# Indian Minerals Yearbook 2019

## (Part- I)

## 58th Edition

## STATE REVIEWS
## (Uttar Pradesh)

### (ADVANCE RELEASE)

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# UTTAR PRADESH

## Mineral Resources

The State is the principal holder of country's andalusite & diaspore resources and possesses 78% andalusite, 37% diaspore, 17% sillimanite and 10% pyrophyllite. Important minerals occurring in the State are: **coal** in Singrauli coalfields, Sonbhadra district; and **diaspore & pyrophyllite** in Hamirpur, Jhansi, Lalitpur and Mahoba districts. Naini area of Allahabad district has good resources of high quality **silica sand**, an important source of glass sand, that contains 98% $SiO_2$ and a very low $Fe_2O_3$. It is found at Shankargarh and Lohargarh in Allahabad district and also Bargarh in Banda district. Silica sand is also found in Aligarh and Chitrakoot districts.

Other minerals that occur in the State are **andalusite** & **calcite** in Mirzapur district; **bauxite** in Banda, Varanasi & Lalitpur districts; **china clay & dolomite** in Banda and Sonbhadra districts; **felspar** in Jhansi district; **fireclay, limestone, potash & sillimanite** in Sonbhadra district; **ochre** in Banda district; **granite** in Banda, Hamirpur, Lalitpur & Mahoba districts; **iron ore (haematite)** and **rock phosphate** in Lalitpur district (Table -1). The reserves/resources of coal along with details of coalfield are provided in Table-2.

## Exploration & Development

During 2018-19, National Oil Companies (NOC) continued their operations for exploration of oil and gas in the State. GSI also carried out exploration in Sonbhadra & Lalitpur districts. The details of exploration carried out by GSI in the State are furnished in Table-3.

## Production

Coal, limestone and sulphur were the mineral items produced in Uttar Pradesh during 2018-19.

The value of minor minerals' production was estimated at ₹ 5614 crore for the year 2018-19.

The number of reporting mines in Uttar Pradesh was 2 in 2018-19 in case of MCDR minerals. (Table-4)

## 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 furnished in Table - 5.

**Table –2 : Reserves/Resources of Coal as on 1.4.2019 : Uttar Pradesh**

(In million tonnes)

| Coalfield | Proved | Indicated | Inferred | Total |
|---|---|---|---|---|
| **Total**/Singrauli | 884.04 | 177.76 | – | 1061.80 |

***Source:*** *Coal Directory of India, 2018-19.*

## Table – 1 : Reserves/Resources of Minerals as on 1.4.2015: Uttar Pradesh

| 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 | - | - | - | - | - | - | - | - | - | - | 24200 | 24200 | 24200 |
| Bauxite | '000 tonnes | - | - | - | - | - | - | - | 10390 | 500 | 8018 | - | 18908 | 18908 |
| Calcite# | tonne | - | - | - | - | - | - | - | - | - | 11000 | - | 11000 | 11000 |
| China clay# | '000 tonnes | - | - | - | - | - | - | - | 11600 | 3447 | 10018 | - | 25065 | 25065 |
| Diaspore# | tonne | 861653 | 543478 | 940945 | 2346076 | 18548 | 10662 | 19855 | 545 | - | 234566 | - | 284175 | 2630251 |
| Dolomite# | '000 tonnes | - | - | - | - | - | 12622 | - | 3500 | - | 66230 | - | 82352 | 82352 |
| Felspar# | tonne | - | - | - | - | - | - | - | - | - | 200000 | - | 200000 | 200000 |
| Fireclay# | '000 tonnes | - | - | - | - | - | - | - | - | - | 3221 | - | 3221 | 3221 |
| Granite## (Dimension Stone) | '000 cu. m | - | - | - | - | - | - | - | - | - | 494819 | - | 494819 | 494819 |
| Iron ore (Haematite) | '000 tonnes | - | 20000 | - | 20000 | - | - | - | - | - | 38000 | - | 58000 | 58000 |
| Limestone | '000 tonnes | - | - | 12849 | 12849 | 33360 | 129180 | 38375 | 142763 | 40000 | 31200 | - | 414878 | 427727 |
| Ochre# | tonne | - | - | - | - | - | - | - | 25000 | 35000 | 10000 | - | 70000 | 70000 |
| Potash | million tonnes | - | - | - | - | - | - | - | - | - | 198 | 685 | 883 | 883 |
| Platinum Group of metals | tonne | - | - | - | - | - | - | - | - | 0.01 | - | - | 0.01 | 0.01 |
| Pyrophyllite# | tonne | 3598112 | 770113 | 1233511 | 5601736 | 132189 | 213979 | 213522 | 378450 | 66512 | 1070930 | 43200 | 2118782 | 7720518 |
| Quartz-Silica sand# | '000 tonnes | 445 | 19825 | 15144 | 35413 | 9415 | 30012.83 | 7048.4 | 957.34 | 6290 | 51590 | - | 105314 | 140727 |
| Rock Phosphate | tonne | - | - | - | - | - | 432898 | 3118586 | - | 740000 | 21481960 | - | 25773444 | 25773444 |
| Sillimanite | tonne | - | - | - | - | - | - | - | 2100000 | 9350000 | - | - | 11450000 | 11450000 |

