Indian Minerals Yearbook 2022

(Part- I)

61st Edition

STATE REVIEWS
(Jharkhand)

(ADVANCE RELEASE)

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MINISTRY OF MINES
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JHARKHAND

Mineral Resources

Jharkhand is one of the major mineral producing States. It is the sole producer of flint stone in the country and is one of the leading producers of coal, gold, graphite, bauxite, iron ore & limestone. Uranium ore is mined and processed by Uranium Corporation of India Ltd (UCIL) for supply as fuel to the country's nuclear power reactors through six underground mines, one opencast mine, and two processing plants. Jharkhand has the sole resources of emerald mineral. It accounts for about 31% rock phosphate, 23% iron ore (haematite), 30% apatite, 14% andalusite, 20% cobalt ore, 20% copper ore, 9% each granite (dimension stone) & graphite and 5% silver ore resources of the country.

Important minerals that occur in the State are **bauxite** in Dumka, Gumla, Latehar, Lohardaga & Palamu districts; **china clay** in Dumka, Hazaribagh, Lohardaga, East & West Singhbhum, Sahebganj & Ranchi districts; **coal** in Bokaro, Deoghar, Dhanbad, Giridih, Godda, Hazaribagh, Palamau, Pakur & Ranchi districts; **copper** in Hazaribagh & East Singhbhum districts; **dolomite** in Garhwa & Palamu districts; **felspar** in Deoghar, Dhanbad, Dumka, Giridih, Hazaribagh, Jamtara, Koderma, Latehar, Palamu & Ranchi districts; **fireclay** in Dhanbad, Dumka, Giridih, Godda, Hazaribagh, Latehar, Palamu, Ranchi & West Singhbhum districts; **gold** in East Singhbhum district; **graphite** in Palamu district; **iron ore** (haematite) in West Singhbhum district; **iron ore** (magnetite) in Gumla, Hazaribagh, Latehar, Palamu & East Singhbhum districts; **kyanite** in Saraikela-Kharsawan & West Singhbhum districts; **limestone** in Bokaro, Dhanbad, Garhwa, Giridih, Hazaribagh, Palamu, Ranchi, East & West Singhbhum districts; **manganese ore** in East & West Singhbhum districts; **mica** in Giridih and Koderma districts; **ochre** in West Singhbhum district; **dunite/pyroxenite** in East Singhbhum district; **quartz/silica sand** in Deoghar, Dhanbad, Dumka, Giridih, Godda, Hazaribagh, Jamtara, Koderma, Latehar, Palamu, Ranchi, Sahebganj, Saraikela-Kharsawan & West Singhbhum districts; and **quartzite** in East & West Singhbhum districts.

Other minerals that occur in the State are **andalusite** and **rock phosphate** in Palamu district; **apatite, chromite, cobalt, nickel, gold** & **silver** in East Singhbhum district; **asbestos** in East & West Singhbhum districts; **barytes** in Palamu & East Singhbhum districts; **bentonite** in Pakur & Sahebganj districts; **garnet** in Hazaribagh district; **granite** in Deogarh, Dhanbad, Dumka, Giridih, Godda, Gumla, Hazaribagh, Koderma, Lohardaga, Palamu, Ranchi & East Singhbhum districts; **sillimanite** in Hazaribagh district; **talc/steatite/ soapstone** in Giridih, Koderma, Palamu, East & West Singhbhum districts; **pyrophyllite** in Saraikela-Kharaswan district; **titanium minerals** in Ranchi and East Singhbhum districts; and **vermiculite** in Giridih & Hazaribagh districts (Table - 1). The reserve/resources of coal and the various coalfields located in Jharkhand are furnished in Table - 2.

Exploration & Development

The details of exploration activities conducted by GSI for base metals, graphite, vanadium and associated minerals, tungsten, rare earths elements, rare metals, lithium during the year 2021-22 are furnished in Table - 3.

