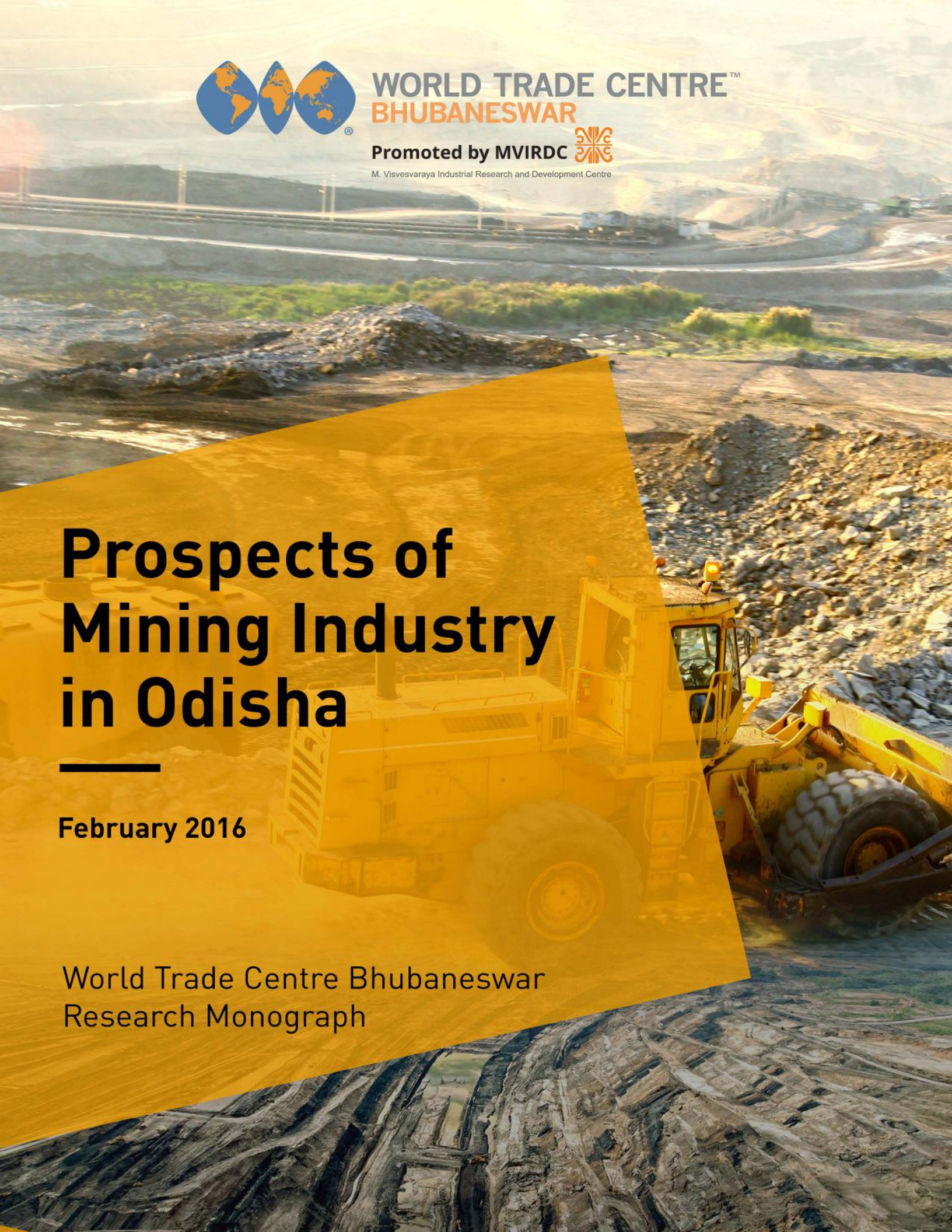

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# Prospects of Mining Industry in Odisha

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World Trade Centre Bhubaneswar
Research Monograph

Prepared in association with

**Mr. Rafiq Kadeer**

**Pune**

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# Prospects of Mining Industry in Odisha

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# Prospects of Mining Industry in Odisha

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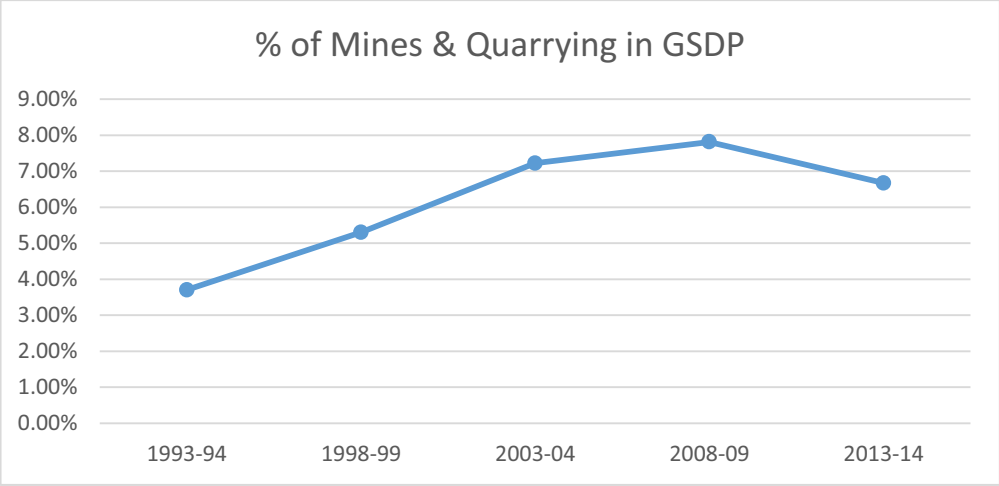
**Prospects of Mining Industry in Odisha**

**An overview**

Mining is one of the core sectors driving growth in an economy and not only does it attribute to the Gross Domestic Product (GDP), but also acts as a catalyst for the growth of other basic industries like power , steel, cement etc. which in turn are critical for overall development of the economy.

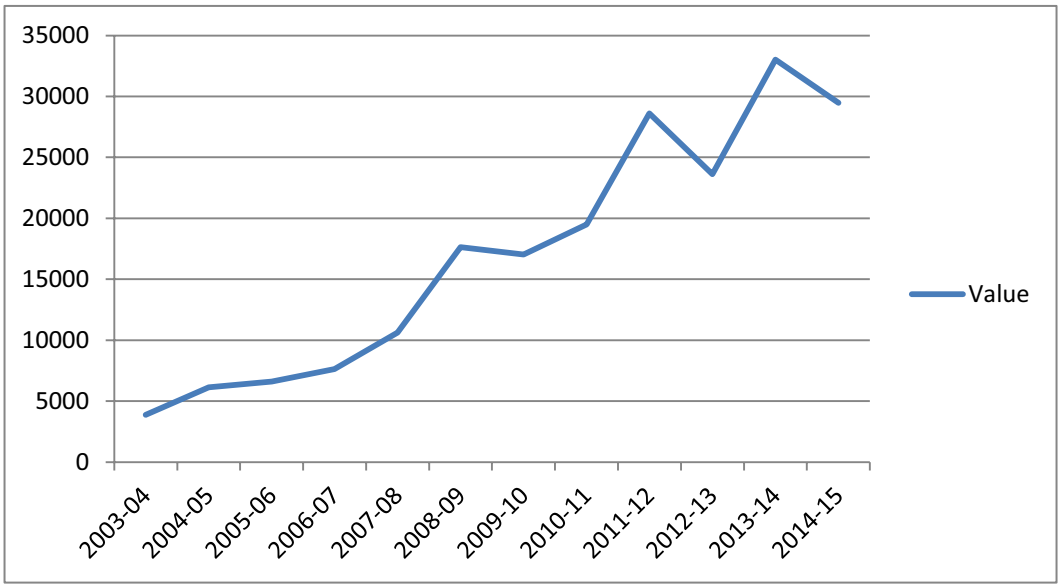
The sectoral analysis of Odisha GSDP at 2004-05 price base shows that the Mining and Quarrying sector of the state witnessed a negative growth of 4.18% during 2011-12 after registering an average growth of more than 11.0% between 2002-03 and 2009-10. The sector however, shows a recovery with an average growth rate of 3.6% between 2012-13 and 2014-15. The contribution of this sector to Odisha's real GDP for a period for last two decades is shown below:

The sectoral analysis of Odisha GSDP at 2004-05 price base shows that after registering an average growth of more than 11.0% between 2002-03 and 2009-10, the Mining and Quarrying sector of the state witnessed a negative growth of 4.18% during 2011-12. The sector however, shows a recovery with an average growth rate of 3.6% between 2012-13 and 2014-15. The contribution of this sector to Odisha's real GDP for a period for last two decades is shown below:

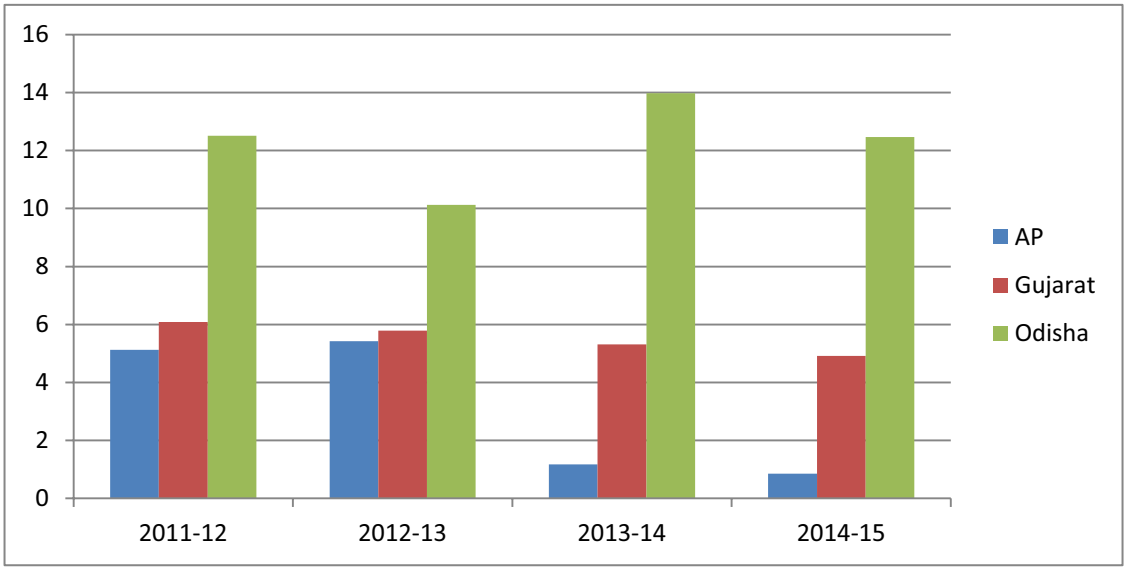



During 2013-14 there were 102 reporting mines in the state. In terms of value of output of minerals, Odisha ranks highest in India in recent years and its share has been increasing.

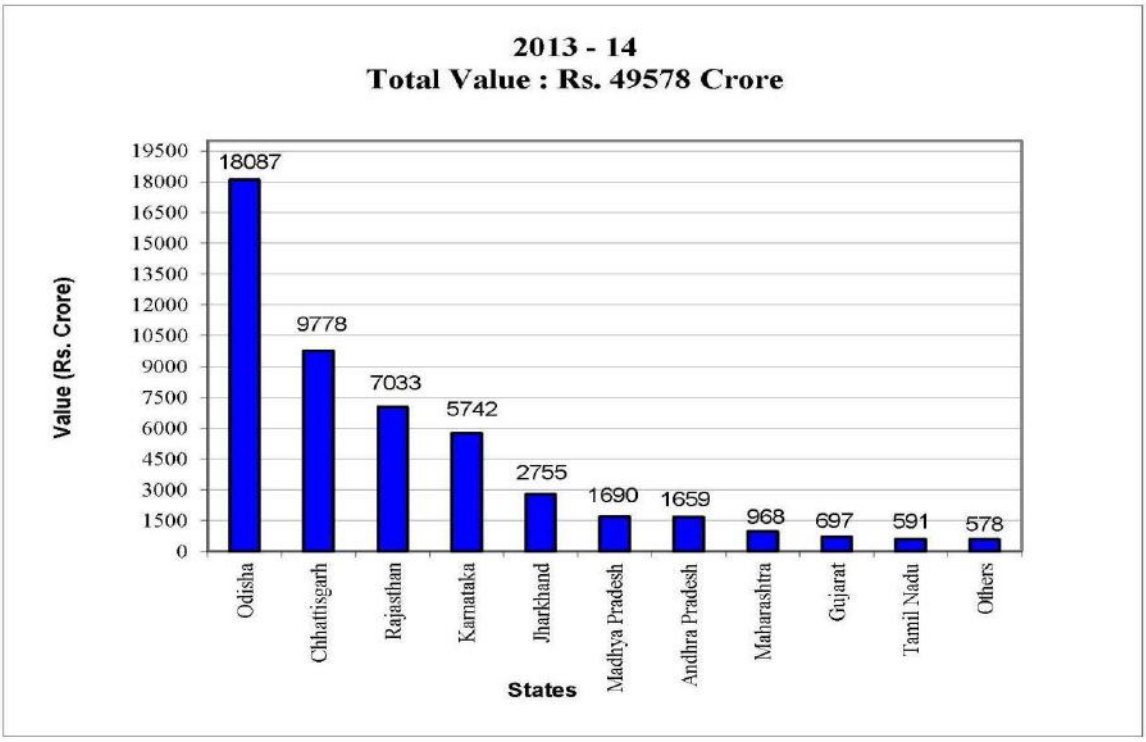
The graph below depicts the growth of Odisha Mining sector in terms of total value of mineral production from 2003-04 to 2014-15




As per the data available for past four years, the percentage share of total value of mineral output in Odisha was much more than the states of western and southern regions as shown below:



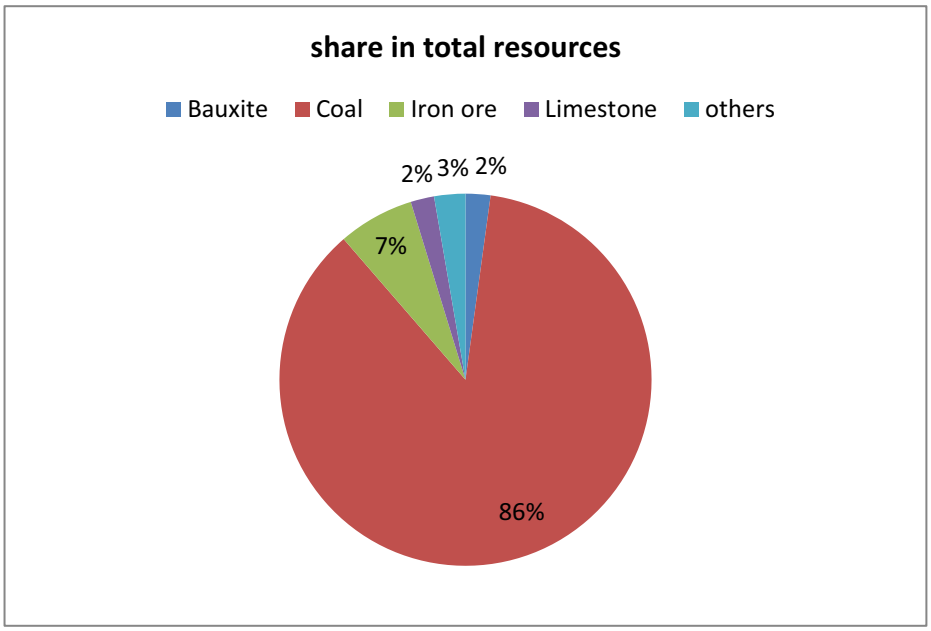

The bar diagram below depicts the contribution of different states in the total value of mineral production in India (excluding Atomic minerals, fuels and minor minerals) during 2013-14.




**MINERAL RESOURCES**

The distribution pattern of different mineral deposits in the state is controlled by the geological environment in which they occur. The mineral belt is spread over in an area more than 6000 sq km. The southern and western districts namely Koraput, Rayagada, Kalahandi, Bolangir, Boudh and Phulbani covering large parts of the granulite belt of Eastern Ghats are large repositories of high-grade bauxite, graphite and manganese ore, besides the wide variety of gemstones, including diamond (recently reported). On the other hand, the Precambrian supracrustals and the Gondwana SuperGroup lying in the northern districts, namely Kendujhar, Mayurbhanj, Sundargarh, Sambalpur, Dhenkanal and Cuttack, contain rich and large deposits of iron ore, chromite, manganese, coal, limestone, dolomite and a host of other minerals.

