Indian Minerals Yearbook 2022

(Part- I)

61st Edition

STATE REVIEWS
(Bihar)

(ADVANCE RELEASE)

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MINISTRY OF MINES
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BIHAR

Mineral Resources

Bihar is the principal holder of country's pyrite resources and possesses 94% of resources. The important mineral occurrences in Bihar are **coal** in Rajmahal coalfield; **limestone** in Kaimur (Bhabhua), Monghyr & Rohtas districts; **mica** in Nawada district; **quartz/silica sand** in Bhagalpur, Jamui, Monghyr & Nalanda districts; **quartzite** in Lakhisarai, Monghyr & Nalanda districts; and **talc/ soapstone/steatite** in Monghyr district. Besides, occurrences of **bauxite** in Monghyr & Rohtas districts; **china clay** in Bhagalpur & Monghyr districts; **felspar** in Gaya, Jamui & Monghyr districts; **fireclay** in Bhagalpur & Purnea districts; **gold** in Jamui district; **granite** in Bhagalpur, Gaya, Jahanabad & Jamui districts; **iron ore (haematite)** in Bhagalpur district; **iron ore (magnetite)** in Gaya & Jamui districts; **lead-zinc** in Banka & Rohtas districts; and **pyrites** in Rohtas district have been reported (Tables - 1 & 2).

Exploration & Development

GSI carried out exploration for coal, REE, Potash and Iron ore. Details of exploration activities conducted by GSI during 2021-22 are furnished in Table-3.

Production

Limestone is the only major mineral produced in Bihar. The value of minor minerals' production is estimated as ₹ 4,272 crores for the year 2021-22. There was a single reporting mine in Bihar for MCDR mineral which relates to Limestone.

Table – 1 : Reserves/Resources of Coal as on 1.4.2022 : Bihar

(In million tonnes)

Coalfield	Proved	Indicated	Inferred	Total
Total/Rajmahal	310	4080	48	4437

Source: *Coal Directory of India, 2022-23*

Table – 2 : Reserves/Resources of Mineral as on 1.4.2020 : Bihar

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						
Bauxite	'000 tonnes	-	-	-	-	-	-	-	-	-	4114	-	4114	4114
Gold														
Ore	tonne	-	-	-	-	-	-	-	-	-	128884860	94000000	222884860	222884860
Metal	tonne	-	-	-	-	-	-	-	-	-	21.6	16	37.6	37.6
Iron Ore (Haematite)	'000 tonnes	-	-	-	-	-	-	-	-	-	55	-	55	55
Iron Ore (Magnetite)	'000 tonnes	-	-	-	-	-	-	-	-	48850	589	-	49439	49439
Lead-Zinc Ore														
Ore	'000 tonnes	-	-	-	-	-	-	-	-	435	11000	-	11435	11435
Lead metal	'000 tonnes	-	-	-	-	-	-	-	-	-	24	-	24	24
Zinc metal	'000 tonnes	-	-	-	-	-	-	-	-	14.75	24	-	38.75	38.75
Limestone	'000 tonnes	11807	-	-	11807	3388	2558	1675	67926	135740	772343	10558	994188	1005995
Potash	Million tonnes	-	-	-	-	-	-	-	-	-	230	-	230	230
Pyrite	'000 tonnes	-	-	-	-	13462	-	9680	-	51419	1500000	-	1574561	1574561
Rare-Earth Elements	tonne	-	-	-	-	-	-	-	-	-	1459	-	1459	1459