Production

Coal was the principal mineral item for which production was reported in the State. The other important minerals produced are Bauxite, Copper Ore and Concentrate, Iron Ore, Limestone, etc. The value of minor minerals' production was estimated as ₹ 40 crore for the year 2021-22. There were 44 reporting mines in 2021-22 in case of MCDR of minerals (Table – 4).

Mineral-based Industry

The present status of each mineral-based industry is not readily available. However, the principal large and medium-scale mineral-based industries in the organised sector in the State are furnished in Table - 5.

Table – 1 : Reserves/Resources of Minerals as on 1.4.2020: Jharkhand

Mineral	Unit	Reserves				Remaining Resources								Total resources (A+B)
		Proved STD 111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	
			STD121	STD122			STD221	STD222						
Andalusite	'000 tonnes	-	-	-	-	-	-	-	-	-	-	11800	11800	11800
Apatite	tonne	-	-	-	-	-	-	-	2110000	1620000	3540000	-	7270000	7270000
Asbestos	tonne	-	-	-	-	-	3871	18309	2885	5769	124059	-	154893	154893
Bauxite	'000 tonnes	29524	731	9717	39972	25895	7647	14969	25962	63224	70527	41050	249272	289244
Chromite	'000 tonnes	-	-	-	-	-	-	-	15	98	623	-	736	736
Cobalt	Million tonnes	-	-	-	-	-	-	-	-	2	-	7	9	9
Copper														
Ore	'000 tonnes	6150	-	3000	9150	10445	2804	3988	87330	99890	37855	-	242313	251463
Metal	'000 tonnes	72.08	-	35.37	107.45	115.59	29.98	45.9	1002.92	1023.12	454.7	-	2672.21	2779.66
Emerald	Kilogram	-	-	-	-	-	-	-	-	-	-	55869	55869	55869
Garnet	tonne	-	-	-	-	-	-	88303	-	-	21768	-	110071	110071
Gold														
Ore (Primary)	tonne	-	-	-	-	-	-	9206	-	4710966	4579355	767000	10076527	10076527
Metal (Primary)	tonne	-	-	-	-	-	-	0.08	-	2.24	12.49	0.62	15.43	15.43
Graphite	tonne	2091442	-	512637	2604079	1341224	491883	3020107	60607	5167431	6639828	681208	17402288	20006367
Iron Ore (Heamatite)	'000 tonnes	388078	16760	129839	534677	324634	902980	814308	101700	122673	617586	1291588	4175469	4710146
Iron Ore (Magnetite)	'000 tonnes	-	-	-	-	-	518	1986	411	3948	3722	82	10667	10667
Kyanite	tonne	-	331193	-	331193	1017105	920088	523589	-	1754900	3727685	-	7943367	8274560
Limestone	'000 tonnes	6780	3512	395	10687	74071	50565	11535	91922	13220	356962	11803	610078	620765
Manganese Ore	'000 tonnes	132	433	493	1059	1394	1046	5198	-	1395	4658	-	13691	14749
Nickel	Million tonnes	-	-	-	-	-	-	-	-	2	7	-	9	9
Potash	Million tonnes	-	-	-	-	-	-	-	-	-	152	-	152	152

(contd)

Table - 1 (concld)

Mineral	Unit	Reserves				Remaining Resources								Total resources (A+B)
		Proved STD 111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	
			STD121	STD122			STD221	STD222						
Rare-earth Elements	tonne	-	-	-	-	-	-	-	-	-	4	-	4	4
Rock Phosphate	tonne	-	-	-	-	-	-	-	-	-	107370000	-	107370000	107370000
Sillimanite	tonne	-	-	-	-	-	-	-	-	-	83000	-	83000	83000
Silver														
Ore	tonne	-	-	-	-	-	-	-	-	-	23840000	-	23840000	23840000
Metal	tonne	-	-	-	-	-	-	-	-	-	5.22	-	5.22	5.22
Titanium	tonne	-	-	-	-	-	-	-	-	3630000	20635000	2338767	26603767	26603767
Vermiculite	tonne	-	-	-	-	-	-	-	-	-	30048	-	30048	30048

Figures rounded off.

