. The limestone is a bedded deposit having strike N 15o E-S 15o W to NE-SW & dip varying from 2o to 5o. About 477 million tonnes of limestone reserves/resources were estimated.

**Table - 4: Mineral Production in Meghalaya, 2013-14 to 2015-16  
(Excluding Atomic Minerals)**

(Value in ₹ '000)

Mineral	Unit	2013-14			2014-15			2015-16 (P)		
		No. of mines	Qty	Value	No. of mines	Qty	Value	No. of mines	Qty	Value
<b>All Minerals</b>		<b>14</b>		<b>40391047</b>	<b>17</b>		<b>15142157</b>	<b>16</b>		<b>21218264</b>
Coal	'000t	-	5732	37974500	3	2524	12670500	3	3712	18634200
Limestone	'000t	14	3616	2344472	14	3691	2399582	13	3847	2511989
Minor Minerals®	-	-	-	72075	-	-	72075	-	-	72075

*Note: The number of mines excludes minor minerals.*

*\*Associate with limestone.*

*@ Figures for earlier years have been repeated as estimates, wherever necessary, because of non-receipt of data.*



## STATE REVIEWS

**Table – 5 : Principal Mineral-based Industries in Meghalaya**

Industry/plant	Capacity (’000 tpy)
<b>Cement</b>	
Adhunik Cement (Subsidiary of Dalmia Cement), Distt. Jaintia Hills.	1500
Amrit Cement Industries Ltd, Khleriat, Distt. Jaintia Hills.	1000
Cement Manufacture Co. Ltd, Lumshnong, Distt. Jaintia Hills.	600
Green Valley Industries, Nongsning, Distt. Jaintia Hills.	1000
JUD Cement Ltd, Norpuh, Distt. Jaintia Hills.	500
Mawmluh Cherra Cements Ltd, Cherrapunjee, Distt. East Khasi Hills.	210
Meghalaya Cements Ltd, Thangskai, Distt. Jaintia Hills.	650
Megha Technical & Engineering (P) (Subsidiary of CMCL), Lumshnong, Distt. Jaintia Hills.	670
<b>Ferro-alloys</b>	
Jaintia Ferro Alloys Pvt. Ltd, Byrnihat.	6
Maithan Alloys Ltd, Ribhoi.	15 MVA
Nalari Ferro alloys Pvt Ltd, Norbhog.	11
Khasi alloys Pvt Ltd, EPIP Meghalaya.	4.1
<b>Iron &amp; Steel</b>	
Jai Kamakhya Alloy Pvt Ltd	815 tpd

*Note: Data, not readily available for cement industries on respective websites, is taken from Survey of Cement Industry & Directory, 2016.*