Figures rounded off

Table – 3 : Details of Exploration Activities in Bihar, 2021-22

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq. km)	No. of boreholes	Meterage		
GSI							
Iron Ore							
Jamui	Bhanta block	-	-	-	-	173	Preliminary exploration for magnetite was taken up in Bhanta block to establish the continuity of the already proved ore body of adjoining Majos block with significant resource, which is under consideration of auction by Govt. of Bihar. Situated in the northeastern extremity of the Chhotanagpur Plateau, the block is mostly flat and covered by alluvium of Jamui Formation with no surface exposure of rock/ore body. Seven boreholes were drilled which intersected different types of ore-bearing zones viz. Lateritic soil, BMQ associated with intermittent quartz-mica +amphibole schist and Biotite/amphibole bearing mica schist with thin bands of magnetite. BMQ associated with intermittent layers of quartz-mica +amphibole schist was only intersected in boreholes BJB-01, BJB-06 and BJB-07. In boreholes BJB-02, BJB-04 and BJB-05, Biotite/amphibole bearing mica schist with thin bands of magnetite were intersected. The exploration works in the block established the continuity of the Majos ore band for about 500m. Resource will be estimated after receipt of complete analytical data.
REE and Rare Metals							
Banka	Karada block	1:4000	4	-	224	307	Preliminary exploration for REE/RM was carried out in Karada block by means of detailed mapping of 4 sq. km. area on 1:4,000 scale, 50 cu. m of pitting/trenching, 224 m of auger drilling and surface geochemical sampling viz. 50 BRS, 53 PTS, 10 PCS and 194 auger soil samples. The block exposes two different lithodomains viz. unclassified metamorphics and Chhotanagpur gneissic complex. The Unclassified Metamorphic Group includes granulites, amphibolite and tremolite-actinolite schist which occur in the form of enclaves within the Chhotanagpur gneissic complex. Migmatite gneiss, amphibole bearing gneiss and granite gneiss belong to the Chhotanagpur Gneissic Complex. Quartz and pegmatite veins are exposed as later Intrusive Available analytical results of 104 nos. auger soil samples indicate tREE value ranging from 98 ppm to 1314 ppm, out of which 43 nos. of samples shows tREE value > 500 ppm with an average of 716 ppm. 15 nos. bedrock samples indicate tREE value ranging from 27.66 ppm to 877.5 ppm where 4 nos. of sample yielded tREE value

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Table – 3 (contd)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq. km)	No. of boreholes	Meterage		
	Jogmaran block	1:4000	4	-	179.35	298	> 500 ppm. Preliminary exploration for REE and RM in Jogmaran block was carried out during FS 2021-22 by means of detailed geological mapping (1:4000 scale) of 4 sq. km area, auger drilling of 179.35 m, pitting/trenching of 50 cu. m and 196 auger soil samples, 102 bedrock samples were collected. The block forms part of Chhotanagpur Gneissic Complex and is represented by amphibolite, granite gneiss, intrusives viz. granite, pegmatite and quartz vein. Auger drilling was carried out systematically on 200 m x 200 m grid pattern for sampling of in-situ soil profile developed over various litho-units and drilled upto maximum depth of 2.60 m. B-horizon forms the major part of the soil profile than A and C-horizons. Available analytical results of 99 nos. auger soil samples indicate SREE value ranging from 166.35 ppm to 1325.28 ppm, out of which 21 nos. of samples shows SREE value > 500 ppm with an average of 825.75 ppm. Results of 18 nos. bedrock samples indicate SREE value ranging from 151.23 ppm to 725.07 ppm where only one sample yielded SREE value > 500 ppm.
	Bhairoganj block	1:2000	4	-	-	-	During F.S. 2021-2022 detail mapping on 1:2,000 scale was carried in parts of toposheet no. 72L/10 as the G-3 item of preliminary exploration for REE and rare metals in Bhairoganj Block, Banka district, Bihar along with auger drilling in 200 x 200m grid spacing with collection of auger soil samples, pit/ trench samples, bedrock samples, petrochemical samples, heavy mineral samples and bulk samples with the objective to estimate the resources of REE and RM in soil profile and weathered rock. Geologically, the area is composed of the lithologies of the Chhotanagpur Gneissic Complex (CGC). The SREE values of auger soil samples in the A-horizon varies from 297 to 730 ppm [avg. 451 ppm (n=146)] whereas in the B-horizon the value of SREE varies from 98 to 1116 ppm (avg. 418 ppm (n=146) ppm] respectively. In the C-horizon, the SREE varies from 102 ppm to 1833 ppm (avg. 450 ppm with n=146). The values of SREE in the pits/trenches samples varies from 110 to 1749 ppm (avg. 513 ppm with n=100). The total estimated resource of SREE for unprocessed auger soil samples by extended area method is 3.12 MT with an average grade of 401 ppm at a cut-off grade of 300-500 ppm and 1.17 MT with an average grade of 636 ppm at a cut-off grade of >500 ppm which can be categorised as 333 category as per the UNFC.