Table – 2 : Reserves/Resources of Coal as on 1.4.2023: Jharkhand

(In million tonnes)

Coalfield	Proved	Indicated	Inferred	Total
Total	**55749**	**26994**	**5095**	**87838**
Raniganj	1594	445	-	2039
Jharia	17735	1798	-	19533
East Bokaro	3977	3553	762	8292
West Bokaro	3923	1279	17	5218
Ramgarh	937	912	58	1906
North Karanpura	11774	6173	1865	19812
South Karanpura	6045	1267	1083	8394
Aurangabad	352	2142	503	2997
Hutar	191	27	32	250
Daltonganj	84	60	-	144
Deogarh	326	74	-	400
Rajmahal	8811	9267	774	18852

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

Table –3 : Details of Exploration Activities in Jharkhand, 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							
Base Metal							
Palamau	Sokra-Chando area	-	-	-	-	-	Hornblende biotite granite gneisses, garnet biotite gneiss, foliated alkali-feldspar granites and its coarse-grained variety were the major rock types found in the area of investigation. Exposures of amphibolite, calcsilicate, and ferrugenous quartzite were found at places in small patches. Small occurrences of Kyanite-magntite schist, dolomite and graphite along with quartz veins were found in the area. Rocks of the area were seen mylonitised at several places inferring there by the presence of shear zone. Garnet biotite gneiss was found to be the most deformed rock overlained by hornblende biotite granite gneiss. Calcsilicate/ Ferrugenous Quartzite/Amphibolite have wavy erosional contact with biotite hornblende granite gneiss. Foliated alkali feldspar granite was seen to have intrusive contact. Kyanite-Magnetite Schist, Dolomite and graphite with quartz veins were seen associated along

(contd)

Table –3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							shear planes and have sheared contact with other rocks. Mineralisation was found in the form of en-echelon hydrothermal veins mostly associated with calc-silicate (magnetite mineralisation) and quartz veins (graphite mineralisation). It is mostly associated with NE shear planes and associated with hydrothermal fluids. Abandoned small magnetites and dolomites quarries are found in the area were exhausted at local level for use in iron industries.
REE, Rare Metals and associated strategic minerals							
Palamu	Sildag-Chhatarpur -Tenpa area	-	-	-	-	-	The study area formed a part of CGGC and its regional trend varied from NE-SW to NW-SE. The major lithounits exposed in the study area were migmatites, biotite granite gneiss (± garnet), granite gneiss, porphyritic granite, pink granite, grey granite, pegmatites, amphibolites, dolerite and ultramafics. Migmatites were well exposed in north-west and south-west part of the study area. The area like Sildag, Rudwa, etc. has well developed exposures of migmatites. In the NW part of the study towards south of Village Liwar, a bouldery outcrop of ultramafics has been mapped. This ultramafic body showed NE-SW trend that laid within the migmatites. Grey granite was exposed near Village Kangalidih. In these granites sulphides were observed which occurred as fracture filling and disseminations. Pegmatite vein of dimension (270 x 25) m was also noted in this lithounit. The area suffered four major phases of deformation. Gneissic foliation represents D2 deformation which varied from NE-SW to NW-SE due to the swerving of S2 planes and that which got preserved mostly in granite gneiss and biotite gneiss. During the present study, no significant mineralisation was observed. However, near Village Manea pyrite and chalcopyrite grains were seen alligned along the gneissic plane of the biotite gneiss. Apart from this molybdenite was also observed in amphibolite near Village Liwar. The analytical result of 52 BRS, 20 PTS, 52 stream sediment samples and 26 panned concentrate samples (contd)