Odisha occupies a prominent place in the country as a mineral rich state. As per the all India mineral inventory prepared by the Indian Bureau of Mines on 1.4.2013, 95.84 percent of Chromite, 92.40 percent of Nickle, 52.65 percent of Bauxite, 36.49 percent of Manganese, 34.91 percent of Iron ore and 24.89 percent of Coal deposits of India are located in the state. Among the districts, almost one-third of the minerals are confined to Keonjhar district alone whereas this district together with Sundargarh constitutes more than 50 percent of the State's mineral resources. Coal deposits in the state constitute a very important and impressive position within the State, it constitutes the lion's share (87%) of all the mineral deposits, followed by iron ore and bauxite, as may be seen from Figure below:




Mineral resources of the state on the basis of their abundance and importance are described below:

**Bauxite**

**Occurrences:**

Deposits of Bauxite occur in the districts of Balangir, Kalahandi, Kandhamal, Kendujhar, Koraput, Malkangiri, Rayagada and Sundergarh. More than 95% of the bauxite resources of the state come under East Coast Bauxite (Eastern Ghats Mobile Belt) located in Southern and Western parts of the state i.e. Koraput, Raygada, Kalahandi, Bolangir districts. The other deposits, smaller in dimensions are residual products of lateritisation of metavolcanics as in Dholkatapahar (Kuanr) of Keonjhar district and Similipal Complex belonging to Similipal Group, shales of Banded Iron Formations of Nuamundi Group as in Tantra, Kusumdihi of Sundergarh district and shales of Khariar high land Group of Nuapada district equivalent to Vindhyan Group.

A very significant feature of the deposits is their low reactive silica content and consequently easy extractability of alumina by Bayer's process.

**Reserves and resources position**

Odisha alone accounts for 52.6% of country's Bauxite resources. Out of the total bauxite resources in Odisha 516.97 million tonnes (26.3%) are reserves and 1451.61 million tonnes (73.7%) are remaining of resources category.

More than 95% of the Bauxite resources of this state come under East Coast Bauxite (Eastern Ghats Mobile belt) located in Southern and Western parts of states in Koraput, Raygarh,

Kalahandi, and Bolangir Districts. The Koraput district alone holds nearly half of the state bauxite resources. The next in the order of ranking are Kalahandi, Rayagada and Bolangir districts which hold 23.7%, 14.9% and 10% of the states bauxite resources respectively.

The detailed exploration has led to upgradation of resources into reserves category in three districts of the state. Of the total 516.97 million tonnes of reserves, 333.03 million tonnes (64.4%) are in Koraput district, 182.59 million tonnes (35.3%) are in Rayagada district and the rest 1.36 million tonnes (0.3%) are in the Sundergarh district.

The district wise reserves and resources of bauxite in the state are given below:

(in '000' tonnes)

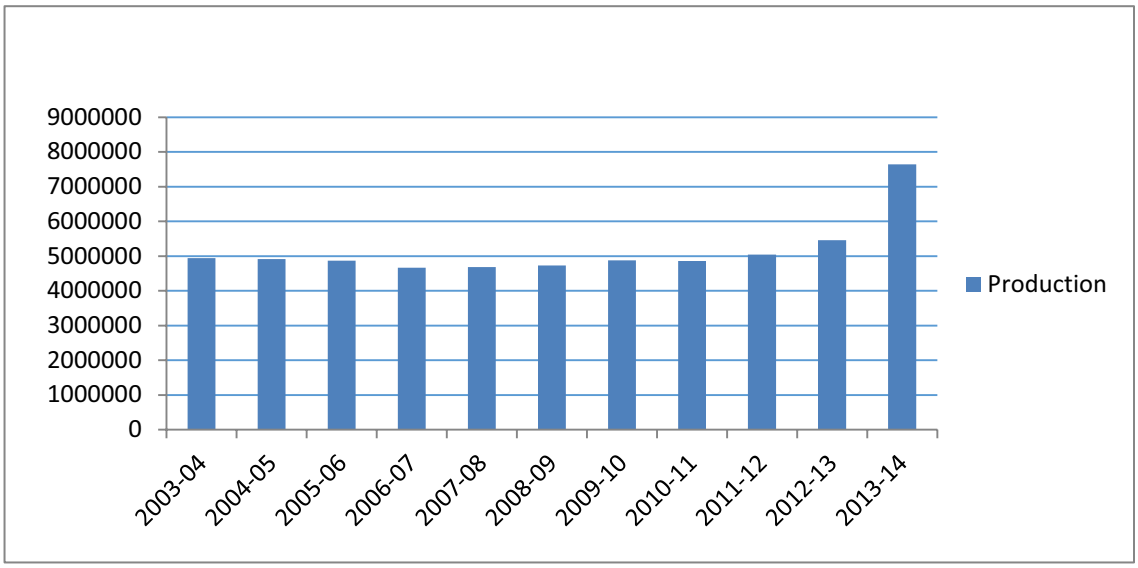
| **District** | **Reserve** | **Remaining resources** | **Total** |
|---|---|---|---|
| Bolangir | 0 | 196224 | 196224 |
| Kalahandi | 0 | 467216 | 467216 |
| Kandhamal | 0 | 40740 | 40740 |
| Keonjhar | 0 | 28166 | 28166 |
| Koraput | 333027 | 562800 | 895827 |
| Malkangiri | 0 | 17000 | 17000 |
| Raygada | 182587 | 110422 | 293009 |
| Sundargarh | 1357 | 29043.00 | 30400 |
| **Total** | **516971** | **1451611** | **1968582** |

The directorate of Geology, Government, of Odisha has recently undertaken bauxite investigations in Rayagada and Kalahandi districts.

**Production**

India is the 5$^{th}$ largest producer of bauxite in the world roughly accounting for 7.3% of the world production. In India, share of Odisha was 35.2% of the all India production during 2013-14.

Production of bauxite in the state increased from 4.94 million tonnes in 2003-04 to 7.64 million tonnes during 2013-14. Production of bauxite which was low during 2010-11, however, has picked up 2011-12 onwards. Exhibit below depicts the year wise production trend for past few years.




During 2013-14, Odisha was the top producer, with 35% of total production in the country. The District wise, grade wise production of Bauxite during 2013-14 is given below:

| **District** | **No of mines** | **Grade** | | | | **Total** |
|---|---|---|---|---|---|---|
| | | **50%-55%** | **45%-50%** | **40%-45%** | **Below 40%** | |
| Koraput | 2 | - | 3307968 | 2985159 | - | 6293127 |
| Rayagada | 1 | - | - | 880239 | 449823 | 1330062 |
| Sundargarh | 1 | - | 12006 | - | - | 12006 |
| **Total** | **4** | **-** | **3319974** | **3865398** | **449823** | **7635195** |

During 2013-14, there were 4 operating bauxite mines in the state out of which 2 mines from Koraput contributed 82.4%, one mine from Rayagada contributed 17.4% and one mine from Sundargarh district contributed 0.2% of the total bauxite production from the state. The total value of bauxite production during this year was R.s 358 crore.

**Exports**

As per the Indian Bureau of Mines, exports of bauxite were mainly to China, Chinese Taipei/ Taiwan, Kuwait and UAE.

**Import**

Imports of Bauxite during 2013-14 were mostly from Guinea and China

**IRON ORE**

**Occurrences**

Odisha has vast reserves of high grade iron-ore with average Fe content of over 60%. Deposits of Iron ore (hematite) occur in the districts of Dhenkanal, Jajpur, Kendujhar, Koraput, Mayurbhanj, Sambalpur & Sundergarh whereas deposits of iron ore (magnetite) occur in the Mayurbhanj district. A large part of the ore minerals consists of haematite with subordinate amount of magnetite and other oxides/ hydrated oxides of iron. Major iron ore resources in Odisha are located in tribal infested forest areas of Keonjhar, Sundargarh, Mayurbhanj, Jajpur and Koraput districts representing five distinct geographic areas as Bonai-Keonjhar, Gandhamardan, Tomka-Daitari, Gorumahisani-Badampahar-Sulaipat and Hirapur.

**Reserves and resources position**

Iron ore resources (hematite + magnetite) in the country as on April 1, 2013 were 7182.735 million tonnes of which 3342.003 million tonnes are reserves and 3840.732 were remaining resources. Odisha accounts for about 35% of all India hematite resources and very negligible percentage of magnetite resources. Out of the total, magnetite resources are 153 thousand tonnes. Out of the total hematite resources of Odisha, 3342.00 million tonnes (46.5%) are reserves and remaining 3840.58 million tonnes (53.5%) are remaining resources.

About 98% of the state Iron Ore resources are confined in two districts viz. Kendujhar (61.5%) and Sundergarh (36.3%). remaining 2.0 % resources are in the districts of Mayurbhanj (1.47%), Koraput (0.04%) and Dhenkanal (0.02%).

The detailed exploration at G1 and G2 level has led to upgradation of resources into reserves category in three districts of the states. Of the total 3342 million tonnes of proved reserves, 2312.60 million tonnes (69.2%) are in the Keonjhar district, 994.91 million tonnes (29.8%) in Sundargarh district and 34.5 million tonnes (1.0%) in the Mayurbhanj district.

The district wise reserves and resources of Hematite and Magnetite of the state are given in table:

**Hematite**

(in '000 tonnes)

| **District** | **Reserves** | **Remaining resources** | **Total** |
|---|---|---|---|
| Dhenkanal | 0 | 1120 | 1120 |
| Jajpur | 0 | 3510 | 3510 |
| Keonjhar | 2312598 | 2100987 | 4413585 |

| | | | |
|---|---|---|---|
| Koraput | 0 | 2650 | 2650 |
| Mayurbhanj | 34493 | 70991 | 105484 |
| Sambalpur | 0 | 50000 | 50000 |
| Sundargarh | 994911 | 1611322 | 2606233 |
| **Total** | **3342003** | **3840579** | **7182582** |

**Magnetite**

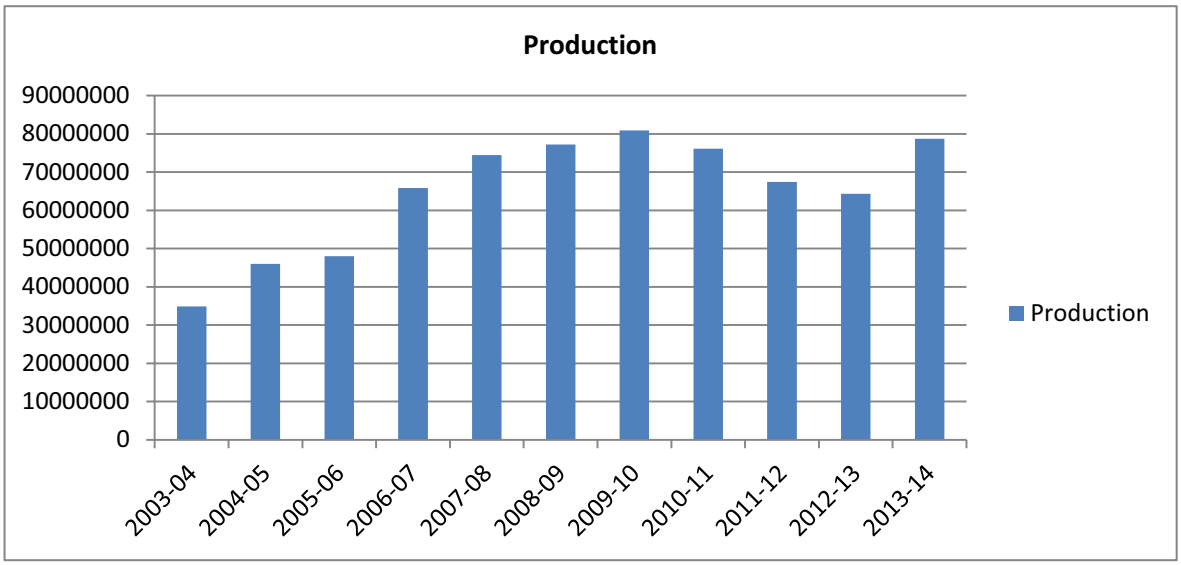
(in '000 tonnes)

| **District** | **Reserves** | **Remaining resources** | **Total** |
|---|---|---|---|
| Keonjhar | 0 | 43 | 43 |
| Mayurbhanj | 0 | 110 | 110 |
| **Total** | **0** | **153** | **153** |

**Production**

During 2013-14 Odisha was the top iron producing state in India accounting for about half of total iron ore production in the country.

Production of Iron ore in the state has increased from 34.89 million tonnes in 2003-04 to 78.77 million tonnes during 2013-14. The rise in Iron ore production which was consistent till the year 2009-10, however, declined during next four years due to cap in production level imposed by the Supreme Court of India. Due to relaxation in cap the production has again picked up 2013-14 onwards. Of the total production, 40.7% was lumps, 59.3% was fines, a negligible quantity of concentrates. Values of iron ore produced during 2013-14 stood at Rs. 14887 crore. The trend of iron ore production in the state during last 11 years is depicted below:




Within the total ore production, the share of 'lumps' has been declining while that of of 'fines' has been increasing over the years. The share of concentrate is of minuscule in total iron ore production. More than 90% of production from the state is of high grade having 60% and above Fe content, which constitute 47.3% of lumps and 52.7% of fines.

During 2013-14, Odisha was the top producer of iron ore with 50% of total production. The District wise, grade wise production during 2013-14 is given below:

(In tones)

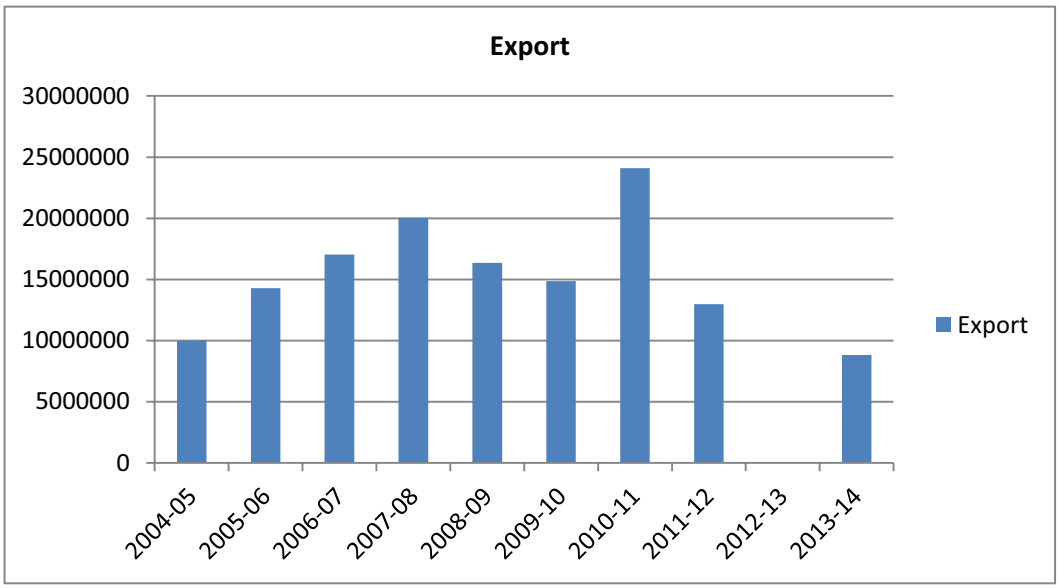
| **District** | **No of mines** | **Grade** | | | | | | | **Total** |
|---|---|---|---|---|---|---|---|---|---|
| | | **Below 55%** | **55% -58%** | **58%-60%** | **60%-62%** | **62%-65%** | **65% and above** | **concentrate** | |
| Keonjhar | 44 | 2955 | 1998 | 2032 | 3864 | 30335 | 14207 | 66 | 55457 |
| Mayurbhanj | 3 | 107 | 655 | 226 | 66 | 61 | 61 | - | 1176 |
| Sundergarh | 24 | 312 | 961 | 1383 | 6027 | 8704 | 2207 | - | 19594 |
| **Total** | **71** | **3374** | **3614** | **3641** | **9957** | **39100** | **16475** | **66** | **76227** |

During 2013-14, there were 71 iron ore producing mines in state, out of which 44 mines from the Keonjhar district contributed 72.8 %, 3 mines from Mayurbhanj district contributed 1.5% and 24 mines from Sundargada district contributed 25.7% of the total production. The amount of fines at 59.3% was more than lumps which was 40.7 % of the total production. More than 86

% of the ore produced was of high grade having Fe content of 60% and above. The total value of iron ore production during this year was Rs 14887 crore.