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Table – 3 (contd)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq. km)	No. of boreholes	Meterage		
Potash							
Rohtas	Madhukupia-Katudanr block	1:4000	8	-	-	-	Detailed Mapping of 8 sq. km area was carried out (on 1:4000 scale) in Madhukupia-Katudanr block area, the litho units mapped belongs to Semri Group of Vindhyan Supergroup and remaining part of the block is covered by alluvium. The Fawn Limestone Formation is overlain by rocks of Glauconitic Sandstone Formation. Glauconitic Sandstone Formation consists of fine-grained sandstone and shale intercalation at the base, followed by khaki sandstone with characteristic spheroidal weathering, quartz arenite unit, glauconitic sandstone and the upper quartz arenite. In the study area the bedding trend is N70°E-S70°W, with dip ranging from 18° to 50° towards north. A total of 10 vertical boreholes were drilled at 800m X 400m (BRMK-01 to BRMK-10) spacing in the block to assess the glauconite resources of 8 sq. km area by 725m drilling. The glauconitic sandstone was intersected in boreholes BRMK-01, BRMK-02, BRMK-03, BRMK-04, BRMK-05, BRMK-06, BRMK-07, BRMK-08 & BRMK-10 and fine-grained sandstone with occasional intercalation of quartz arenite was intersected in BRMK-09. A total of 50 nos. of bedrock samples from anticipated mineralised horizons, 50 nos. of PTS samples from 50 cu.m. pitting/ trenching were collected. In bedrock samples fine grained sandstone yielded a maximum of 4.35% K_2O, Glauconitic Sandstone a maximum of 3.26% K_2O and green shale (Fawn Limestone Formation) 4.93% K_2O. Pit sample comprising of fine-grained sandstone yielded maximum of 4.91% K_2O.
Coal							
Bhagalpur	Shivnarayanpur area, Northern Extension of Hura Coalfield, Rajmahal Coalfields	-	30	7	-	-	Reconnaissance survey for Gondwana coal exploration under thick Gangetic alluvium in Shivnarayanpur Area, Rajmahal Coalfields, Bhagalpur District, Bihar commenced on 15.05.2021 and had achieved 1644.00 m drilling in seven boreholes (BRRBSA-1 to 7) in FS 2021-22. An area of 30 sq. km. has been covered through Large Scale Mapping.The subsurface data of Shivnarayanpur Area reveals occurrence of Barakar Formation under the cover of younger Dubrajpur Formation and Alluvium in ascending order. In the area of exploration, no outcrop is exposed and the entire area is covered by thick pile of Gangetic Alluvium resting over