Table –3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							were received. In bedrock samples, maximum concentration of 2,450 ppm of SREE was recorded east of Village Basdihar in migmatites rock. Whereas in panned concentrate sample, maximum value up-to 9,000 ppm is obtained south east of Village Sildag in migmatite terrain.
Hazaribagh	Darudih, Jharpo and Banhe areas	-	-	-	-	-	The area exposed rocks of Unclassified Metamorphics, represented by calc-silicate, calc-amphibolite, gneissose amphibolite and amphibolite; and granite gneiss suites of CGC, represented by granite gneiss, migmatite-gneiss, garnet bearing granite gneiss, hornblende gneiss and quartzo-feldspathic gneiss. These rocks were seen invariably intruded by younger intrusives such as pegmatite, aplite and quartz vein. The area was seen with subdued topography and largely peneplain supporting cultivation. The exposures were limited along the major river sections. From NGCM data and field conditions it appears that the REE/RM mineralisation is of secondary origin and is concentrated within the weathered profile. The orientation sampling carried out at seven locations indicated that the 'B' horizon and -120 mesh fraction were more accommodative for REE concentration than the 'C' horizon. In the most promising site at SW part of the study area, a systematic grid-based colluvial sampling was carried out at 500m interval covering 12 sq. km area. In this part a number of weathered pegmatite bodies were present. The area also accommodated many linear pegmatite bodies along and across the Siwane nadi. The analytical results of 30 BRS samples showed that the tREE values in pegmatite ranged from 40 ppm to 1,124 ppm, in migmatite gneiss from 77 ppm to 999 ppm and rest other showed very low values. The tREE values for 44 colluvial samples ranged from 74 ppm to 1,069 ppm and in stream sediment samples collected from Bhandarbar and Hatwe area in the south it ranged from 1,546 ppm to 1,854 ppm. The REE-bearing mineral phases were identified included xenotime, monazite,

(contd)

Table –3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							zircon and a few apatite. A few REE-bearing mineral phases, such as monazite, zircon, allanite and apatite were observed in thin sections of hornblende gneiss, calc silicate, gneissose amphibolite and migmatite gneiss.
Palamu	Chhotanagpur	-	-	-	-	-	The CGGC within the study area containd various gneissic components, different granitoid components along with mappable units of Unclassified Metamorphics. The younger quartz veins, pegmatite veins etc. intruded into CGGC were documented, and these were formed during different tectono-magmatic events/ experiences by the CGGC during its evolution. The gneissic rock included migmatite gneiss along with gneissose granite, gneissose biotite- granite and gneissose hornblende-biotite-granite. The granitoid rock has various components like granite, granodiorite quartz-syenite. The unclassified metamorphic included the enclaves of calc-silicate and hornblende-schist. Evidences of three phases of deformation were observed in various structural fabrics of the mapped area. For REE mineralisation various intrusive like granite and different generation of pegmatite veins were targeted. The pegmatite veins were differentiated based on presence of mica and magnetite. The magnetite-bearing pegmatites were observed mostly at the north-western part of the study area around Kusumahi and Baghmar villages, were quite thick (maximum up to 50 m) and had length (up to 1.5 km). While the mica-bearing pegmatites were found mostly in the central and southern part of the study area, south of Gobardha and Samda villages which were of relatively smaller dimension. The part analytical results received till date of the BRS and PTS samples collected from these pegmatites and younger granitoid intrusion did not show any encouraging values of total REE (SREE). The maximum SREE value for the BRS sample was up to 438 ppm (in the gneissose granite) and for the PTS samples, the maximum SREE value was up to 584

(contd)