*Figures rounded off.*

*# Declared as Minor Minerals vide Gazette Notification dated 10.02.2015*

*## Minor Mineral before Gazette Notification dated 10.02.2015*

**Table –3 : Details of Exploration Activities in Uttar Pradesh, 2018-19**

| 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** | | | | | | | |
| Mahoba | Bundelkhand Granitoid Complex | 1:12500 | 104.0 | - | - | - | During reconnaissance survey (G4) for sulphide mineralisation in Bundelkhand Granitoid Complex, large scale mapping on 1: 12,500 scale was carried out for 104 sq.km along with geophysical survey (IP, SP, Magnetic) of 51 L Km. The investigation was taken up with an objective to assess the potentiality of base metal mineralisation in the Bundelkhand Granitoid Complex. Specks, disseminations and smears of pyrite, pyrrhotite and chalcopyrite were occasionally observed in quartz reef and medium-grained pink granite. Geophysical surveys viz. IP, SP and Magnetic were conducted south-west of Mahoba in two blocks. Preliminary analysis of IP, Resistivity and Magnetic data does not reveal any prominent geophysical anomaly zones in the area. |
| **REE** | | | | | | | |
| Sonbhadra | Nawatola-Laband area | 1:1000 | 2.0 | - | - | 110 | Preliminary exploration for REE was carried out with an objective to assess potentiality of REE mineralisation in Nawatola-Laband area, Sonbhadra district. An area of 2 sq. km was mapped on 1:1,000 scale (DM) along with pitting-trenching of 50 cu.m. From the analytical results of samples it has been observed that out of 110 samples (channel, pitting/ trenching and soil), 19 samples have yielded REE values greater than 750 ppm and 6 samples showed values greater than 1,000 ppm. Out of 10 soil samples, 5 samples yielded REE value more than 750 ppm and the values were found to vary from 412.77 to 2,729.23 ppm with an average value being 903.56 ppm. Out of 10 pit samples, six samples showed values greater than 750 ppm. REE enrichment was observed in the form of magnetite- bearing |

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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 | | |
| | | | | | | | K-feldspar granite veins intruding into K-feldspar porphyroclast-rich granite gneiss rock. The study will continue. |
| **PGE** | | | | | | | |
| Lalitpur | Madaura area | 1:12500 | 100.0 | - | - | 18 | During reconnaissance survey (G4) for PGE mineralisation in Madaura area, Lalitpur district, an area of 100 sq. km was mapped on 1:12,500 scale. In the mapped area, lateralisation of the ultramafics has been observed in ultramafic bands exposed from Madaura to Markhera. Magnetite, haematite and quartz grains were found to be dispersed on the surface of the outcrops. The analytical results of 18 samples showed Cr values ranging from 2,000 to 2,868 ppm. The maximum values of Mn and Ni are 1,426 ppm and 1,229 ppm, respectively. Pd and Pt values of 20 samples have shown values ranging from less than 5 ppb to 18 ppb and less than 10 ppb to 52 ppb, respectively. |
| **Diamond** | | | | | | | |
| Panna & Chattarpur | Ajaygarh | - | - | - | - | - | Reconnaissance survey for Kimberlite/Lamproite was taken up in Ajaygarh block in parts of Panna and Chattarpur districts, Madhya Pradesh and Banda district of Uttar Pradesh. A pyroxenite body was identified in Bhawanipur of Ajaygarh block intruded in the medium-grained granite of Bundelkhand Granite Complex. A suspected diamond grain of 2 mm size was identified as Kimberlite indicator mineral from the sample collected from village Kauhari. SEM EDX study of the grain confirmed that it is a gem quality diamond without any inclusion. Further, the SEM image of diamond showed that the edges of the diamond were sharp with solid angles with elongated and pyramidal hillocks, etc. indicating its proximal primary source. |