**Export**

Although Odisha has been exporting iron ore for long, there has been quantum jump in exports from the year 2004-05 onwards. Exports reached to its peak at 24.10 million tonnes in 2010-11. However there has been remarkable downfall in exports during last three years. The trend iron ore exports for past ten years is shown below:




Source: Directorate of Steel & Mines, Odisha; Economic Survey 2013-14,Odisha

As per the Indian Bureau of Mines, the Indian iron ore is exported mainly to China, Japan, Korea and Oman.

**Imports**

As per the Indian Bureau of Mines, imports of iron ore during 2013-14 were from the countries like Russia, Bahrain, Australia, South Africa, Senegal, Finland & Mali and Ukraine etc.

**CHROMITE**

The entire demand for chromite (99%) is from the ferro-alloys/charge chrome industry. Chromite is also consumed in refractory industry in small quantities.

Major share (98.6%) of chromite resources in the country is located in Odisha. Most of its deposits contain high-grade metallurgical type of chromites.

The important chromite deposits are confined to following three areas:

(a) Boula-Nuasahi in Keonjhar district. The chromite deposits occur at and around Bidyadharpur barrage, Nuasahi and Agarpara.

(b) Sukinda in Jajpur district. The main deposits of Chromite and Nickel of Sukinda are present in the area Kamardah, Saruabil, Kaliapani, Kathpal, Maruabil, Bhimtangar etc.

(c) Bhalukasuni in Balasore district. The main deposits of this area are Bhalukasuni village of Nilgiri Sub-division.

(d) In Similipal ultramafic complex of Mayurbhanj District.

Sukinda ultramafic complex in Jajpur district contributes nearly 95% of total chromite reserves of the country.

**Reserves and Resources**

Chromite resources in the country as on April 2013 were of the order of 321.75 million tonnes, of which more than 95 % are located in the Odisha. Out of the total resources in the state, 106.40 million tonnes or 34.5% are of reserves category and rest 201.99 million tonnes or 65.5% are remaining resources category. Chromite deposits of Sukinda and Nausahi ultramafic belt constitute 95% of country's chromite resources. Within the four districts in which resource assessment has been made such as Balasore, Dhenkanal, Jaipur and Keonjhar, the Jaipur districts holds more than 90% of the resources. The district wise reserves and resources of chromite are given below:

('000' tonnes)

| **District** | **Reserves** | **Remaining resources** | **Total** |
|---|---|---|---|
| Balasore | 0 | 3 | 3 |
| Dhenkanal | 802 | 1724 | 2526 |
| Jajpur | 100236 | 183541 | 283777 |
| Keonjhar | 5359 | 16717 | 22075 |
| **Total** | **106397** | **201985** | **308381** |

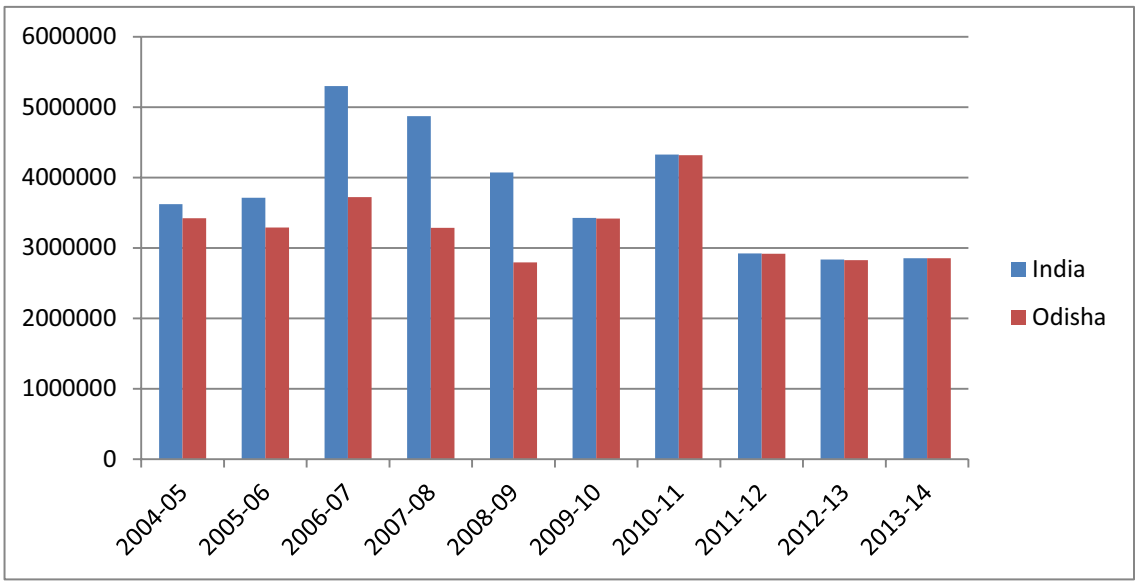
**Production**

India is the 7$^{th}$ largest producer of chromite in the world roughly accounting for 8.6% of the world production. During 2013-14, Odisha accounted for 99.96 % of the total all India chromite production.

Out of the 25 reporting chromite mines in the country, 21 were located in Odisha out of which 15 were in Jajpur, 4 in Keonjhar and 2 in Dhenkanal districts.

Mining of chromite in the state is dominated by six principal producers viz. TATA Steel, Odisha Mining Corporation (OMC), Indian Metals Ferro Alloys Ltd. (IMFAL), Ferro Alloys Corporation (FACOR), Balesore Alloys Ltd. and Jindal Stainless Steel Ltd. The share of these six companies in the total production was 95%. The three major public sector companies namely OMC, NML, and IDCOL, having 4 mines together reported 24% of the production. The remaining 76% was contributed by Private sector mines. In the private sector, TATA Steel, IMFAL and FACOR having their own plants and 6 operating mines produced 61% of the total production.

Production of Chromite in the state has declined from a level of 3.42 million tonnes in 2004-05 to 2.85 million tonnes in 2013-14, however it has remained leading producer in the country. The trend of chromite production in India and Odisha is given below:




During 2013-14 also, Odisha was the top producer, accounting for almost the entire production in the country. At present mining operations for chromite are restricted only in the Sukinda ultramafic belt and in the Baula Nausahi chromite belt in Odisha.

The District wise, grade wise production during 2013-14 is given below:

( In tonne)

| District | No of mines | Grade | | | Concentrate | Total |
|---|---|---|---|---|---|---|
| | | Below 40% | 40% - 52% | 52% and above | | |
| Jajpur | 15 | 591971 | 850595 | 630212 | 693425 | 2766203 |
| Keonjhar | 4 | 23578 | 62051 | - | - | 85629 |
| Total | 19 | 615549 | 912646 | 630212 | 693425 | 2851832 |

During 2013-14, there were 19 chromite ore producing mines in state, out of which 15 mines from the Jajpur district contributed 97% and 4 mines from Keonjhar district contributed 3% of the total production. More than half of the production was of high grade having $Cr_2O_3$ content of 40% and above. The amount of fines at 66.7 % was more than lumps which was only 9 %. The mines of the Jajpur district also produced chrome concentrates which was 24.3% of the total production. The total value of chromite ore production during this year was Rs. 2317 crore.

**Exports**

Export of chromite has dwindled 2006-07 onwards. The trend of exports for past ten years is shown below:


Exports of chromite decreased marginally to 195 thousand tonnes in 2013-14 from 196 thousand tonnes in the previous year. Out of total chromite exported in 2013-14, the share of about 18% was of chromite concentrate, while chromite lumps and other chrome ores together accounted for 82%. Exports were mainly to China (90%) and Japan (9%).

In 2013-14, 73 tonnes of chromium & alloys (scrap) were also exported. Exports were mainly to Italy (41%) and Peru (21%). Exports of chrome ore increased considerably to 35 thousand tonnes in 2013-14 from 23 thousand tonnes in the previous year.

**Imports**

Imports of 261 thousand tonnes during 2013-14 were mainly from Oman, South Africa and UAE.

## MANGANESE

Manganese ore is anther indispensible raw material in steel making where it is used in the form of ferro-manganese and also as a direct feed to the blast furnace.

The manganese deposits of Odisha, restricted to four distinct geographic belts: (i) the Bonai-Kendujhar Belt in Sundargarh and Keonjhar districts (ii) Kuttinga-Nishikal-Ambadola-Patna belt in Koraput, Kalahandi and Bolangir districts (iii) Ghoriajhor belt (Gangpur Group) in Sundargarh district and (iv) Bamra subdivision of Sambalpur district.

**Reserves and resources position**

Odisha accounts for 36.5 % of country's manganese resource. Out of the total 213.14 million tonnes resources reported from 7 districts, 34.39 million tonnes (16.1%) are reserves and 178.76 million tonnes (83.9%) are remaining resources.

The district wise reserves and resources position of Mangnese in the state as on 1st April, 2013 is given below:

(in '000' tonnes)

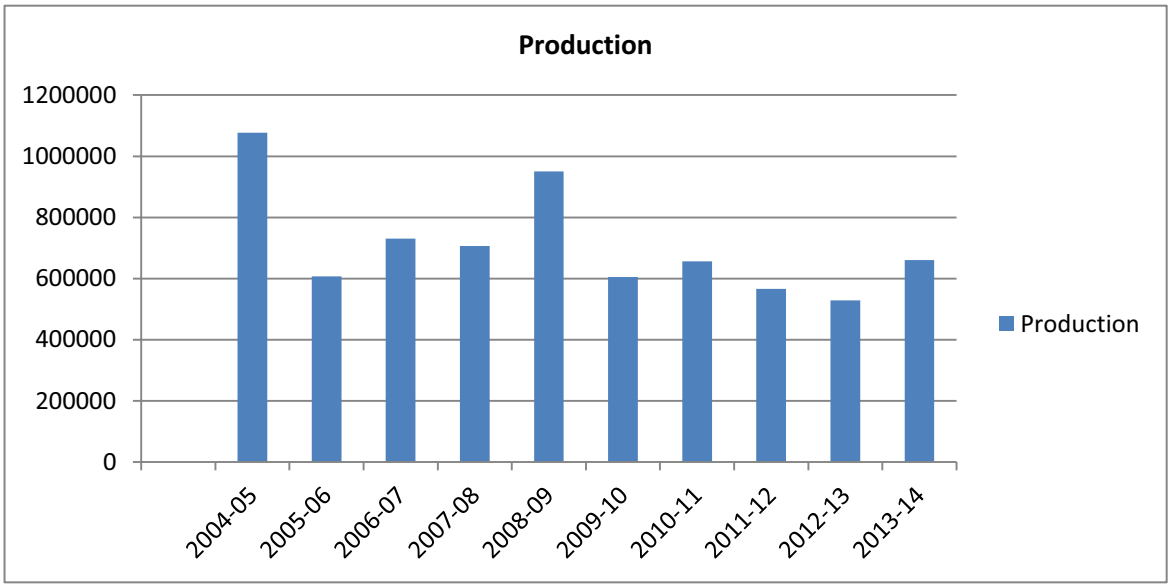
| **District** | **Reserves** | **Remaining resources** | **Total** |
|---|---|---|---|
| Bolangir | 0 | 2094 | 2094 |
| Keonjhar | 10286 | 130021 | 140307 |
| Koraput | 0 | 1248 | 1248 |
| Mayurbhanj | 0 | 57 | 57 |
| Raygada | 0 | 318 | 318 |
| Sambalpur | 0 | 120 | 120 |
| Sundargarh | 24100 | 44898 | 68998 |
| **Total** | **34386** | **178756** | **213142** |

Keonjhar with 140.3 million tonnes and Sundargarh with 69.00 milllion tonnes together hold about 98% of Odisha's manganese resources. 34.9% of Sundergarh and 7.3% of the Keonujhar resources have been upgraded to reserve category as per UNFC system.

The grade of the ore is variable from deposit to deposit as also from body to body within the same deposit. High grade (above 45%Mn) and medium grade (35 to 44.99% Mn) ore constitute roughly 20% of the total reserve, although about 60% of the total reserve is of marketable grade.

**Production**

The state of Odisha produces about 25% of Manganese Ore in India. The trend of production during last 10 years is shown below:




During 2013-14, Odisha was third largest producer of Manganese in the country having a share of 25.5% in the total production.

The District wise, grade wise production during 2013-14 is given below:

| District | No of | Grade (Mn Content) | Total |
|---|---|---|---|

| | mines | MnO2 | above 46% | 35% - 46% | 25% - 35% | below 25% | |
|---|---|---|---|---|---|---|---|
| Kendujhar | 17 | 32069 | 57424 | 112916 | 242743 | 22715 | 467867 |
| Sundergarh | 17 | 3151 | 1013 | 27762 | 122540 | 38105 | 192571 |
| **Total** | **34** | **35220** | **58437** | **140678** | **365283** | **60820** | **660438** |

During 2013-14, there were 34 manganese ore producing mines in state, out of which 17 mines from Kendujhar district contributed 70.8 % and 17 mines from Keonjhar district contributed 29.2 % of the total production. The total value of manganese ore production during this year was Rs. 327.9 crore.

**Export**

The state has been exporting limited quantity of Manganese Ore intermittently. As per date of the Department of Mines, Government of Odisha and Odisha Economic Survey 2013-14, the export of manganese is shown below:

(in tonnes)

| Year | Quantity |
|---|---|
| 1999-2000 | 29119 |
| 2000-01 | 33953 |
| 2001-02 | 23589 |
| 2002-03 | 0 |
| 2003-04 | 20624 |
| 2010-11 | 3000 |
| 2011-12 | - |
| 2012-13 | - |
| 2013-14 | - |

Exports of Manganese were mainly to China.

**LIMESTONE AND DOLOMITE**

Limestone is the primary constituent for the manufacture of cement. Odisha is endowed with vast resources of limestone confined to three distinct geological settings viz. Gangpur Group, Chattishgarh Super Group and Eastern Ghats Super Group of rocks besides minor occurrences associated with Iron ore Supergroup rocks in Kendujhar district.

The important limestone and dolomite deposits of Odisha are as follows:

Sundergarh district*:* The major deposits are located at Biramitrapur, Hatibari, Purnapani in the northern limbs; Lanjiberna, Gomardiha, Khatkurbahal, Kutra in the Southern limb and Dublabera in the core of the synclinorium.

Koraput district: A total of 42 occurrences have been delineated in the district.

Malkangiri district: Good quality limestone is found near Kattameta and Nandiveda. The limestone is of blast furnace grade and cement grade.

Nawarangpur district*:* Limestone and dolomite occur at Gupteswar-Binsuli area.

**Reserves and resources position**

Odisha has 1783 million tonnes of limestone resources which are about 1% of resources in the country. Out of the total, 873.93 million tonnes i.e. 49% are reserves and 51% are remaining resources.