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Table – 3 (contd)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq. km)	No. of boreholes	Meterage		
							the uneven surface of Dubrajpur Formation. Alluvium ranges in thickness from 45.70 m (BRRBSA-1) to 112.25 m (BRRBSA-3) and it is represented by yellow to yellowish-brown red silty clay, sandy clay and soil with white to light grey irregular patches. The underlying Dubrajpur Formation consists of mostly arenaceous lithology represented by ferruginous/quartzose sandstone with floating pebbles. It has been intersected in boreholes BRRBSA-1,2, 4 & 5 with thickness ranging from 6.35 m (BRRBSA-4) to 14.10 m (BRRBSA-2). It is further underlined by coal bearing Barakar Formation having thickness ranging between 19.10 m (BRRBSA-3) to 386.10 m (BRRBSA-5) and comprising of sandstone, shale, siltstone, carbonaceous shale and coal. The sandstone unit in this Formation is basically feldspathic, light grey to off-white and the grain size varies from very fine to very coarse-grained. The shale unit is grey to dark grey and at places intercalated with thin carbonaceous bands/ streaks at places. Basement metamorphics represented by granitic gneiss with alternate layers of dark flaky minerals and leucocratic quartzo feldspathic minerals and augen to elongated feldspars. Total cumulative coal thickness encountered in seven boreholes (BRRBSA-1 to 7) is 74.40 m which is varying borehole wise from 0.50 m (BRRBSA-4) to 34.95 m (BRRBSA-5) with the thickest seam section 5.00 m occurs at roof depth of 164.60 m (BRRBSA-2).
	Regalla Sector	1:10,000	10	-	2854.25	-	South-eastern part of the Godavari Valley Coalfield was taken up during Field Season 2021-22. Large-scale mapping of 10 sq. km. area has been carried out in 1:10,000 scale. The mapped area consists of the Upper Kamthi Formation of the Upper Gondwana sediments. The sub-surface data of the boreholes (TBKR-1 to TBKR-3) reveals the occurrence of a thick pile of Upper Gondwana sediments (Upper Kamthi and Middle Kamthi formations), Lower Gondwana sediments (Lower Kamthi Formation, Barren Measures, Barakar Formation and Talchir Formation) and basement Pakhal group of rocks. A total of 2854.25 m drilling was achieved in three boreholes, namely TBKR-1 to TBKR-3. A total of 28.12 m of coal sample was collected from three boreholes. The coal seams were intersected between 503.64 m (TBKR-1) to 898.65 m (TBKR-2) depth, and borehole wise maximum cumulative

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Table – 3 (concld)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq. km)	No. of boreholes	Meterage		
							thickness of coal is intersected in the borehole TBKR-2 (14.65 m). The results of the Overall Proximate Analysis of coal samples of two boreholes (TBKR-1 and TBKR-2) show that both the coal seam zones of the Lower Kamthi (G-13 to G-16 grade) and Barakar (G-8 to G-14 grade) come under power grade quality.

Table – 4 : Mineral Production in Bihar, 2019-20 to 2021-22 (Excluding Atomic Minerals)

(Value in ₹'000)

Mineral	Unit	2019-20			2020-21			2021-22 (P)		
		No. of mines	Quantity	Value	No. of mines	Quantity	Value	No. of mines	Quantity	Value
All Minerals		**1**		**42983377**	**1**		**43021892**	**1**		**43087082**
Limestone	'000t	1	556	263446	1	1000	301961	1	987	367151
Sulphur#	t	-	6843	-	-	7135	-	-	8160	-
Minor Minerals@		-	-	42719931	-	-	42719931	-	-	42719931

Note : *The number of mines excludes Minor minerals.*
 # Recovered as by-product from oil refinery.
@ Figures for earlier years have been repeated as estimates because of non-receipt of data.

Mineral-based Industry

The present status of each mineral-based industry is not readily available. However, the principal mineral-based industries in the Organised Sector in the State with their total installed capacities are furnished in Table - 5.

Table – 5 : Principal Mineral-based Industries

Industry/plant	Capacity ('000 tpy)
Cement	
Eco cement Durgawati Bhabhua	1000
Kalyanpur Cements Ltd, Banjari, Dist. Rohtas.	1000
Kanodia Cement Bhabhua Bangar Cement	1200
Shree Cement Ltd, Jasoia Aurangabad Grinding Unit, Aurangabad.	3600
Shree Cement Ltd, New Bihar Cement plant, Aurangabad	2000
UltraTech Cement plant, Patliputra	1900
Petroleum Refinery	
Indian Oil Corporation, Barauni.	6000

Note: *Data, for fertilizer industries, is taken from Indian Fertilizer Scenario, FAI Statistics,.*