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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 | | |
| Banda | Bariyarpur | - | - | - | - | - | Reconnaissance survey for Kimberlite/ Lamproite was taken up in Bariyarpur block in parts of Panna and Chattarpur districts, Madhya Pradesh and Banda district of Uttar Pradesh. In the Bariyarpur block, both ultramafic and mafic dykes were identified. Kimberlite indicator minerals (KIMs) like pyrope garnets, ilmenites, spinels, phlogopites and micro diamonds were recovered during Heavy Mineral Studies (HMS) of stream sediment samples. Moissanite, a very rare naturally occurring silicon carbide mineral has also been found during HMS which indicates proximal source of diamondiferous kimberlite. This rare mineral was reported for the first time in Panna Diamond Belt. Kimberlitic affinities of pyrope garnets, ilmenites, spinels, phlogopites later were confirmed by EPMA studies. Overall, the presence of positive KIMs was clearly an indication of a proximal primary source rock. During field traverse, suspected altered lamproitic rock was observed in the north-west of River Ken. |
| **Gold** | | | | | | | |
| Sonbhadra | Gulaldih area | - | - | - | 2402.60 | - | The preliminary exploration for gold was carried out to assess the potentiality of gold mineralisation in the central block of Gulaldih area. A total of 2,402.60 m of drilling were completed. Sulphide mineralisation in the form of pyrite, arsenopyrite and pyrrhotites with minor presence of chalcopyrite was confirmed in different boreholes at varying depths. |
| **DGM** | | | | | | | |
| **Barytes** | | | | | | | |
| Lalitpur | Mathara-Dang area | 1:12,500 | 60.00 | - | - | 65 | G4 level exploration comprising digging of 6 pits of dimension 2 m x 2 m x 2.5 m and excavation of 2 trenches of dimension 7 m x 1 m x 1.5 m and 5 m x 1 m x 1.5 m was |

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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 | | |
| | | | | | | | carried out. The strike length of 7.00 km was covered to explore barytes in the area. Minor barytes occurrences in the form of veins were encountered at 1.3 m depth in Shahariyapura. Base metals sulphides were observed in dolorite and granodiorite with gold value varying from 0.17 ppm to 0.31 ppm. |
| **Gold** | | | | | | | |
| Sonbhadra | Hardi area | 1:2000 | 0.5 | - | - | - | DGM has continued exploration work in Hardi area (western block), Sonbhadra district with an objective to search for gold deposit in Hardi area. Detailed investigation of eastern block showed a gold deposit extending over a strike length of 1.2 km with average width and depth of 15.5 m and 18 m, respectively. The average grade of the ore was found to be 0.30 ppm. The exploration in Hardi area (western block ) comprised geological mapping of 0.5 sqkm area on 1:2,000 scale, excavation of 120 cu. m through 6 trenches of dimension 120 m x 1 m x 1m, and collection of 83 geochemical samples for chemical analysis. |
| Lalitpur | Bewar | 1:2000 | 1.5 | 01 | 63.43 | 274 | In Berwar area, Latitpur district also search for placer gold was continued by geological mapping of 1.5 sqkm area on 1:2,000 scale. About 91 cu. m of material were excavated in three trenches. One borehole was drilled up to a depth of 63.43 m and 274 samples were collected for analysis. An average grade of 0.16 g/t Au was recorded based on chemical analysis received so far. |
| **Iron Ore** | | | | | | | |
| Lalitpur | Solda-uudana area | 1:12500 | 60.0 | - | - | 433 | G4 level exploration was continued from previous field session with the objective to explore iron ore deposit in solda-uudana area, Lalitpur district. An area of about 60.00 sqkm was covered under geological traversing and the same |