Table –3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							ppm (in the pegmatite vein). In the stream sediment samples only one sample showed SREE value of 1232 ppm. All these values of SREE in the available analytical results of various sample media did not show any anomalous values worthy of any economic significance.
Palamu	Bangasi - Chhotahasa area	-	-	-	-	-	Large-scale mapping revealed that study area is dominated by felsic orthogneisses which contains enclaves of metasedimentary, Felsic granulites, Anorthosite, sillimanite-garnet-schist, mafic rocks and younger intrusive (Pegmatite, syenite and quartz veins). The lithology of the study area has been classified into three major subdivisions viz. (a) Unclassified Metamorphics (b) Chhotanagpur Granite Gneiss Complex and (c) Younger Intrusives; The gneissic component of CGGC encompasses migmatite gneiss, quartzo feldspathic gneiss and hornblende-biotite gneisses. The trend of gneissic foliation of the granitic gneiss varies from WNW-ESE to NE-SW with a moderate to steeply dip towards south. Two different phases of pegmatite unit have been marked based on their disposition and trend pattern. The pegmatite veins were seen mostly occurring as concordant and discordant veins and were sporadically present in the northern part of the study area only. The NE-SW trending Pegmatite-I unit was intruded along S3 foliation. Similarly, the NW-SE trendingPegmatite-II unit was obesrved to be rich in potash feldspar. The concentration of allanite was observed in the central part of unit around Sukri PF. Around Village Paparwaghat magnetite was seen associated with pegmatite unit. Syenite unit was exposed in the southern part of mapped area whereas the northern part was exposed with pegmatite unit. The bedrock samples were concentrated from the younger intrusive only. In the west of Chothasa, an excavated weathered outcrop was exposed where quartz veins and syenite bodies have intruded into the amphibolite unit. The granites were found to be quite variable in character ranging from fine-grained to porphyritic

(contd)

Table –3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							varieties containing feldspar phenocrysts of 1mm to 3cm max. size. The colour of granites varied from greyish to buff white. Two types of granite were observed around Talapara and south of Village Baranw. Mafic intrusive in the form of gabbro/diorite were seen intruded in the gneissic country rock. The study area suffered three phases of deformation. Wall rock alteration in the form of epidotisation, silicification & ferruginisation and kaolinisation was also recorded in the study area. Analytical result of Rb value ranged from 2.85ppm to 1,236ppm. The total REE content in BRS samples ranged from 8.05ppm to 623.90ppm. Analytical results of Rb in pegmatite PTS samples ranged from 6.30ppm to 1,567ppm. The total REE content in PTS samples varied from 6.30ppm to 869ppm.
Lithium							
Koderma	Pihra area	1:12500	100	-	-	340	An area of 100 sq. km was mapped on 1:12,500 scale and collected 100 bedrock samples, 100 pitting and trenching samples, 100 soil samples for chemical analysis were collected and 15 petrographic studies and 25 heavy mineral studies to assess the potentiality of Rare metal and REE in the study area were undertaken. The area of investigation lies in the southernmost part of the Bihar Mica Belt (BMB). Major part of the study area was covered by the Metamorphic of Bihar Mica Belt whereas the rocks of CGGC were exposed in SE and NE part of toposheet. Central and NW parts of the study area were covered by Quaternary alluvium of Pleistocene to Holocene Age. Mica schist, Quartz mica schist and quartzite form the part of Bihar Mica Belt. Pegmatite, quartz veins and granite were the intrusive bodies. The BMB appears to be a nearly E-W trending anticlinorium with several subsidiary folds. The granite was seen mostly intruded into the cores of the larger anticlines and has parental association with pegmatite which they resemble in composition. In the studied area, numerous pegmatites vein with variable dimensions were emplaced along the joints, fractures, foliation, bedding planes, etc. The pegmatites in the study area of Bihar Mica Belt

(contd)