District wise reserves and remaining resources as on per 1.04.2010 inventory are given below:

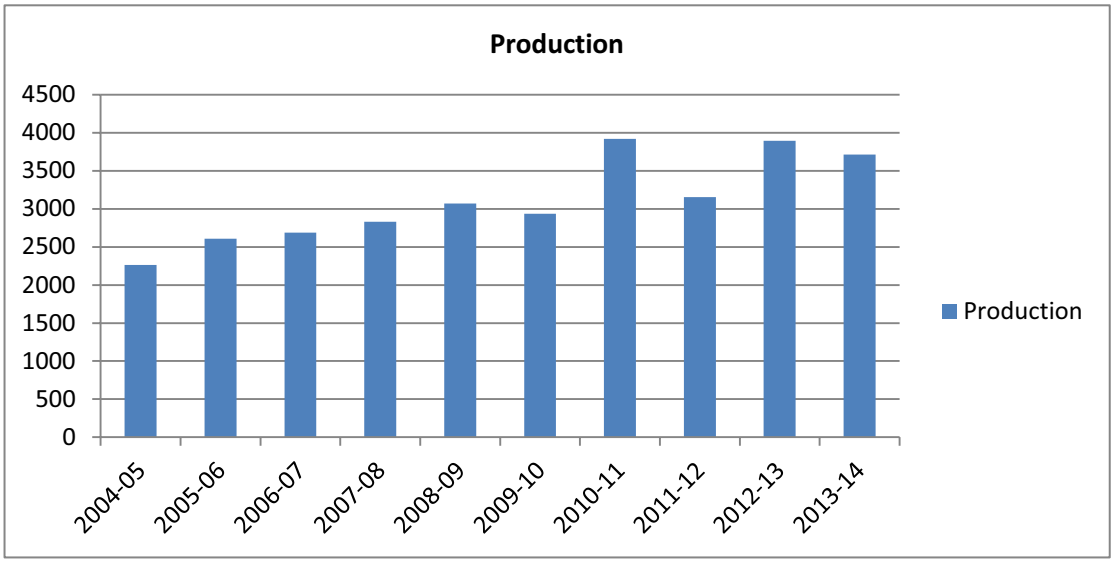
(in '000' tonnes)

| **District** | **Reserves** | **Remaining resources** | **Total** |
|---|---|---|---|
| Bargarh | 56,141 | 14,333 | 70,474 |
| Koraput | 85,718 | 220,324 | 306,042 |
| Malkangiri | 190,145 | 240,000 | 430,145 |
| Nawapara | 1,453 | 9,792 | 11,245 |
| Sambalpur | 0 | 37,660 | 37,660 |
| Sundargarh | 540,476 | 386,946 | 927,422 |
| **Total** | **873,933** | **909,055** | **1,782,988** |

Of the six districts, Sundargarh holds more than half of the resources. Remaining 40% of the resources are located in the district of Malkangiri and Koraput. About 84% of reserves are within Sundargarh and and Malakangiri district.

**Production**

Production of limestone was in the range of 3 to 4 million tonnes from 2008-09 to 2013-14. The trend of limestone production during past 10 years is shown below:




The District wise, grade wise production during 2013-14 is given below:

| District | No of mines | Grade | | | | Total |
|---|---|---|---|---|---|---|
| | | Cement | Iron & Steel | Chemical | Others | |
| Bargarh | 1 | 1002 | - | - | - | 1002 |
| Sundergarh | 7 | 2732 | 9 3 | - | - | 2825 |
| **Total** | **8** | **3734** | **9 3** | **-** | **-** | **3827** |

During 2013-14, there were 8 limestone producing mines in state, out of which 7 mines in the Sundergarh district contributed 73.8 % and 1 mine in the Bargarh district contributed 26.2% of the total production. Of the total, 97.6 % was of cement grade and 2.4% was of steel grade limestone. The total value of limestone production during this year was Rs. 141.2 crore.

**COAL**

Talchir and Ib-river coalfields are the major Coalfields in Odisha in which Karharbari and Barakar are the major coal bearing formations. Location and extent wise details of major coal fields of Odisha are shown below:

| **Name of the Coalfield** | **Basinal area. (sq.km.)** | **Districts** |
|---|---|---|
| Talchir | 1813 | Dhenkanal, Angul, Sambalpur |
| Ib River | 1460 | Sambalpur,Jharsuguda,Sundargarh |

**Reserves and resources position**

Out of 47 Gondwana and 14 Territory coalfield accounted for the national inventory of coal, Odisha has only two coal fields, yet its share in the reserves so far established in the country stands at 24.7%. The distribution of coal resources in the state is given below:

(in billion tonnes)

| **Coalfield** | **Resources (billion tonnes)** | **District** |
|---|---|---|
| Talcher | 51.37 | Anugul, Dhenkanal |
| IB | 24.23 | Sambhalpur,Jharsugada |
| **Total** | **75.60** | |

The entire coal of the state is of non-coking type grade.

The depth wise coal resources in the two coalfields as on 01.04.2014 are given below:

(in million tonnes)

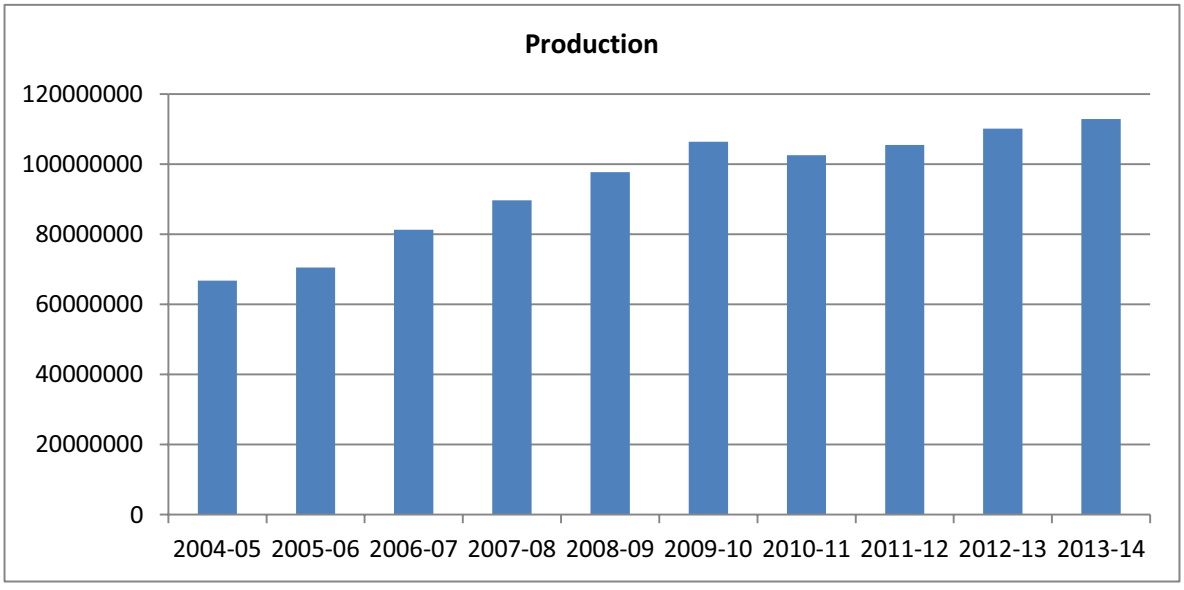
| **Coal field** | **Depth (meters)** | **Proved** | **Indicated** | **Inferred** | **Total** |
|---|---|---|---|---|---|
| **IB river** | 0.300 | 8748.69 | 5653.29 | 549.56 | 14951.54 |
| | 300-600 | 385.83 | 4242.74 | 4587.74 | 9216.54 |
| | 600-1200 | 0.00 | 27.52 | 2.69 | 30.21 |
| | Total | 9134.52 | 9923.55 | 5139.92 | 24197.99 |

| | | | | | |
|---|---|---|---|---|---|
| **Talchar** | 0-300 | 17373.78 | 12294.40 | 2719.90 | 32388.08 |
| | 300-600 | 1283.00 | 14074.47 | 1081.93 | 16439.40 |
| | 600-1200 | 0.000 | 1580.82 | 466.33 | 2047.15 |
| | Total | 18656.78 | 27949.69 | 4268.16 | 50874.63 |
| | 0-300 | 1668.83 | 2794918317.21 | 5669.60 | 25655.64 |
| | 600-1200 | 0.00 | 1608.34 | 469.02 | 2077.36 |
| | **Total** | **27791.30** | **37873.24** | **9408.08** | **75072.62** |

About 63% of the resources in Odisha are within a depth range of 0-3000, out of which 68% are in the Talchar coalfield. As a result of detailed exploration more than half of the resources have been upgraded to proved category in both the coalfields. Grade of the coal in both the fields vary from A to G, however, coal of better quality ranging from grade A to G is in the Talchar coalfield.

**Production**

The trend of coal production during past ten years is shown below:




During 2013-14, with production of 112.92 million tonnes, Odisha was the third largest producer of coal in India. Of the total, over 98% of production is reported from 17 opencast mines. The 10 underground mines produced negligible quantity of coal. The value of coal production during 2013-14 was Rs. 15016 crore. The grade wise production of coal during 2013-14 is given below:

(In 000 Tonnes)

| **Grade** | **Quantity** |
|---|---|
| G1 | - |
| G2 | - |
| G3 | - |
| G4 | - |
| G5 | 101 |
| G6 | - |
| G7 | 3 2 |
| G8 | 162 |
| G9 | 1186 |
| G10 | 1101 |
| G11 | 9997 |
| G12 | 42581 |
| G13 | 57106 |
| G14 | 651 |
| G15 | - |
| G16 | - |
| G17 | - |
| UNG | - |
| **ALL GRADES** | **112917** |

## VANADIFEROUS MAGNETITE

Deposits of vanadiferous magnetite in north Odisha are distributed in five belts viz. (I) Bisoi-Rairangpur (ii) Bisoi-Jasipur (iii) Baripada-Udala in Mayurbhanj district and (iv) Nuasahi-Baula and (v) Rangmatia-Betai in Keonjhar and Balasore districts.

### Reserves and resources portion

The resources of vanadium ore in Odisha constitute about 20% of the all India total. As of 01.04.2013, the resources stood at 4.86 million tones, all of which are still under resource category.

The district wise resources of ore as well as contained V2O5 are given below:

(in tonnes)

| **District** | | **Resources** | **Remaining** | **Total** |
|---|---|---|---|---|
| Balesore | Ore | 0 | 73920 | 73920 |
| | Metal | 0 | 4790875 | 4790875 |
| Mayurbhanj | Ore | 0 | 236.54 | 236.54 |
| | Metal | 0 | 13321.4 | 1332.4 |
| **Total** | **Ore** | **0** | **4864795** | **4864795** |
| | **Metal** | **0** | **13557.94** | **13557.94** |

About 98% of the resources are concentrated in the Mayurbhanj district, the metal content of which has been estimated at 13321 tonnes.

Production of Vanadiferous Magnetite is not reported from the state.

## BASE METAL ORES AND ASSOCIATED STRATEGIC MINERALS/METALS

Odisha is relatively less endowed with basemetal ores. The deposits are associated with the Precambrian schists occurring in parts of north Odisha.

## COPPER ORE

Occurances of the copper ore are reported from following areas of the state:

Mayurbhanj district: Copper mineralization has been located in Kesarpur-Kusumdihi area.

Sambalpur district: Copper mineralization has been located near Adash.

**Reserves and resources position**

Odisha has limited resources of copper ore accounting for only 0.4 % of the all India total as per inventory of 01.04.2013. The 6.051 million tonnes of copper ore falls under resources category as shown below:

(In 000 t)

| **District** | | **Reserves** | **Remaining resources** | **Total** |
|---|---|---|---|---|
| Mayurbhanj | Ore | 0 | 3430 | 3430 |
| | Metal | 0 | 37.98 | 37.98 |
| Sambalpur | Ore | 0 | 2621 | 2621 |
| | Metal | 0 | 25.46 | 25.46 |
| **Total** | **Ore** | **0** | **6051** | **6051** |
| | **Metal** | **0** | **63.44** | **63.44** |

Of the total, 56.7 percent of resources fall in the Mayurbhanj district and remaining 43.3 percent are in the Sambalpur district. In terms of metal content, the remaining resources of copper in these two districts have been estimated at 63.44 thousand tonnes.

**Production**

Production of copper ore is not reported in state.

**LEAD & ZINC**

Occurances of Lead & Zinc ores are reported from following areas of the state:

Sundargarh district: Sargipalli lead deposit located between Lokdega and Bharatpur covering a stretch of 1600 m. Galena with minor chalcopyrite and sphalerite occur near Kiringera , Beligocha and Kanchera.

Mayurbhanj District: Near Pithabata and Beradiha. Patingia, Champagarh, Shanjabani and Nandabani.

Bolangir District: East of Saintala, near Jalerpodar and Bodipara. Galena specks occur in quartz veins over a length of 29km between Ampali and Chormara, between Kansar and Dongarmonda.

Kalahandi District: Specks of galena occur near Baminipada. Occurrences of galena have been reported at Toresinga, Khairamal, Sishakhal and Pipalpadar.

Deogarh District: Galena mineralisation is noticed near Gangajal.

**Reserves and resources position**

As per 01.04.2013 inventory Odisha has only 1.75 million tonnes of lead zinc ore resources accounting for 0.25 percent of the all India resources. These remaining category of resources fall in the Sundargarh district, having metal content of 76.96 thousand tonnes.

**Production**

Production of lead and Zinc ore is not reported in the state.

**STRATEGIC MINERALS AND METALS**

These minerals are extremely important for new and existing technologies related to electronics, ceramics, defence and other critical industries.

**CASSITERITE (TIN ORE)**

Cassiterite is the primary ore of Tin which is used for Soldering, Tin Plate and Chemicals.

Malkangiri District: At Mundaguda, Mohapadar, Vedurpalle, Dumguda and Bajirpador.

Sonepur District: Pegmatite from the confluence of Tel and Mahanadi rivers.

Boudh district: In areas around Ambuda, Manmunda, Bamunda and Karunapalli are potential for tin as well as Nb, Ta and Tungsten (W) mineralization.

Malkangiri District: Small deposit tin ore concentrates from this district has been reported.

**HIGH VALUE PRECIOUS MINERALS / METALS**

**GOLD**

Gold occurrences of Odisha are confined in the northern parts of Odisha adjoining Bihar. Occurrence of alluvial gold has been recorded in almost all the districts of Odisha and panning of the stream sediments in the major rivers has yielded gold.

Angul district: Washing for gold has been reported from Tikiria and Ouli rivers. River gravels near Katni, Dolia and Gundichanali are also washed for gold.

Kendujhar district: Around Kanjipani and Salaikana. Besides, extensive gold panning activity has been reported from Sunajhar and Rangadhi areas. Placer gold has also been reported from Bangir nala NNW of Sonapenth, Gopinathpur and Bamnipal.

Koraput district: Gold has been reported from Dasamantapur and Kollaru areas.

Mayurbhanj district: Gold mineralisation has been suspected around Jashipur, Suriagora, Gohaldongri, Ruansi, Munisahi, Bijatola and Kalimati areas .

Occurrences of gold are found near Kudersai and Sigora at the headwaters of the Borai river. Similar occurrences are also reported in the near vicinity of Ruansi and Gohaldungri.

Sundargarh district: Occurrences of alluvial gold have been reported near Jareikela along Koel and Brahmani rivers and near Raghunathpalli, Sargipalli, Kusumura and Sarbahal on the Ib river.

Sambalpur district*:* Reported occurrences of gold in this district include those from near Tahud, Soramohan, Dantamure and Hirakud.

**PLATINUM**

Presence of platinum has been reported from Sukinda and Nuasahi areas located at the trijunction of Kendujhar, Jajpur and Dhenkanal districts.

Jajpur district: In Sukinda area.

Kendujhar district: At Baula Pt and Pd along with Ni, Cu, Co and Au. The PGE mineralized zone has a length of nearly 1 km with width varying between 2m and 40m. PGE grades between 2 g/t and 8g/t.

Mayurbhanj district: In Simlipal Basin.

**Reserves and resources position**

As per minerals inventory prepared by IBM on 01.04.2013 about 14 million tonnes of remaining resources category of ore belonging to platinum group of metals ore estimated to occur in the district of Keonjhar. No production of this ore is reported from the state.

**NICKEL**

Nickel occurs at following places:

Jajpur district: The known occurrences are divided into four sectors, namely Kansa sector (1.8 sq.km), Kamardah – Saruabil – Sukerangi sector (6.0 sq. km), Kaliapani sector (1.82 sq.km) and TISCO sector (4.30 sqkm). The nickel deposits of Sukinda area contain both high and low grade ores.

Mayurbhanj district: In Simlipal area, two large patches of prospective ore zones, viz. Gurguria and Nawana blocks together have an area spread of more than 12 sq km. The Bhilapoga sector occupying an area of 7 sq km constitutes a part of the Gurguria block.

Kendujhar district: In Nuasahi Ultramafic Belt.

**Reserves and resources position**

Odisha holds more than 92 percent of the all India nickel resources. As on 01.04.2013, the total remaining resources category stood at 174.63 million tonnes. The district wise resources position of the ore is shown below:

(in million tonnes)

| District | Reserves | Resources | Total |
|---|---|---|---|
| Jaipur | 0 | 139.66 | 139.66 |
| Keonjhar | 0 | 7.97 | 7.97 |
| Mayurbhanj | 0 | 27.00 | 27.00 |
| **Total** | **0** | **174.63** | **174.63** |

80 percent of the resources fall in the Jajpur district.

**Production**

The state is yet to commence the production of nickel ore.