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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 | | |
| | | | | | | | was mapped on 1:12,500 scale. About 128 cu. m pitting work was done in 8 pits. A total of 433 grid and pit samples were collected for chemical analysis. About 12.00 sqkm area seems to be dominated potentially by iron ore especially haematite, limonite & laterite. |
| **PGE** | | | | | | | |
| Lalitpur | Ikauna area | 1:1000 | 1.12 | 20 | 3497.0 | 9165 | Exploration work started in 2000-01 to estimate resources of PGE in Ikauna area, Lalitpur district was concluded in field session 2018-19. PGE mineralisation was found enriched in the area in altered periditite, talc-actonolite and chlorite schist over a strike length of 2.00 km with depth persistence of 60.00 m. Exploration comprised drilling of 20 boreholes to a cumulative depth of 3,497 m with average depth of 175 m, mapping of 1.12 sq.km area on 1:1,000 scale and excavation of 2,452 cubic meter material through 20 trenches. A total of 9,165 samples were collected and 2,377 samples were analysed. The PGE values were found from 0.03 ppm to 4.85 ppm. Two samples were sent to IBM for beneficiation study. PGE resources of Indicated Category has been estimated at about 8.37 million tonnes with an average grade of 0.40 ppm PGE. |
| **MECL** | | | | | | | |
| **Andalusite** | | | | | | | |
| Garhwa & Sonbhadra | Nagar-Untari and adjoining areas | 1:12500 | 100.00 | - | - | 35 | The content of andalusite in the rock showed variations from 5.38% to 22.78% by weight. The total possible resources estimated by isochore method per 1 m and 5 m depth was about 11.80 million tonnes and 58.99 million tonnes, respectively. |

## Table – 4: Mineral Production in Uttar Pradesh, 2016-17 to 2018-19 (Excluding Atomic Minerals)

(Value in ₹ '000)

| Mineral | Unit | 2016-17 | | | 2017-18 | | | 2018-19 (P) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | No. of mines | Qty | Value$ | No. of mines | Qty | Value | No. of mines | Qty | Value$ |
| **All Minerals** | | **2** | | **56655753** | **2** | | **56914337** | **2** | | **56824691** |
| Coal | '000t | - | 16056 | - | - | 18309 | - | - | 20275 | - |
| Limestone | '000t | 2 | 2656 | 515192 | 2 | 2399 | 773776 | 2 | 2622 | 684130 |
| Sulphur# | t | - | 46618 | - | - | 47691 | - | - | 51738 | - |
| Minor Minerals @ | | - | - | 56140561 | - | - | 56140561 | - | - | 56140561 |

***Note:*** *The number of mines excludes minor minerals.*
*$ Excludes the value of Fuel minerals.*
*# Recovered as by-product from oil refinery.*
*@ 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) |
|---|---|
| **Abrasives** | |
| John Oakey and Mohan Ltd, Ghaziabad | NA |
| Micro Lapping Abrasive, Near Munni Devi Temple, Seohra, Dhampur | 0.08 (Abrasive powder) |
| **Aluminium** | |
| Hindalco Industries Ltd, Renukoot | 700 (alumina) 345 (aluminium) |
| **Asbestos Product** | |
| Asbestos Cement Ltd, Raibareli | NA |
| Uttar Pradesh Asbestos Product Ltd, Mohanlalganj, Lucknow | NA |
| **Cement** | |
| ACC Ltd, Tikaria, Distt Sultanpur (G) | 3000 |
| Ambuja Cement, Dadri, Gautam Budh Nagar (G) | 1800 |
| Raebareli Cement Works, Birla Corporation (G) | 1300 |
| Heidelberg Cement (Diamond Cement), Madora Jhansi (G) | 2700 |
| Jaypee Cement, Sadvakhurd (Blending Unit) | 600 |
| Kanodia Cement, Bulandsahar | 330 |
| Shree Cement, Sikandarabad (G), Bulandsahar | 2000 |
| The KCP Ltd., Dalla Cement Factory, Dalla Distt Sonebhadra | 500 |
| Jaypee Cement, Chunar Cement Factory, Chunar, Distt Mirzapur (G) | 2500 |