Table –3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							were oriented along N-S to NW-SE and NE-SW to E-W. These pegmatites were emplaced within all the rock types of the area. The pegmatites appeared very coarse-grained with quartz, feldspar (both orthoclase and plagioclase), muscovite as major constituents with minor amount of biotite, garnet and tourmaline at places. These pegmatites also contained beryl, columbite-tantalite and ilmenite, as accessory. Megascopically, a few of these pegmatites were of zoned type where a well-developed quartz core was found in the middle portion of the lens and was seen surrounded by intergrowth zone of admixture of quartz and feldspar (both k-feldspar and plagioclase).
Tungsten							
Giridih	Kakakudar-Gaganpur area	-	-	-	-	-	Geologically, rocks of the Unclassified Metamorphics (represented by biotite schists, quartzites, tremolite-actinolite-talc schists, dolomitic marble, amphibolite/ hornblende schist and very small pockets of granulitic calc-silicate rocks), Chhotanagpur Granite Gneissic Complex (consisting enclaves of older metamorphics in the form of meta-sedimentary and meta-volcanic rocks within gneissic component) and later intrusive of dolerite, pegmatite and quartz veins form the chief litho-units of the area. Old workings (OW) for copper, lead, zinc etc. at Gaganpur, Jhalakdiha, Kakakuddar and Chandio villages (east to west respectively) occurred within the granite and/ or granite with mica-schist Scheelite specks associated with similar rock types (talc-muscovite schist, tremolite-muscovite schist, impure carbonate rock) in Chandio, Kakakuddar OW areas which were observed under UV light. Mineralisation can be correlated to skarn type in the area wherein previous sedimentary units were intruded by late granite fluxes resulting in contact metasomatism and subsequent formation of skarn minerals. The mineralisation can be inferred to be litho-controlled as primary commodity for investigation, tungsten was observed to be associated with talc-tremolite schist with muscovite, tremolite schist in close vicinity of

(contd)

Table –3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							dolomitic marble etc. From the available chemical analytical data significant values of copper (3,934mg/kg), Zn (2,587mg/kg), Mo (294.31ppm) have been observed near Kakakuddar OW. An elevated Pb value of 5,961mg/kg was analysed from Trench-1 close to Kakakuddar OW. Panned stream sediment samples collected close to Kakakuddar OW gave Th value of 1,229.45 ppm. Pb value amounting to 3,752 mg/kg and Ag value of 3.22 ppm have been reported near Chandio OW besides Au value as high as 0.18 ppm from the soil sample which has been further corroborated by value of 0.80 ppm of Au from Trench-5 sample. Au value of 0.43 ppm has been analysed from tremolite schist towards S of Chandio OW. The lab study is in progress.
Graphite, Vanadium and associated minerals							
Palamu and Latehar	Nawadih-Gurha area	-	-	-	-	-	The area can be broadly classified into three subdivisions viz. (i) The Unclassified enclave suite (Unclassified metamorphic) consisting of quartzite, calc-silicates, amphibolite, graphitic quartzite, ultramafite, (ii) granite gneiss, migmatite gneiss and granitoids of CGC and (iii) younger intrusive consisting of pink and grey granite, pegmatite, quartz, and quartzo-feldspathic veins. The dominant foliation plane in the study area was NW-SE. The area had experienced upper amphibolite to granulite facies of metamorphism During the investigation, a total of 15 bands of graphite in form of linear continuous and discontinuous bodies were delineated. The strike length of the band varied from 332m to 1.07km and the width varied from 84m to 375m. The host rocks for graphite mineralisation in the area were granite gneiss, quartzite and granulite. The analytical result of 102 BRS and 100 PTS yielded 13.46% average fixed carbon. About 79 BRS yielded more than 10% FC. So far 61 BRS for vanadium were analysed and showed encouraging concentrations in the range of 73 to 4859 ppm and the average was 782 ppm. Seventeen samples out of 61 yielded more than 1,000 ppm of vanadium which is very close to the present cut- off value.