**INDUSTRIAL/NON-METALLIC MINERALS**

**ASBESTOS**

Kalahandi District: Tremolite-asbestos bands have been reported near Sanibahal village in Kalahandi District.

Sundargarh District: In Bonai region asbestos occurs near Rangra.

Mayurbhanj District: Small occurrences of asbestos are found near Balidihi and Jashipur.

**Reserves and resources position**

Odisha has limited asbestos resources of only 56700 tonnes in the Keonjhar district, all of which belong to remaining resources category.

As such production of Asbestos is not reported from the state.

**QUARTZ/QUARTZITE**

The quartz and quartzite occurrences are found in almost all the districts of Odisha excepting the coastal plains.

Sundargarh district: Occurrences of quartz are found near Biramitrapur, Damadapara, Gobira, Charabera, Talsara, Pansuan, Bhalulate, Bijadihi, Soidihi, AthaGhats, Sampapaibat, Ramhri, Nevotoli, Bhadapur, Manjmunda, Lohadar, Danakudar, and Kolijhar.

Bolangir district: A major quartz reef occurs between Saintala and Belgaon. The quartz is of high purity and is mined and sent to ferro-silicon factory at Theruballi in Koraput district A good deposit is also located at SW of Ghagabahl near Turekela.

**QUARTZ/SILICA SAND AND QUARTZITE**

**QUARTZ/SILICA**

The total resources of quartz/silica sand in the state, as per the 01.04.2010 inventory was 73.94 million tonnes out of which 1.85 percent were reserves and 98.15 percent were remaining resources. The district wise resources position is given below:

(in thousands tonnes)

| District | Reserves | Remaining resources | Total |
|---|---|---|---|
| Angul | 0 | 66 | 66 |
| Bargarh | 0 | 252 | 252 |
| Baudh | 0 | 400 | 400 |
| Bolangir | 0 | 1,561 | 1,561 |
| Dhekanal | 0 | 576 | 576 |
| Kalahandi | 402 | 65,961 | 66,363 |
| Keonjhar | 0 | 262 | 262 |
| Mayurbhanj | 0 | 351 | 351 |
| Rayagada | 0 | 326 | 326 |
| Sambalpur | 0 | 306 | 306 |

| | | | |
|---|---|---|---|
| Sonepur | 703 | 2,040 | 2,743 |
| Sundargarh | 262 | 473 | 735 |
| **Total** | **1367** | **72574** | **73941** |

Out of the 12 districts, Kalahandi holds about 90 percent of resources, followed by Sonepur (3.7%). The resources have been upgraded to reserve category in three districts out of which 51.4 percent are in Sonepur district, 29.4 percent in Kalahandi district and 19.2 percent in Sundargarh district.

**QUARTZITE**

The total resources of quartzite as per 01.04.2010 inventory were 60.40 million tonnes out of which 10.87 percent were reserves and 89.13 percent were remaining resources.

The district wise details resource position of the quartzite is given below:

(in thousands tonnes)

| **District** | **Reserves** | **Remaining resources** | **Total** |
|---|---|---|---|
| Angul | 0 | 158 | 158 |
| Bolangir | 0 | 121 | 121 |
| Dhekanal | 0 | 3 | 3 |
| Jaipur | 0 | 2051 | |
| Bargarh | 0 | 252 | 252 |
| Baudh | 0 | 400 | 400 |
| Bolangir | 0 | 1,561 | 1,561 |
| Dhekanal | 0 | 576 | 576 |
| Kalahandi | 402 | 65,961 | 66,363 |
| Keonjhar | 0 | 262 | 262 |
| Mayurbhanj | 0 | 351 | 351 |
| Rayagada | 0 | 326 | 326 |

| | | | |
|---|---|---|---|
| Sambalpur | 0 | 306 | 306 |
| Sonepur | 703 | 2,040 | 2,743 |
| Sundargarh | 262 | 473 | 735 |
| **Total** | **1367** | **72574** | **73941** |

More than 75 percent of the state quartzite resources are in the district of Keonjhar and rest about 24 % is concentrated in the district of Sundargarh, Jharsugada, Mayurbhanj and Jaipur. The resources of the Jharsugada, Keonjhar and Mayurbhanj district have been upgraded to reserve category each representing 50.9%, 30.6 % and 18.5% respectively of the total quartzite reserves of the state.

**Production**

**QUARTZ/ SILICA SAND**

There has been lot of floatation in production of quartz/silica sand. The production of 7.13 million tonnes has been reported from a mine of Mayurbhanj district during 2012-13. The district wise production of quartz/silica sand is shown below:

**QUARTZITE**

The production of quartzite has also been fluctuating over the years. The past two years has shown substantial increase in the production from three mines located in Jharsugada and Mayurbhanj districts.

| **District** | **2003-04** | **2004-05** | **2010-11** | **2011-12** | **2012-13** | **2013-14** |
|---|---|---|---|---|---|---|
| Boudh | 0 | 2.56 (3) | - | - | - | |
| Jharsugada | 9.55 (2) | 27.82 (21) | - | 2.21 (1) | 26.10 (2) | |
| Keonjhar | 1.24 | 0 | - | - | - | |
| Mayurbhanj | 8.54 (3) | 5.28 (3) | - | 2.51 (2) | 0.71 (1) | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sonepur | 0 | 2.12 (1) | - | - | - | |
| Sundargarh | 0.08 (1) | 0.02 (1) | - | - | - | |
| **Total** | **19.41 (7)** | **37.89 (10)** | **4.61** | **4.72 (3)** | **26.82 (3)** | **32.03** |

*Figures in parenthesis indicate number of mines*

**GLASS SAND**

Cuttack district: Gondwana sandstones occurring around Naraj includes some fine-grained varieties of sand suitable for manufacture of glassware.

Dhenkanal district: Kolhan sandstone occurring in the Shialari Pahar and in the hill NE of Kamparkala is suitable for glass making.

Kendujhar district*:* White, granular and friable sandstone suitable for glass manufacture occurs on hill 1432.

Koraput district: A band of pure white quartzite, suitable for glass manufacture occurs near Dalapur.

Mayurbhanj district: A large reserve of glass sand is available from the quartzite occurring around Panijia and east of Souri.

**BEACH SAND MINERALS**

The coastal tracts of Ganjam and Puri districts contain workable concentration of heavy minerals in the beach and dune sands, which include ilmenite, garnet, rutile, sillimanite, zircon and monazite. The heavy mineral concentration varies from 8.6 to 25%, ilmenite constituting about 40% of the total heavies.

**CLAY**

The state is endowed with a number of china clay and fire clay deposits.

**a) CHINA CLAY**

Koraput district: Obuguda, Doliambe, Turia, Baipariguda, Santhopur, Kallaru, Saradaputti, Boipariguda, Sorispadar and Devandera.. Clays derived from kaolinised gneiss are reported

from Misoriguda, Pukkili, Jodiguda, Nabgam, Madhupur, Lafhiponga , Pathibonda and Sirgarajnkonta.

Cuttack district: South-west of Banrapal and Baideswar Hill.

Dhenkanal district: Near Sibalopose.

Sundergarh district: Small irregular deposits of China clay/kaolin are reported from Manjapara, Kaintora, Bhaunra and Dharuadihi. White shale also occurs near Kardega, Baraibera and Bangura. Other occurrences in this district are Sarangoda, east of Siringi, Dwarjam and Satrasda.

Phulbani district: White clay is reported from Karanda and Bahanda. Other minor occurrences of clay include Deogarh, Tuljeri, Tatakandi and Dundurkot.

Kendujhar district: A white clay deposit occurs about 1.6 km to the west of Keonjhar and the Sandi Murra. The Taranipukuri – Amvapara deposit contains three patches of kaolin.

Balasore district: White clay deposit occurs North of Arubandha and North of Gardihi.

Mayurbhanj district*:* Near Karanjia, Joshipur , Chachabari and Baripada

Bolangir district: Near Sargod, Baludongri, Khola, Ghichampra, Sagupali, Ghuhukilikra, Barasinghari and Dangchancha.

b) **FIRE CLAY**

Sundargarh district: Good quality of fire clay is mined at Kiripsora, Gopapali, Kathpali, Khutijharia, Kurutoi, Juraboga, Girsuan, Jamakani etc. A good number of fire clay beds are recorded in and around Tencligad, Siarmai, Balinga, Benkibahal, Forkbahaj, Kiripsora, Garjanbehi, Khuntijheria, Dulunga, Khajurdihi and Jharpal and Girisuan areas.

Cuttack district: Workable deposits are located near Talbasta and Chandiprasad.

Puri district: Fire clay occurs east of Barthajimundia. Similar occurrence of clay is reported from Jaganathprasad and Bharatpur.

Dhenkanal district: Fire clay bodies are reported from Rajharan, Chhindipada, Junagarh , Patrapura, Sibultosi and near Hingirida Ghatsi.

Sambalpur district: Fire clay has been reported from near Jurabaga , Darilpalli and Rampur. Similar clay is also reported from Kuropali, Baripahar, Lukopali and Khindia.

**GEMSTONES**

Following is description of the gemstone occurrences in Odisha.

Kalahandi district: The best quality gems of Odisha have so far been recovered from several important gem tracts lying within this district. The 25 km long Jilingdhar- Hinjilibahal belt is the most important for contributing the best quality ruby.

Orhabahal-Urharanga area is the source area of deep blue dichroic iolite.

Alluvials of Ghatspara-Singjharan areas yield Hessonite garnet and zircon.

Simple pegmatites granites have recorded to yield chrysoberyl and cat's eye in Sirjapali-Tundla areas.

Rhodolite and almandine garnets occur in Banjipadar-Sargiguda sector. Besides, occurrence of blue opaque corundum, enstatite, cat's eye, apatite and aquamarine has also been recorded from these areas.

Bolangir district: Occurrences of emerald, topaz, heliodor and aquamarine are known from Ghuchepara-Antarla sector. Similarly, Chrysoberyl and Cat's eye are recovered from Ghumsar-Dehli belt.

Muribahal-Tentelkhunita sector carry chrysoberyl and orange, brown and yellow zircons. Besides, occurrences of aquamarine, topaz and amethyst have also been recorded from this belt. Sanaibahal- Suklimuri sector carry green beryl, aquamarine, heliodor and amethyst.

Sonepur district: Several important gemstone tracts lie in this district, the important ones being Badmal-Mursundi and Binika- Sonepur. The former extends from Birmaharajpur in the south up to Badmal in the north and beyond spreading over an area of 350 sq.km. Gemstones including garnet, cat's eye, topaz, smoky quartz and diamond are recovered in this area and the gravel beds of Mahanadi River. Excellent quality rhodonite garnets occur at Naktamunda-Siali areas in this district.

Sambalpur district: Aquamarine occurs at Charbati- Beldihi near Rairakhol. Aquamarine, gem quality garnets (rhodolite and almandine), iolite and amethyst occur at Bagdhapa-Tablai. Red opaque corundum, pyrope garnet, iolite, green tourmaline and aquamarine occur at Meghpal-Ranchipada areas, the most important of these being the rare occurrence of alexandrite.

Nuapada district: Transparent to light blue sapphire occurs in Katamal –Babebir-Amera sector. An occurrence of iolite and almandine garnets has also been recorded from Damjhar-Burhpara-Mantritarai lying close to the above sapphire belt.

Rayagada district: Chrysoberyl and cat's eye occur in Paikdakulguda-Hatamuniguda areas. Chrysoberyl is also reported in Karla – Ghatsi - Karanjgurha areas . Occurrence of sillimanite, cat's eye has been recorded in Irukubadi- Tarhama.

Boudh district: Gem quality garnets, chrysoberyl, cat's eye, topaz, zircon, moonstone, agate and diamond are being recovered from the Mahanadi River between Boudh and Ramagarh.

Gravel beds spread over an area of about 45 sq.km along Tel River between Kantamal and Manundo have been reported to yield garnets, topaz, cat's eye, iolite, tourmaline and diamond. In addition, gem quality tourmaline from Bargocha.

Angul district: Good quality garnet (rhodolite) and corundum occur in Magarmuhan-Jhilli-Nuagan belt.

Deogarh district: Occurrences of hessonite and rhodolite have been recorded over a long belt along Budido - Palsma – Jharpost.

Phulbani district: Occurrence of chrysoberyl and cat's eye are reported from Belghar areas. There are also reported occurrences of diamond in the Mahanadi basin.

Although resource potential of gemstone in Odisha is very high, no systematic assessment has been attempted yet in order to arrive at a reliable reserve estimate.

**GRAPHITE**

Natural graphite is mostly consumed for refractories, batteries, steelmaking, brake linings, foundry facings and lubricants.

The graphite occurrences in state are geographically distributed in six belts, viz, Sargipalli, Titlagarh, Tumudibandh, Nishikal, Muniguda and Dhandatapa belts covering an area of about 15,500 sq.km.

1. *Sargipalli Belt:* The belt is 65 km long and 25 km wide covering parts of Baragarh and Bolangir districts. A majority of the graphite deposits in Sargipalli belt is distributed at Sargipalli– Danga Chancha and Temrimal of Baragarh district and Raju-Nagphena, Baudan, Gangadar R.F. and Banjipali area of Bolangir district. Besides, minor clusters of graphite bodies are also noted at Manbham in Sambalpur, Komna in Nuapada District and Salepali in Bolangir District.

A majority of the graphite producing mines in Bolangir District are located around Turekela at Nagphena, Bendar R.F., Bonaimal, Ganjapadar, Bangipal and Dudukamal.

2 *Titlagarh Belt:* This belt is 55km long and 40km wide covering parts of Bolangir and Kalahandi districts. Graphite occurs at Chandatora, Kansa and Beniabandu, west of Saintala. There are not less than 32 abandoned quarries and pits in the belt, besides there are at least 60 occurrences of graphite where quarrying has not yet been undertaken.

3 *Tumudibandh belt:* This belt covers a major part of Phulbani and parts of Rayagada, Kalahandi and Gajapati districts. Major mining activity is around Tumudibandh and Belghar area of Phulbani district and Muniguda area of Rayagada district. About 50 graphite occurrences have so far been located in this belt, main concentration being at Tumudibandh- Belghar- Muniguda- Jagdalpur, Laxmipur and Gumma areas.

4. *Nishikal – Kinchikhal Belt:* This belt being the southwestern continuation of Tumudibandh belt spreads over an area of 190 sq.km. The graphite occurrences in this belt are associated with manganese. The grade is highly erratic even in the same body.

5. *Muniguda belt:* This 38 km long belt lies in parts of Rayagada and Phulbani districts. The width of this belt varies between 10 km and 25 km. Important localities of graphite occurrence in this belt are Berhsagaon, Durhugi , Karlagi , Katikhole , Jagdalpur , Turukripa , Mandurpalli , Sunmudra , Kalupadar , Talchalinala, Bhalipadmpur, Maniguda, Khariaguda and Saleguda.

6. *Dhandatapa Belt:* This 40 km long and 10 km wide belt lies to north of the Mahanadi river. Graphite occurrences of this belt are distributed in Akharkata, Adeswar, Girida and Kamalpur blocks falling under Athamallick sub-division of Angul district.

In addition to the major graphite occurrences along above six prominent belts, smaller occurrences associated with migmatised khonda-lite are known from Adash area of Deogarh district and Daspalla area of Nayagarh district.

**Reserves and resources**

The Graphite reserves of the state constitute about 10% of the all India graphite resources. Out of the total resources within the state, 2.6% are of reserves category and 97.4 % are the remaining resources.