(Contd)

Table - 5 (Contd)

| Industry/plant | Capacity ('000 tpy) |
|---|---|
| Jaypee Cement, Tanda, Ayodhya, Distt Faizabad (G) | 1000 |
| Jaypee Cement, Churk Mirzapur (G) | 1500 |
| Birla Corp. Ltd.( Erstwhile Reliance Cement,) Kundanganj, Distt Raebareli | 2000 |
| UltraTech Cement, Dadri (G) | 1300 |
| UltraTech Cement, Aligarh (G) | 1300 |
| UltraTech Cement Ltd. Ayodhya, Ambekar Nagar | 1000 |
| UltraTech Cement Ltd. Bara , Allahabad | 4000 |
| UltraTech Cement Ltd. Dallakolta, Robertsonganj | 500 |
| Mangalam Cement, Aligarh (G) | 750 |
| **Electrode** | |
| Ankit Sangal, Sujroo, Muzaffernagar | 0.85(electrode no 10) 0.15(electrode no 8) |
| **Fertilizer** | |
| Asian Fertilizers Ltd, Deokahia, Gorakhpur | 66 (SSP) |
| Coromandel International Ltd (Formerly Liberty Phosphate Ltd), Raebareli | 132 (SSP) |
| Jubilant Agri and Consumer Products Ltd (Formerly Vam Organic Chemicsls Ltd), Bhartiagram, Gajraula | 165 (SSP) |
| IFFCO, Phulpur (Unit I & II), Distt Allahabad | 1697.8 (Urea) |
| IFFCO, Aonla (Unit I & II) | 1999.8 (Urea) |
| Indo Gulf Fertilizer Ltd (a unit of Aditya Birla Nuva Ltd), Jagdishpur | 1105.5 (Urea) |
| Kanpur Fertilizer & Cement, (formerly Duncan India Ltd), Kanpur | 722 (Urea) |

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Table - 5 (Contd)

| Industry/plant | Capacity ('000 tpy) |
|---|---|
| Khaitan Chemicals & Fertilizers Ltd, Goramachhia, Jhansi. | 132 (SSP)<br>52.8 ($H_2SO_4$) |
| Khaitan Chemicals & Fertilizers Ltd, Malwan, Fatehpur. | 115 (SSP)<br>52.8 ($H_2SO_4$) |
| KRIBHCO Shyam Fertilizer, Piprola Shahajahanpur. | 864.6 (Urea) |
| Madan Madhav Fertilizers & Chems Pvt. Ltd, Fetehgarh. | 24 (SSP) |
| Natraj Organics Ltd, Muzaffarnagar. | 60 (SSP) |
| Tata Chemicals Ltd, Babrala, Distt Badaun. | 1155 (Urea) |
| V. K. Phosphates Ltd, Bartara , Shahjahanpur | 33 (SSP) |
| Natraj Organics Ltd, Muzaffarnagar. | 60 (SSP) |
| Tata Chemicals Ltd, Babrala, Distt Badaun. | 1155 (Urea) |
| V. K. Phosphates Ltd, Bartara , Shahjahanpur | 33 (SSP) |

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Table - 5 (Concld)

| Industry/plant | Capacity ('000 tpy) |
|---|---|
| **Ferroalloys** | |
| Hindustan Ferro Alloys, Hamirpur. | 3.2 |
| The India Thermit Corpn. Ltd, Kanpur. | 0.3 |
| **Iron & Steel** | |
| Malvika Steel Ltd, Jagdishpur. | 511 (pig iron)<br>600 (saleable steel) |
| **Sponge Iron** | |
| RLJ Concast Pvt.Ltd, Baragaon Chunar | 60 |
| S. A.Iron & Alloy Pvt.Ltd.Jeewanthpur, Mughalsarai | 90 |
| **Petroleum Refinery** | |
| IOCL, Mathura. | 8000 |

***(G)**; Grinding Unit*

***Note:** Data, not readily available for fertilizer and cement Industries on respective websites, is taken from Indian Fertilizer Scenario, FAI Statistics, and Survey of Cement Industry & Directory, respectively.*