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Table –3 (concld)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Palamu	Adhmaniya block	-	-	-	-	-	The area exposed rocks of i) Unclassified Metamorphics, ii) Chhotanagpur Gneissic Complex, and iii) acid and basic intrusive that were intruded in different rock types. The host rocks for mineralisation in the area were graphite-bearing sillimanite schist and granite gneiss. The graphite mineralisation was in the form of lenticular bands disposed of in an enchelon pattern. Two graphite schist bands trending in WNW-ESE were delineated. The southern band was 700 m in length with a moderate dip southwesterly. The northern band was bifurcated into two branches having an approximate strike length of 200m and 650m dipping moderately towards the southwest. The ground geophysical survey (SP) of 29 LKM was carried out in this block. Two anomalous zones were delineated on the SP map. Zone-I in the southern part of the block was approx. 700m in strike direction whereas Zone-II was swerving and branched into two parts. Graphite mineralisation was picked up well by SP anomaly. Out of the total 13 boreholes, boreholes JHPA-01, JHPA-02, JHPA-03 and JHPA-04, and JHPA-05 were drilled in the southern band of the area. Proximate analysis of 55 BRS and 63 core samples were received. Fixed carbon up to 25.23 % and vanadium up to 1,359 ppm were obtained from Bedrock samples (n=55). In Borehole JHPA-01, it was weighted average of 9.57%, FC was for 63m sample length with a maximum FC up to 17.28%. In Borehole JHPA-02, it was weighted average of 9% FC for 30m sample length with a maximum FC up to 15.1%. In Borehole JHPA-11, three enriched zones of vanadium were intersected. Zone-I, Zone-II, and Zone-III were with a weighted average of 887ppm (17 m sample length), 833 ppm (27 m sample length) and 660 ppm (17 m sample length) respectively. In Borehole JHPA-02, it was 28m sample length with a weighted average of 906 ppm of vanadium while in Borehole JHPA-13, a zone of 18m sample length with a weighted average of 645ppm was intersected.

Table – 4 : Mineral Production in Jharkhand, 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		**54**		**32278813**	**46**		**30845510**	**44**		**58300177**
Coal	'000t	-	131763	-	-	119295	-	-	130105	-
Natural Gas (ut.) +	m c m	-	5	-	-	2	-	-	4	-
Bauxite	t	20	1418793	1400830	19	1497472	1607332	19	1808725	2334128
Copper Ore	t	-	288477	-	-	41772	-	-	25834	-
Copper Conc.	t	2	7660	604135	2	1208	23707	2	-	-
Gold Ore	t	-	4807	-	-	2859	-	-	3682	-
Gold	kg	1	18	64689	1	11	53310	1	12	56268
Iron Ore	'000t	21	25015	29411760	17	21434	28520399	16	24728	55467888
Manganese Ore	t	2	4785	36126	-	-	-	-	-	-
Graphite (r.o.m.)	t	3	21202	20661	3	5962	6069	1	21	23
Kyanite	t	-	-	-	-	-	-	1	2899	5417
Limestone	'000t	5	785	339164	4	324	233245	4	72	35005
Minor Minerals @		-	-	401448	-	-	401448	-	-	401448

Note: *The number of mines excludes Fuel and Minor minerals.*

$ Excludes the value of Fuel minerals.

+ Coal-bed Methane

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

Table – 5 : Principal Mineral-based Industries

Industry/plant	Capacity ('000 tpy)
Alumina	
Hindalco Industries Ltd, Muri.	450 KTPA
Asbestos Products	
Hyderabad Industries Ltd, Jasidih, Distt. Deogarh.	NA
Cement	
ACC Ltd, Chaibasa, Distt. Singhbhum.	900
ACC Ltd, Sindri, Distt. Dhanbad (G).	2350
Bokaro Cement Plant (formerly JV of Jaypee Cement & SAIL), Bokaro (G).	2100
Lafarge, Jojobera, Distt. Singhbhum.	4600
Burnpur Cement Patratu Ramgarh	300
Ceramic	
Maithan Ceramics Pvt. Ltd, Dhanbad.	80

(contd)

Table - 5 (contd)

Industry/plant	Capacity ('000 tpy)
Chemicals	
Bihar Caustic & Chemicals Ltd, Garhwa Road, Distt. Palamu.	92.75 (caustic soda lye)
Copper Smelter	
HCL, ICC, Ghatsila, Distt. Singhbhum (East).	19 (refined copper) 20.5 (copper smelting) 18.5 (copper cathode) 84 (fabricated wire bar) 54(H_2SO_4), 390 t ($NiSO_4$) 480 kg ($CuSO_4$) 14.6 kg (selenium) 9868 kg (Ag), 698 kg (Au)
Foundry	
Grind chem, Adityapur	15 (Foundry fluxes)
Jharkhand Grid chem Pvt. Ltd, Adityapur, Gamharia	25 (Foundry fluxes)