The district wise Graphite resources of the state are given below:

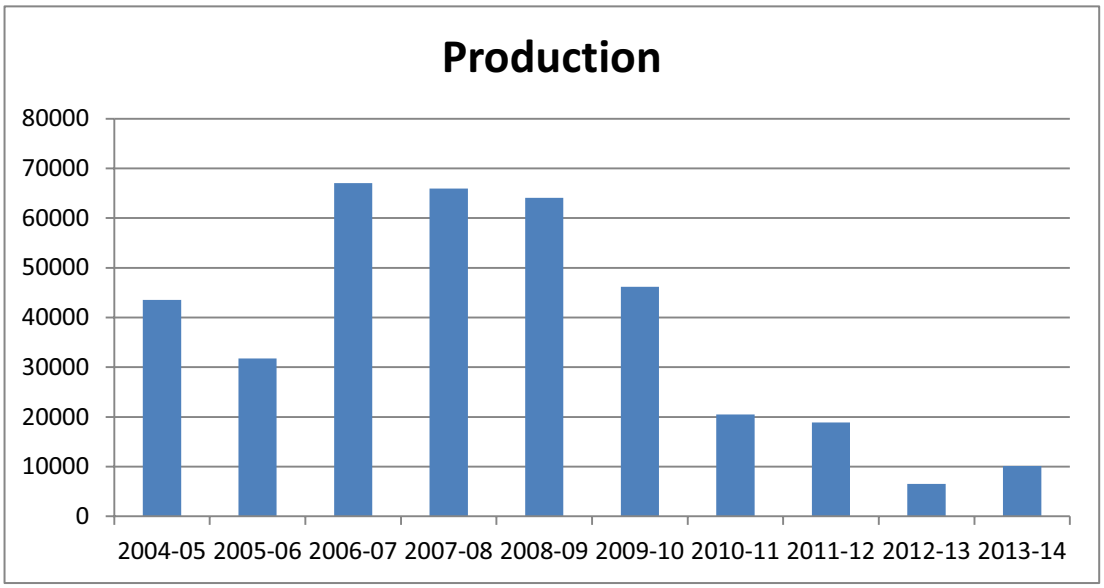
(in tonnes)

| **District** | **Reserves** | **Remaining resources** | **Total** |
|---|---|---|---|
| Bargarh | 6097 | 672684 | 678781 |
| Baudh | 0 | 52000 | 52000 |
| Bolangir | 73946 | 5254678 | 5328624 |
| Kalahandi | 0 | 1034756 | 1034756 |
| Kandhamal | 0 | 780030 | 780030 |
| Koraput | 0 | 227922.85 | 227923 |
| Nawapara | 0 | 555803 | 555803 |
| Raygada | 405404 | 9914099 | 10319503 |
| **Total** | **485447** | **18491973** | **18977420** |

Of the eight districts from where estimates of resources are available, Rayagada holds more than half of the resources. The resources of only three districts have been upgraded to reserve category. The Rayagada, Bolangir, and Bargarh districts constitute 83.5%, 15.2% and 1.3% of the total reserves of the state respectively.

**Production**

Production of graphite has fluctuated over the years. The trend of production for last ten years is shown below:




During 2013-14, Odisha was third largest producer of Graphite in the country. The District wise, grade wise production during 2013-14 is given below:

(tones)

| **District** | **No of mines** | **Production** |
|---|---|---|
| Nuapada | 1 | 3039 |
| Rayagada | 1 | 7100 |
| **Total** | **2** | 10139 |

During 2013-14, there were 2 Graphite ore producing mines in state out of which 1 mine from Rayagada district contributed 70 % and the remaining 30 % was contributed by a mine from the Nuapada district. The total value of Graphite ore production during this year was Rs. 63.08 lakh.

**PYROPHYLLITE**

The compact variety of pyrophyllite is used for slate pencils and tailors chalk. It has many other industry uses when combined with other compounds, such as in insecticide and for making bricks. Pyrophyllite is also widely used in high-pressure experiments, both as a gasket material and as a pressure-transmitting medium.

In Odisha, pyrophyllite occurrences are found only in Keonjhar district. Pyrophyllite occurrences in this district have been recorded in a 90 km long belt extending from Rebna- Palaspal in the south to Remuli- Joda road on the north. The main deposits are at Dhoba Kuchuda, Balabhadrapur, Anjor, Baliadihi, Madrangajodi, Dalimpur, Nitigotha, Buriadihi, Sidhmath, Sarasposi, Ukchabeda, Roduan, Bolianposi, Rampakot and Rebna-Palaspal. Occurrences are also reported near Manada, Joshipur and foothills of Simplipal in Mayurbhanj district and from near Lahunipada in Sundergarh district.

**Reserves and resources position**

Odisha holds about 22% of the all India Pyrophillite resources. As per the Mineral inventory detail of 01.04.2010, the estimates have been made for the Keonjhar district alone. Out of the total resources of 12.29 million tonnes, 4.86 million tonnes are reserves (39.5%) and rest 7.43 million tonnes (60.5%) are resources.

**Production**

As per the Odisha Economic Survey 2014-15, the state produced 9000 tonnes in 2011-12, 7000 tonnes in 2012-13 and 4000 tonnes of Pyrophyllite in 2013-14, As per the information given in the document of the Indian Bureau of Mines, Nagpur, the state did not produce pyrophillite from 2010-11 to 2012-13. The state, however, produced 10066 tonnes of Pyrophyllite in 2013-1 from two mines of the Keonjhar district which was 4.8% of the all India pyrophillite production. Value of pyrophillite production in the state during this year was Rs 49.14 lakh.

**KYANITE**

Angul district: A small deposit of Kyanite is reported from Toradanali area. It is low in alumina and high in iron. Other occurrences are near Magarmuhan, Jhilli, Golagadia and Sikheswar.

Sundergarh district: Kyanite is known to occur near Ghoriajhor, Kumbakerra, Bailama, Chhota-Phiringbahal, Lolabara, near Salijor, near Amkhai and Kodamunda.

Mayurbhanj district: A kyanite-dumortierite deposit occurs at Panijia , near Purnapani and Simlipal.

**MICA**

It is used in paints as a pigment extender, in the electrical industry as thermal insulation, its shiny and glittery appearance makes it ultimate for toothpaste and cosmetics.

Kalahandi district: Occurrences of muscovite mica are reported from Komorjhori, Thalkodebse and Godal.

Koraput district: Occurrences of muscovite mica in pegmatite are reported from near Anartopalla, Garrisapalle, Polleru, Dupinikuda and Erranguta. The mica books vary from 0.5cm to 8 cm in thickness. Muscovite mica is also reported from Tentolikuntia and Pilibasini.

Phulbani district: Occurrences of muscovite mica are reported from near Gopalpur, Dharnakud, Banlsing, Chichanga, Darikupa and Chopura.

Bolangir district: Occurrences of muscovite are reported from around Beramal , Bhurpara , Sikkar Palrapalle , Banjab , Godageda and Garimal .

Sundargarh district: The important occurrences are recorded near Ghoriajon, Tungaumunda, Diamunda, Kadlimunda, Salijarria, Bindujharia and Phatatangar.

**Reserves and resources position**

Odisha holds nearly 20% of the all India Mica resources. The remaining resources of 105.28 million kgs have been estimated in the lone district of Sonepur.

No production of Mica has been reported so far from the state.

**Sillimanite**

Sundargarh district: Sillimanite forms about 3-5% of quartzites and quartz-schists occurring as hills near Kahatua. Besides, it also occurs around Tilsora and Phatsinagar.

Sambalpur district: Sillimanite bearing schists are reported from the hills occurring to the north and southeast of Golabandh. Sillimanite-rich quartz-schist and quartz-sillimanite schists occur near Utunia, Palsoma, north east of Mumorphol and north east of Lugupoda.

**Reserves and resources**

The total resources of Sillimanite in the state as 2010 are reported to be 13.10 million tonnes which are 19.6 % of the all India. Of the total, 12.23 % are resources and 87.77 % are remaining resources. The district wise breakup of resources is given below:

(in million tonnes)

| **District** | **Reserves** | **Remaining resources** | **total** |
|---|---|---|---|
| Ganjan | 1.610 | 10.23 | 11.83 |
| Sambalpur | 0 | 1.23 | 1.23 |
| **Total** | **1.60** | **11.46** | **13.06** |

Silliminate deposits of the Ganjan district have been explored and upgrade to reserve category.

**Production**

Production of Silliminate in the state from a single mine of Ganjan district for last five years is given below:

In tonnes

| Year | Production |
|---|---|
| 2009-10 | 14117 |
| 2010-11 | 17889 |
| 2011-12 | 17489 |
| 2012-13 | 12314 |
| 2013-14 | 11722 |

The total value of Sillimanite production during 2013-14 was Rs. 771.30 lakh.

**SOAPSTONE**

Soapstone, steatite and talc are three terms used in trade for the one and the same mineral. Its occurrences in the state are given below:

Cuttack district: A fairly large deposit of soapstone occurs around Ballgot. The material is being used for making vessels. There are small occurrences near Ambasar, Champajhar and Garhpur.

Kendujhar district: There are several extensive occurrences of talc in the area around Keonjhargarh.

Koraput district: Good quality soapstone occurs at Katpada and Kendupatti. Soapstone deposits also occur at many places in Jeypore and Malkangiri areas.

Mayurbhanj district: Extensive deposits of soapstone occur on the hillock south of Dindarani Parbat. Small deposits are reported from Dublabera, Myrisahi, Kendumundi, Diring, Simlipahar and Nulungi.

Sundergarh district: A fairly large deposit of soapstone occurs near Jharbera and Bhaludungri.

**DIMENSION STONE-GRANITE**

Granite is resistant to weathering and is found in a variety of pleasing colour. It is capable of retaining its polish fresh as in the original form for a long time. It is quite popular for use as tomb stone, paving and architecture material.

Out of 150 varieties of granite known from India, more than 20 varieties of granite are available in the state having more than hundreds of working mines. The commercial varieties include Berhempur Blue, Koraput Blue wave, Titlagarh green, Sawan Rose, Grey Mahogany Grey Magic, Sira Grey, Pottangi Green, Grey/White Porphyry, Yellow Granite, English Teak, White Zebra, Tiger Skin etc.

Since nomenclatures of DSG are based on colour, texture and structural design, many varieties referred could belong to more than one rock type. So the DSG varieties and occurrences are classified as few segments.

*Ganjam-Nayagarh-Khurda-Cuttack-Phulbani-Baudh Segment*: This part of the state belongs primarily to Eastern Ghats constituted mainly by rocks belonging to Eastern Ghat Supergroup in Khurda and Cuttack districts .The varities identified are Berhempur blue, grey granite, Seaweed green, midnight green, pink granite(Oriental Juparna), multi coloured granites, Phulbani pink, rose wood, Cats Eye etc

*Koraput-Rayagada Segment:* This area mostly constitutes of Eastern Ghat Supergroup. The varieties identified are Red Pearl, White Wave, White Porphyry Black granite, Jeypur black and Pottangi Green etc.

*Kalahandi-Bolangir-Nuapada Segment:* The rocks of Bolangir area are identified as the source rocks for DSG. The different varieties found are Pink Granite, Cats Eye, White Porphyry, Sea weed green, Midnight green Tiger skin etc.

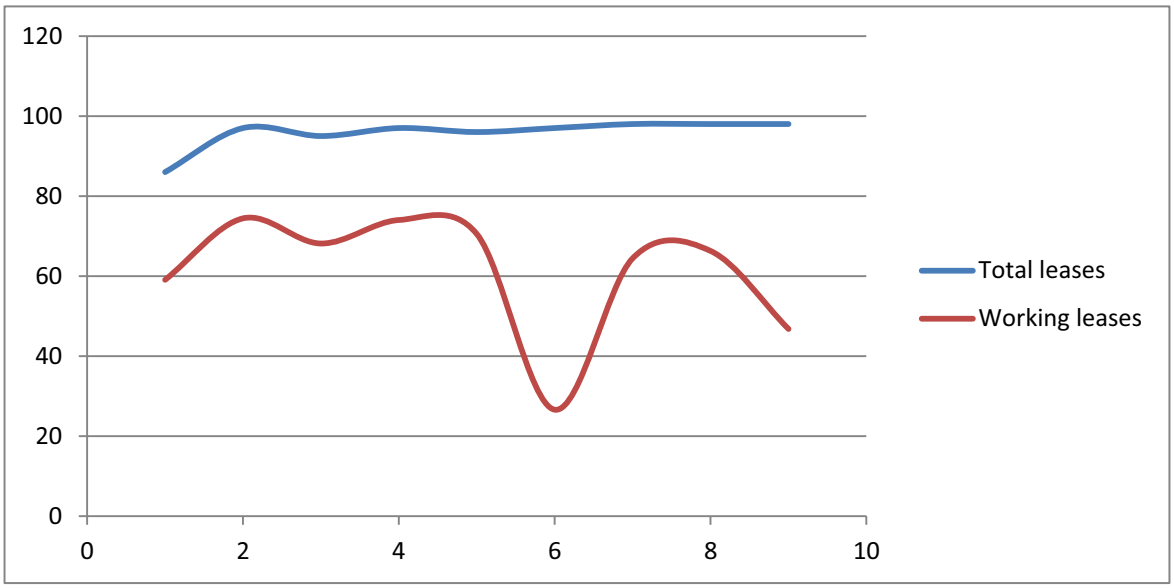
*Sambalpur-Deogarh-Sundergarh segment :* The area in north west occupied by cratonic granite gneisses, green stones and sedimentaries belonging to Gorumahisani, Singbhum, Gangpur Groups and Gondwana Supergroup of rocks and EGSG Group of rocks in southern part.

*Sambalpur-Angul-Dhenkanal Segment:* The area forms a part of EGSG and Gondwana Supergroup. Nepheline Syenite occurs as intrusive to EGSG in Redhakhol area. A number of DSG namely grey porphyry, salt and pepper, tiger skin, midnight green occurrences are identified in the east – west stretch of this area extending from Redhakhol to Badamuktaposi.

*Kendujhar-Mayurbhanja-Balasore Segment:* This area is a part of Bonai-Singbhum craton. In this belt varieties of granites found are silver grey, grey porphyry, pink, black & green.

**Mining Leases**

The trend in total lease area and that of working lease area in the state is shown below:




It can be seen that while the total area of mining leases have increased from 86 thousand hectares in 2005-06 to 98 thousand hectares in 2013-14, there has been decline in the area of working leases from 59 thousand hectares to 46.79 thousand hectares during the corresponding period. Despite decline in the area of working leases, the production of minerals has increased substantially.

As per the Odisha Economic Survey, 2014-15, there were 595 mining leases in 2013-14, covering an area of 98178 thousand ha. Out of these, 102 leases over an area of 46788 thousand ha were in operation. Mineral-wise leases, both working and non-working, in Odisha during 2013-14 are given below:

| **Minerals/Ores** | **Total Leases** | | **Working Leases** | |
|---|---|---|---|---|
| | **Nos.** | **Area in Hectares** | **Nos.** | **Area in Hectares** |
| Asbestos | 1 | 117.350 | - | - |
| Asbestos & Pyroxenite | 1 | 49.22 | - | - |
| Bauxite | 7 | 6630.404 | 3 | 5060.131 |

| | | | | |
|---|---|---|---|---|
| Chinaclay | 16 | 1557.352 | 1 | 76.575 |
| Chinaclay and F. Clay | 2 | 93.161 | - | - |
| Chromite | 24 | 6906.781 | 11 | 1585.752 |
| Chromite & Pyroxenite | 1 | 406.000 | - | - |
| Serpentinite,Manganese & Chromite | 1 | 187.03 | - | - |
| Coal | 30 | 18685.995 | 28 | 17495.738 |
| Dolomite | 5 | 521.649 | 3 | 408.405 |
| Fireclay | 24 | 2675.984 | - | - |
| Fireclay & Sandstone | 1 | 192.175 | - | - |
| Fireclay & Sillicasand | 1 | 255.160 | - | - |
| Galena | 1 | 5.261 | - | - |
| Gemstone | 16 | 271.184 | 2 | 3.895 |
| Graphite | 104 | 2834.076 | 2 | 24.730 |
| Iron ore & Manganese | 63 | 14930.593 | 13 | 5343.636 |
| Iron ore | 76 | 20847.679 | 21 | 11084.630 |
| Iron ore & Bauxite | 2 | 480.163 | 2 | 480.163 |
| Iron, Dolomite & Lime stone | 1 | 134.733 | - | - |
| Iron Ore,Quarzite & soap stone | 1 | 92.895 | - | - |
| Kyanite | 1 | 55.49 | - | - |
| Limestone | 9 | 2850.404 | 1 | 502.215 |
| Limestone & Dolomite | 37 | 5330.075 | 5 | 1912.165 |
| Manganese ore | 40 | 5943.535 | 2 | 224.881 |
| Manganese & Bauxite | 2 | 95.243 | - | - |
| Mineral Sand | 1 | 2464.054 | 1 | 2464.054 |
| Nepheline Syenite | 1 | 14.277 | - | - |

| | | | | |
|---|---|---|---|---|
| Pyrophlite | 3 | 198.294 | - | - |
| Pyrophlite & Quartzite | 6 | 299.978 | 1 | 3.920 |
| Quartz | 67 | 1131.452 | - | - |
| Quartz & Felshper | 1 | 8.127 | - | - |
| Quartz & Gemstone | 2 | 60.141 | - | - |
| Quartz & Quartzite | 7 | 148.583 | 1 | 4.653 |
| Quartz & Silica sand | 1 | 111.980 | - | - |
| Quartzite | 23 | 541.254 | 5 | 112.794 |
| Sand (stowing) | 5 | 502.885 | - | - |
| Sand stone | 2 | 9.921 | - | - |
| Silica sand | 1 | 17.446 | - | - |
| Soapstone | 6 | 465.377 | - | - |
| Soapstone & Pyroxenite | 1 | 50.646 | - | - |
| Soapstone, Stiatite & Talc | 1 | 3.640 | - | - |
| **Total** | 595 | **98177.647** | **102** | **46788.337** |

The Odisha Mining Corporation Limited (OMC) established in 1956 is the largest state public sector in mining sector unit in the country. The major minerals mined by OMC are chrome, iron and manganese ore which cater to the requirement of mineral based industries such as steel, sponge iron, pig iron, ferro-manganese, ferro-chrome, etc.