(contd)

Table - 5 (contd)

Industry/plant	Capacity ('000 tpy)
Iron & Steel	
Bokaro Steel Plant, Bokaro	6900 (sinter) 4585 (pig iron) 4500 (Crude/liquid steel) 35.5 (H_2SO_4) 27.2 (ammonium sulphate)
Tata Steel Ltd, Jamshedpur	6000 (pellets) 8000 (sinter) 10550 (Pig Iron) 13000 (Crude/liquid steel)
Usha Martin Ltd, Jamshedpur.	500 (Sponge iron) 1200 (pellets) 715 (sinter) 1000 (Liquid/ crude Steel)
Pellet	
Orissa Manganese & Minerals Ltd, Kandra, Sarai Kharsawan.	1600 (pellets)
Pig Iron	
Atibir Industries Pvt. Ltd, Bhorandiha, Giridih	600 120 (Sponge iron) 680 (sinter)
Elcctrosteel Steels Ltd, Siyal Jori, Chandan Kiyari	1500
Sponge Iron	
Anindita Steel Ltd, Senegarha Rabodh	120
Ashirwad Steel & Industries Ltd, Gamharia, Jamshedpur.	72
Bihar Sponge Iron Ltd, Chandil, Distt. Saraikela-Kharsawan.	210
Brahmaputra Metallics Limited, Kamta, Gola, Distt. Ramgarh.	105 148.5 (Semi-finished Steel)
Balmukund Sponge & Iron Pvt. Ltd, Majhaladih, Gadisrirampur	63 75 (Crude/liquid steel) 37 ((Pig Iron)
Chintpurni Steel Pvt. Ltd, Indra, Zarba	90 100 (Semi-finished steel)
Jai Durga Iron Pvt. Ltd, (I &II) Jhumari Tellaiya, Distt. Koderma	(36+66) =96

(contd)

Table - 5 (concld)

Industry/plant	Capacity ('000 tpy)
Jai Balaji Industrial Engg. Ltd, Barajamda	120
Rungta Mines Limit Chaliyama Rajnagar	620.4
Saluja Steels & Power Pvt. Ltd, Mahtodih.	60
Satpuria Alloys Pvt. Ltd, Manjhladih	60
Shivam Iron & Steel Co. Ltd, Bandhi, Chandwara	90
Zoom Vallabh Steels Ltd, Dugdha, Distt. Saraikela-Kharsawan.	120
Ferro-alloys	
Astha Ferrotech Pvt. Ltd, Adityapur, Tatanagar	201
Anjaney Ferro Alloys Ltd, Mahijam	12
Bihar Foundary & Ccasting Ltd, Marar	36
Dayal Ferroalloy Ramgarh cantt	10
Gautam Ferro Alloys Ltd,	5.5
Shivam Iron & Steel Co. Ltd, Jambad, Udnabad	37.4 (Si-Mn)
Tin Plates	
The Tin Plate Co. of India Ltd, Jamshedpur.	379
Glass	
IAG Co. Ltd, Bhandainagar.	360 TPD
Refractory	
SAIL Refractory Unit (formerly Bharat Refractories Ltd), Ranchi Road, Ramgarh.	7.5
SAIL Refractory Unit (formerly Bharat Refractories Ltd), IFICO, Ramgarh.	42
SAIL Refractory Unit (formerly Bharat Refractories Ltd), Bhandaridah, Distt. Bokaro.	26
Jharia Firebricks Pottery Works (P) Ltd, Dhansar, Distt. Dhanbad.	20
Mineral Trade Corporation Khaparsai, Chaibasa	6.6
Raj Refractory (P) Ltd, Hardag, Distt. Ranchi.	6

G; Grinding Unit

Note: *Data, for Cement Industries on respective websites, is taken from Survey of Cement Industry & Directory.*