Out of 595 mining leases in the state, 35 leases covering an area of 17,483 ha have been sanctioned to OMC. Of these, 6 were in operation, covering an area of 5,930 ha. Mineral wise numbers of leases held by OMC by the end of 2013-14 are given below:

| **Minerals/Ores** | **Leases held** | | **Leases in operation** | |
|---|---|---|---|---|
| | **Nos.** | **Area (in hect.)** | **Nos.** | **Area (in hect.)** |
| Chromite | 11 | 5829.304 | 2 | 935.166 |
| Iron | 11 | 5786.914 | 3 | 3260.176 |

| | | | | |
|---|---|---|---|---|
| Iron & Manganese | 5 | 4166.668 | 1 | 1734.570 |
| Manganese | 3 | 685.241 | - | - |
| Lime stone | 1 | 859.99 | - | - |
| Gemstone | 4 | 154.756 | - | - |
| **Total** | **35** | **17482.874** | 6 | **5929.912** |

Mine wise production of Iron ore and Chrome ore from OMC mines from 2009-10 to 2013-14 is given below.

**Iron ore**

(in tonne)

| **Mine** | **2009-10** | **2010-11** | **2011-12** | **2012-13** | **2013-14 (up to 30.9.2013)** |
|---|---|---|---|---|---|
| Daitari | 1628699 | 801854 | 1988975 | 703440 | 100670 |
| Gandhamardan | 3270154 | 3,149,986 | 672505 | 205327 | 148215 |
| Khandadhar (kurmitar) | 2398181 | 1,333,221 | 1611612 | 1441000 | 423000 |
| Khandbandh | 86479 | x | x | x | x |
| Barpada kasia | 39000 | 51,022 | x | 104855 | 49337 |
| Mahaparbat | x | x | x | x | x |
| **Tiringpahar** | **x** | **x** | **x** | **x** | **x** |
| **Total** | **7422513** | **5,336,083** | **4273092** | **2454622** | **721222** |

**Chrome ore**

(in tonne)

| **Mine** | **2009-10** | **2010-11** | **2011-12** | **2012-13** | **2013-14 (up to** |
|---|---|---|---|---|---|

| | | | | | **30.9.2013)** |
|---|---|---|---|---|---|
| S.Kaliapani | 499996 | 1012250 | 413145 | 521462 | 107830 |
| Bangur | 2235 | x | x | 7774 | x |
| Sukrangi | 4579 | 9815 | 20412 | 67500 | 35460 |
| **Total** | 506810 | 1,022,065 | 433557 | 596736 | 143290 |
| COBP(chrome concentrate | 35789 | 91816 | 107533 | 83682 | 40538 |

OMC has decided to diversify its activities and has entered into sectors such as coal and bauxite mining and power generation. Joint Venture Companies have been formed/ are in the process of formation to take up following nine JV projects for:

i) mining of Bauxite in Lanjigarh bauxite deposit in Kalahandi & Raygada districts & supply to the refinery of M/s Vedanta Aluminium Ltd. at Lanjigarh

ii) development of Kodingamali Bauxite deposit in Koraput district for supply of bauxite to the Alumina refinery of HINDALCO at Kansarigada, Rayagada district.

iii) to develop Mandakini-B coal block having a coal reserve of 1200 MT in Angul district for production of at least 15 MTPA of coal for power generation.

iv) to develop Utkal-D coal block having a coal reserve of 145 MT in Angul district.

v) Ministry of Coal, Govt. of India allotted Nuagaon – Telisahi coal block having a coal reserve of 733.83 MT in Angul district

vi) To develop an integrated Project having production capacity of at least 15 mtpa of Iron ore from Gandhamardan (Keonjhar) & Malangtoli (Sundargarh) mining leases.

vii) setting up a coal based super critical thermal power plant of 3200MW (3x800MW + 1x800MW Future) capacity in Kamakhyanagar Tahasil of Dhenkanal District.

viii) To develop, establish, finance, construct, operate and maintain the 104 KM long new rail-line between Angul and Sukinda in Odisha.

ix) developing, financing, construction operation and maintenance of 82 Kms. Broad Guage Single Line between Haridaspur to Paradip in Odisha to establish a direct link between the iron ore rich areas in Odisha viz., Barbil Region to Paradip Port.

In addition following seven mechanical projects have already been taken up/are being taken up by OMC for execution by itself:

i) Design, Engineering, Supply, Construction, Erection, Commissioning & Performance Guarantee test of a new 1000 TPH Ore Handling Plant with 3200 TPH Mechanized Wagon Loading System including related railway infrastructure for Iron Ore mine at Daitari.

ii) Installation of a new Chrome Ore Beneficiation Plant (COBP)at South Kaliapani

iii) Modification of existing COB Plant, Kaliapani.

iv) Construction of a tailing pond for both the COB plants at S. Kaliapani

v) Development of a commercially viable flow-sheet to establish a small scale beneficiation plant to recover Chromite values from the tailings of COB plant.

vi) Mechanized Production and Evacuation System at Kurmitar Iron ore Mines.

vii) Setting up of a beneficiation, pellet plant and evacuation methodology of CLO and finished product for the proposed plant at Gandhamardan-B ML.

**Employment in Mining**

The mineral sector provides employment to a large sector of the population, particularly to rural tribal people belonging to hilly areas. The number of person employed in major mineral activities of the state from 1997-98 onwards is given below:

(number of workers)

| **Districts** | **97-98** | **98-99** | **99-00** | **00-01** | **01-02** | **02-03** | **03-04** | **04-05** | **05-06** | **06-07** | **07-08** | **08-09** | **09-10** | **10-11** | **11-12** | **12-13** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Bauxite** | | | | | | | | | | | | | | | | |
| Koraput, Sundergarh | 449 | 360 | 758 | 603 | 458 | 724 | 792 | 775 | 839 | 866 | 678 | 634 | 664 | 564 | 932 | 895 |
| **Chromite** | | | | | | | | | | | | | | | | |
| Dhenkanal, Jajpur, Keonjhar | 6927 | 7684 | 6779 | 6743 | 5624 | 4786 | 4424 | 6607 | 8236 | 8452 | 9816 | 6528 | 7826 | 7571 | 7053 | 6030 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Coal** | | | | | | | | | | | | | | | |
| Angul, Jharsuguda, Sundergarh, Sambalpur | 20010 | 20087 | 19739 | 19583 | 17069 | 17657 | 17318 | 17624 | 14500 | 13985 | 12747 | 13467 | 13875 | 15389 | 16330 | 14320 |
| **Dolomite and lime stone** | | | | | | | | | | | | | | | |
| Bargarh, Bolangir, Koraput, Sundergarh | 5923 | 6015 | 5616 | 4868 | 3302 | 3245 | 3516 | 1626 | 2378 | 1822 | 1843 | 2206 | 2312 | 2441 | 496 | 1760 |
| Iron ore | | | | | | | | | | | | | | | |
| Jajpur, Keonjhar, Mayurbhanj, Sundergarh | 15953 | 16239 | 12583 | 13255 | 11983 | 10523 | 11418 | 19592 | 20782 | 16677 | 18912 | 16838 | 14679 | 20071 | 17257 | 32901 |
| **Manganese ore** | | | | | | | | | | | | | | | |
| Keonjhar, Sundergarh, Rayagada, Bolangir) | 5745 | 4178 | 4000 | 4081 | 3437 | 3660 | 3892 | 1513 | 1505 | 2612 | 2655 | 2294 | 2538 | 4069 | 2641 | 2186 |
| **Others*** | | | | | | | | | | | | | | | |
| | 4319 | 3885 | 3734 | 3804 | 3262 | 3572 | 2383 | 2100 | 7524 | 2962 | 2525 | 2200 | 1811 | 1772 | 3530 | 1325 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | 59326 | 58448 | 53209 | 52937 | 45135 | 44167 | 43743 | 49837 | **55764** | **47376** | **49176** | **44167** | **43705** | **51877** | 48263 | 59417 |

** Includes (china clay, quartz & quantity, graphite, mineral sand, gem stone, pyrophilite et.)*

Iron sector is the largest employer deploying about 55% of the total workers. Coal and chromite mines engaged 24.10% and 2012-13 of the total work force in the year 2012-13 respectively.

On aggregate basis it is seen that the number of workforce has remained more or less at the same years in last 16 years despite manifold increase in production from all the minerals, Mechanization of the mines leading to higher productivity has restricted the enhance demand of workforce despite production growth in the mining sector. The analysis production verses worker for the individual sector indicates high productivity in the case of coal followed by bauxite productivity in Iron ore is 3.93 tonnes lower than that of coal sector. The per worker in the case of chromite is pretty less.

(in million tonnes)

| **Mineral Ores** | 1997-98 | 1998-99 | 1999-00 | 2000-01 | 2001-02 | 2002-03 | 2003-04 | 2004-05 | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bauxite | 5943 | 7827 | 3797 | 4820 | 7871 | 6813 | 6235 | 6338 | 5805 | 5390 | 6912 | 7468 | 7349 | 8611 | 5424 | 6101 |
| Chromite | 208 | 182 | 259 | 286 | 313 | 687 | 651 | 518 | 400 | 440 | 335 | 428 | 437 | 570 | 414 | 488 |
| Coal | 2116 | 2164 | 2206 | 2288 | 2801 | 2947 | 3476 | 3791 | 4865 | 5812 | 7036 | 7261 | 7669 | 6665 | 6854 | 7691 |
| Iron ore | 762 | 719 | 958 | 1083 | 1401 | 2115 | 3056 | 2351 | 2313 | 3951 | 3940 | 4585 | 5511 | 3793 | 3906 | 1955 |
| Manganese ore | 92 | 128 | 132 | 135 | 156 | 173 | 179 | 712 | 404 | 280 | 266 | 414 | 239 | 161 | 213 | 243 |

**Mineral Based Industries**

Odisha is endowed with vast natural and human resources which can be used for further industrial development. Mineral deposits like Iron Ore, Manganese Ore, Chromite, Bauxite, Graphite etc. offer vast scope for establishing new industries in the state. Cheap unskilled labour force are available in the district as more than 80% of the total population of the state lives in rural areas. Similarly skilled labours are also available adequately to work in the industries.

However due to rare availability of technical and skilled entrepreneurs and inadequate infrastructural facilities in different areas, Odisha continues to be one of the industrially backward states despite its vast natural and human resources.

Industries in Odisha are classified in to following four categories on the basis of investment (i) Large scale heavy industries (ii) Large scale industries (iii) Small and medium scale industries (iv) Handicraft and cottage industries and (v) Khadi and village industries. Most large scale industries in Odisha are mineral based.

The year wise number of large and medium industries set up in the state with the investment and employment generated in the Engineering and metal based category is given below:

| **Year** | **Large** | | | **Medium** | | |
|---|---|---|---|---|---|---|
| | No. of units | Investment (Rs. in Lakh) | Employment generated | No. of units | Investment (Rs. in Lakh) | Employment generated |
| 1.4.2000 to 1.3.2001 | 2 | 1048 | 277 | 1 | 3500 | 265 |
| 1.4.2001 to 1.3.2002 | 6 | 197849.25 | 2110 | 1 | 1500 | 120 |
| 1.4.2002 to 1.3.2003 | 5 | 10375.19 | 1474 | 1 | 1200 | 81 |
| 1.4.2003 to 1.3.2004 | 13 | 36562 | 4634 | 0 | 0 | 0 |
| 1.4.2004 to 1.3.2005 | 27 | 658855 | 7428 | 0 | 0 | 0 |
| 1.4.2005 to 1.3.2006 | 11 | 395475.48 | 3892 | 0 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1.4.2006 to 1.3.2007 | 6 | 305080 | 2975 | 1 | 3600 | 140 |
| | 1* | 100000 | 686 | 1 | 13006 | 80 |
| 1.4.2007 to 1.3.2008 | 7 | 463952 | 5391 | 5 | 9010 | 581 |
| 1.4.2008 to 1.3.2009 | 3 | 1059000 | 2059 | 1 | 2400 | 88 |
| | 1* | 3100.35 | 105 | 0 | 0 | 0 |
| 1.4.2009 to 1.3.2010 | 0 | 0 | 0 | 1 | 1472.7 | 44 |
| 1.4.2010 to 1.3.2011 | 1 | 16865 | 166 | 0 | 0 | 0 |
| 1.4.2011 to 1.3.2012 | 0 | 0 | 0 | 1 | 1553 | 6 |
| 1.4.2012 to 1.3.2013 | 1* | 4817 | 110 | 0 | 0 | 0 |
| 1.4.2013 to 1.3.2014 | 1 | 5161 | 104 | 0 | 0 | 0 |

***** GLASS & CERAMICS

During the past fourteen years, 85 units of large and 13 units of medium industries were set up in the state. During the past three years, however no significant investment has been made in large as well as medium industries.

Major industries in Odisha at present include an integrated steel plants at Rourkela, Kalinga Nagar, Jharsuguda and Angul; NALCO (National Aluminium Company Ltd.) with its Alumina Plant at Damanjodi & Aluminium smelting complex at Angul; Thermal power plants Talcher & Ib valley area etc. in addition to Fertilizer plants, Pulp and paper industries, Ferro alloys plants, cement plants etc. elsewhere in the state. The important large and medium mineral based industries in organised sector in the State are given in Table below:

**Principal mineral-based industries in Odisha**

| **Industry / plant** | **Capacity ( ' 0 0 0 t p y )** |
|---|---|
| **Aluminium / Alumina** | |
| Hindalco Industries Ltd, Hirakud *(Proposed expansion to213 th. tonnes per year). | 161.4* (aluminium) |
| NALCO, Damanjodi. | 2100 (alumina) |
| NALCO, Angul. | 460 (aluminium) |
| Vedanta Aluminium Ltd, Lanjigarh, Dist. Kalahandi. | 1000 (alumina) |
| Vedanta Aluminium Ltd, Jharsuguda, Dist. Sambalpur. | 500 (aluminium) |
| **Asbestos Products** | |
| UAL Industries Ltd, Korian, Dist. Dhenkanal. | 30 |
| **C e m e n t** | |
| Bargarh Cement Ltd, Bargarh. | 960 |
| Ultra-Tech Cement Ltd, Jharsuguda (G). | 800 |
| OCL India Ltd, Rajgangpur, Dist. Sundergarh. | 2000 |
| Toshali Cements Pvt Ltd, Ampavalli, Dist. Koraput. | 180 |
| **Fertilizer** | |
| OCF-Paradeep | |
| Paradeep Phosphates Ltd, Paradeep. | 129.6 ($N_2$)<br>331.2 ($P_2O_5$) |
| SAIL Fertilizer Plant, Rourkela, Dist. Sundergarh. | 360 (CAN) |
| **Iron & Steel** | |
| Rourkela Steel Plant, Rourkela, Dist. Sundergarh. | 3070 (sinter)<br>2000 (pig iron)<br>1671 (saleable steel)<br>1900(crude/liquid steel) |

| | |
|---|---|
| | 85 (tin plates) |
| Visa Steel Ltd, Kalinganagar, | 225 (pig iron)<br>300 (sponge iron)<br>50 (charge-chrome) |
| OCL India Ltd, Lamloi, Dist. Sundargarh. | 120 (sponge iron)<br>85 (billets) |
| Orissa Sponge Iron Ltd, Palaspanga, Dist. Keonjhar. | 250 (sponge iron)<br>100 (steel ingot) |
| Neelachal Ispat Nigam Ltd, Dubri, Dist. Jajpur. | 1711 (sinter)<br>1110 (pig iron)<br>1100(crude/liquid steel)<br>13 (fertilizer) |
| **Pig Iron** | |
| IDCOL Kalinga Iron Works Ltd, Barbil, Dist. Keonjhar. | 170 |
| **Sponge Iron** | |
| Action Ispat & Power (P) Ltd, Pandripather, Dist. Jharsuguda. | 250 |
| Adhunik Metaliks Ltd, Chandrihariharpur, Dist. Sundergarh. | 180 |
| Beekay Steel & Power Ltd, Uliburu, Dist. Barbil. | 105 |
| Bhusan Steels & Strips Ltd, Meramandali, Dist. Angul and Dhenkanal. | 300 |
| Crackers India (Pvt) Ltd, Bobardhanpur, Dist. Keonjhar | 60 |
| Deepak Steel & Power Ltd, Topadihi, Dist. Keonjhar. | 144 |
| Dinabandhu Steel & Power Ltd, Kalinganagar, Dist. Jajpur. | 60 |
| Jay Iron & Steel Ltd, Balanda, Rourkela, Dist. Sundergarh. | 60 |

| | |
|---|---|
| MGM Steel Ltd, Nimidha, Dist. Dhenkanal. | 100 |
| Ganesh Sponge Pvt Ltd, Krushnachandrapur, Dist. Angul. | 30 |
| Kusum Powermet Pvt. Ltd, Kutugaon, Dist. Kendujhar. | 100 |
| Mayur Electro Ceramics Pvt. Ltd, Pratapgarh, Dist. Mayurbhanj. | 15 |
| Neepaz Metaliks Pvt Ltd, Sundergarh. | 60 |
| Rexon Strips Ltd, Kumakela, Dist. Sundergarh. | 60 |
| Rungta Mines Ltd,<br>Unit-I, Karakola, Barbil, Dist. Kendujhar<br>Unit-II, Kamando, Dist. Sundergarh. | 330 |
| Scan Sponge Iron Ltd, Rambahal, Dist. Sundergarh. | 60 |
| Scaw Industries Pvt. Ltd, Gundichapada, Dist. Dhenkanal. | 100 |
| Sponge sales (India) Pvt Ltd, Kutugaon, Dist. Kendujhar. | 60 |
| Sree Metallic Ltd, Loidapada, Dist. Kendujhar. | 174 |
| Suraj Products Ltd, Barpalli, Dist. Sundergarh. | 45 |
| Surya Sponge Iron Ltd, Budhakendua, Dist. Jajpur. | 84 |
| Tata Sponge Iron Ltd, Joda, Dist. Kendujhar. | 390 |
| Vikram Pvt Ltd, Tumkela, Dist. Sundergarh. | 60 |
| **Ferro Alloys** | |
| Balasore Alloys Ltd, Balgopalpur, Dist. Balasore. | 100 |
| FACOR, Charge Chrome Plant, Randia, Dist. Bhadrak. | 65 |
| IDCOL Ferro Chrome & Alloys Ltd., Dist. Jajpur. | 18 |
| Indian Charge Chrome Ltd, Choudwar, Dist. Cuttack. | 62.5 |
| Indian Metals & Ferro Alloys Ltd, Therubali, Dist. Cuttack. | 190 |
| Nav Bharat Ferro Alloys Ltd, Khargprasad, Dist. Dhenkanal. | 75 |

| | |
|---|---|
| Rohit Ferro-Tech Ltd, Kalinganagar, Dist. Jajpur. | 110 |
| Jaypore Sugar Co. Ltd, Rayagada<br><br>Superb Metals Alloys Pvt. Ltd, Rairangpur. | 22.5<br><br>0.3 |
| Tata Steel Ltd, Ferro-Manganese Plant, Joda, Dist. Kendujhar. | 30.5 |
| Tata Steel Ltd, Charge Chrome Plant, Bamnipal, Dist. Kendujhar. | 55.2 |
| **Refractory** | |
| IFGL Refractory Ltd, Kalunga, Dist. Sundergarh. | 0.3 |
| Orissa Industries Ltd, Lakhikata, Dist. Sundergarh. | 125 |
| Orissa Industries Ltd, Barang, Dist. Cuttack. | 19 |
| Tata Refractories Ltd, Belpahar, Dist. Jharsuguda. | 172 |
| **Silicon Carbide** | |
| Indian Metals & Carbide Ltd, Therbali. | NA |
| **Synthetic Rutile** | |
| IRE, Orissa Sands Complex, Ganjam (Presently non-operational). | 100 |

The state can be divided into twelve industrially active zones / areas based on minerals namely:

- Rajgangpur Area (Iron & Steel, Sponge Iron, Cement, Secondary steel. Melting and rolling mill & refractories and chemicals).
- Ib valley area (Thermal power, Sponge iron, refractories, and coal mines)
- Hirakud area (Aluminum & rolling mills)
- Talcher-Angul area (Thermal power, Aluminum, Coal washeries, Ferro alloys, Coal mines).
- Choudwar area (Ferro alloys, Thermal power, pulp and paper, coke oven)
- Balasore area (pulp and paper, ferro alloys, rubber industries)

- Chandikhol (stone crusher, coke oven) →Duburi (Integrated steel, ferro alloys, rubber industries)
- Paradeep area (fertilizer, sea food processing, petroleum coke)
- Khurda Tapang area (stone crusher)
- Joda Barbil area (iron, sponge iron, ferro alloys, iron ore crusher, mineral processing).
- Rayagada area (pulp and paper, ferro alloys).

Micro, Small and Medium Enterprises (MSME) constitute an important and crucial segment of the industrial sector. This sector plays a crucial role in the process of economic development in general & industrial development in particular by value addition, employment generation, removing regional disparities and contribution to export etc.

The MSMEs of the state have been categorized into 12 products such as Food and Allied, Chemical & Allied, Electrical & Electronics, Engineering & Metal based, Forest & Wood Based, Glass & Ceramics, Livestock & Leather, Paper & Paper Product, Rubber & Plastics, Textiles, misc. manufacturing and repairing & servicing etc. By end of 2013 total 123292 SSI units have been set up in the state with an investment of Rs 496959.39 lakh having employment to 706342 people. The share of Engineering & Metal base Category of SSI units within the total was 10.83 %.

The year wise number of SSI units set up with the investment and employment generated in the Engineering and metal based industries in the state is given below:

| **Year** | **No. of SSI unit set up** | **Investment ( Rs. in lakh)** | **Employment** |
|---|---|---|---|
| 2000 | 448 | 2279.03 | 2617 |
| 2001 | 484 | 5738.1 | 3107 |
| 2002 | 484 | 3800.37 | 2290 |
| 2003 | 470 | 3466.24 | 2653 |
| 2004 | 440 | 3799.92 | 2585 |
| 2005 | 461 | 8196.77 | 4626 |
| 2006 | 426 | 8692.51 | 2773 |
| 2007 | 440 | 6331.34 | 2718 |
| 2008 | 436 | 3594.22 | 2337 |

| | | | |
|---|---|---|---|
| 2009 | 385 | 4696.33 | 2321 |
| 2010 | 443 | 6926.84 | 2555 |
| 2011 | 450 | 9475.16 | 4366 |
| 2012 | 434 | 3885.17 | 2278 |
| 2013 | 534 | 6120.69 | 3014 |
| 2014 | 672 | 5038.8 | 3020 |

By end of 2013 there were 13353 units of Engineering & Metal base SSI unit with total investment of Rs. 96078.51 lakh providing employment to 98267 people. The data in the above table reveals that during the last fifteen years the ancillary industries to the mineral sector has not grown substantially having limited scope for the employment. In fact in the past four years there is decline in the investment affecting the employability of the sector.

The information pertaining to industrial potentialities in small scale sector has been compiled from the various District Potentiality Surveys undertaken by the SISI Cuttack during the last five years.

| **District/s** | **Mineral based small Industries** |
|---|---|
| Balasore & Bhadrak | Granite stone polishing, stone chips, Mosaic Tiles, etc. |
| Bolangir & Sonepur | Graphite crucibles, Granite Tiles and Slabs, Hydrated lime, Mini Cement Plant, Quartz grinding, Stone Quarry. |
| Cuttack, Jajpur, Jagatsinghpur & Kendrapara | Chrome benefication, Quartz Calcinations and Grinding, Stone crushing, simple glass mirror, Dustless chalk crayons, chromic acid, sodium dichromate, etc. |
| Dhenakanal & Angul district | Coal based industries. |
| Kalahandi & Nuapada district | Graphite powder and crucibles, mini cement plant, quartz quarrying, calcium oxide from lime, granite zelley, gems cutting. |
| Keonjhar | Stone crushing, mineral grinding, chalk crayons, quartz grinding, manganese dioxide, iron ore sizing, chrome benefication lime etc. |
| Koraput, Nawarangpur, Malkangiri & Rayagada | Granite polishing, tin ore processing, quick lime, mini cement, red oxide paint, mineral grinding, graphite |

| | |
|---|---|
| | crushable/powder, quartz. |
| Mayurbhanj | Granite polishing, soft stone powder, Mosaic tiles, china clay wires, quartz powder, stone chips, glass sand, dimension stone. |
| Boudh & Kandhamal | Granite, precious stone, mini cement plant, graphite powder. |
| Sambalpur, Deogarh, Baragarh & Jharsuguda | Mini cement plant, stone crushing lime, mineral grinding, cement concrete, stone wire, jars and bowls, building bricks, thermometer rope up to 150 degree centigrade, coke briquettes. |
| Sundargarh district | Fire clay bricks and block, like, mineral grinding, quartz calcinations and grinding chalk crayons, refractory tiles, sodium silicate, cement jalli. |

**Private Investment**

The industrial backwardness of the state is mainly due to inadequate infrastructural facilities, limited supply of capital, technology upgradation etc. Promotion and development of medium and large industries need more capital as these industries are capital intensive in nature. Odisha being a poor state is not in a position to mobilize additional capital substantially for setting up more medium and large industries. During the initial stages of industrialization in the country some medium and large industries were set up in Public Sector to abridge the regional disparity. Some industries were also set up in the private sector during this period. After the onset of liberalization process in the country, foreign investment in different sector including infrastructure is coming in a big way to the state. Odisha is today a growing industry economy because of its rich mineral resources attracting huge investments in various sectors like steel, aluminium, cement, power, etc.

By 30th June 2012, total 415 common application forms have been received from large industries for setting up their units with an investment of Rs.14,28,110 Crores. Among them 235 applications has been approved with an investment of Rs.8951.31 Crore which included 3 for Mining, 72 for Steel, 12 for Alumina & Aluminium, 9 for Ferro Products, 26 for Cement, 14 for Pelletisation and 63 for Power generation.The category wise number of applications approved for the mining and mineral based industry is given below. The Directorate of Industries, Odisha has made available a statement on foreign direct investment (FDI) & foreign technology cases (FTCS) approved by government during August 1991 to September 2003 as per which 139 cases of FDI were approved by the state government which included 49 technical and 90 financial cases involving a total investment of 2356.78 million US$ equivalent to Rs 8229.31 crore. From the perusal of the statement it is observed that of the total about 90 percent of the proposed FDI is for the mining sector which includes 33 proposals ranging from exploration, mining development and commercial mining operations, manufacture of iron and

steel products, alumina, aluminium, coal based power projects to other mineral based industries.

As per the Odisha economic survey 2014-15, the state government has signed 93 MoUs by the end of 2012-13 which include 32 steel, 1 aluminum and alumina, 17 coal based thermal power plants, I auto ancillary and 8 for others and downstream industries on investment of 532085.91 which may create an employment of 89340 (29780 direct, 59560 indirect). Out of 93 MoUs, 49 MoUs have been signed with steel promoter for a production capacity of 83.66 million tonnes with an increment of Rs. 2,30,422 were list of 49 steel plants is given below:

Out of the 49 MoUS, 30 projects, with an investment of Rs. 80,506.17 crore have concerned production with a production capacity of 12.66 MTPA for steel 11.45 MTPA for sponge iron and 4.23 MTPA for other production by providing direct and indirect employment to 27690 and 60390 person respectively.

**Annexure**

## List of Common Application Form projects which have been approved

| Name of the Industry | Location | District | Product | Project Cost (Rs in Billion) | Date of Approval. |
|---|---|---|---|---|---|
| **Alumina & Aluminium** | | | | | |
| Hindalco Ind Ltd | Hirakud,Sambalpur | Sambalpur | Aluminium & CPP | 138.04 | 10-Aug-10 |
| Larsen and Turbo Ltd | Rayagada & Sambalpur | Sambalpur | Aluminium Refinery smelter & CPP | 196.68 | 04-May-11 |
| **Cement** | | | | | |
| ACC Limited | Kottameta | Malkangiri | Cement | 35.00 | 10-Aug-10 |
| ACC Ltd | Bardol, Bargarh | Baragarh | Cement | 5.17 | 23-Aug-07 |
| Adhunik Metallics Ltd. | Chadni Hariharpur,Kuarmunda. | Sundergarh | Cement | 4.31 | 18-Dec-06 |
| ASO Cement Ltd. | Rajgangpur, Sundergarh. | Sundergarh | Cement | 1.32 | 14-Sep-06 |
| Binani cement Ltd | Dhamara | Jajpur | Cement Grinding | 1.30 | 04-Feb-11 |
| Chariot steel & Power | Rajganpur, Dist: Sundergarh, Orissa | Sundergarh | Cement | 2.91 | 22-Nov-10 |
| Eco Cement Ltd | Borada, Jajpur | Jajpur | Cement | 0.99 | 16-Oct-08 |
| Emami Paper Mills Ltd. | Somanathpur Industrial Estate | Balasore | Cement Grinding | 1.79 | 10-Jun-10 |
| Everest Industries Ltd. | Somanathpur | Balasore | Asbestos Cement Sheets (Corrogated) & Non-Asbestos Flat Sheet | 0.69 | 22-Nov-10 |
| Grasim Industries Ltd. | Kutra, Sundergarh. | Sundergarh | Cement | 12.00 | 20-Sep-06 |

| | | | | | |
|---|---|---|---|---|---|
| Hyderabad Industries Ltd | Somnathpur Industrial Estate, Balasore | Balasore | Asbestos Cement Sheet & Accessories | 0.25 | 20-Mar-07 |
| Icore Super Cement Pvt. Ltd. | Somanathpur | Balasore | Cement Grinding | 1.51 | 01-Oct-10 |
| J.K.Laksmi Cement Ltd. | Choudwar, Cuttack | Cuttack | Cement Grinding | 1.55 | 31-Dec-09 |
| Jajpur Cements Private Limited | Kalinga Nagar, Sukinda | Jajpur | Cement Grinding | 0.64 | 24-Mar-11 |
| Kalinga Infra Projects Ltd. | Pandloi | Sambalpur | Cement Grinding | 1.76 | 01-Oct-10 |
| Madras Cements Ltd | Jahaditoli, Tehsil-Birmitrapur. | Sundergarh | Cement | 7.50 | 10-Jun-10 |
| Madras Cements Ltd | Nandibera | Malkangiri | Cement | 7.00 | 10-Jun-10 |
| Navadurga Industries Ltd. | Baichua, Tangi, Choudwar | Cuttack | Cement | 2.77 | 24-Mar-11 |
| OCL India Ltd. | Tangi & Rajgangpur CTC, Sundergarh | Sundergarh | Cement & Cement Grinding | 8.50 | 15-May-06 |
| OCL India Ltd. | Tangi & Rajgangpur CTC, Sundergarh | Sundergarh | Cement & Cement Grinding | 8.50 | 15-May-06 |
| Ramco Industries Ltd. | Jharsuguda | Jharsuguda | Asbestos Fibre Cement Sheet | 0.35 | 10-Jun-10 |
| Rungta Mines Ltd. | Near Rajgangpur, Sundergarh | Sundergarh | Cement | 1.64 | 18-Dec-06 |
| Shiva Cement Ltd | Teleghana &Jajpur | Jajpur | Cement & Cement Grinding | 7.50 | 16-Oct-08 |
| Shree Cement Ltd | Sundergarh | Sundergarh | Cement | 6.53 | 01-Oct-10 |
| Sree cement Ltd | Malkangiri | Malkangiri | Cement | 653.00 | 10-Jun-10 |
| Toshali Cements Pvt Ltd | Choudwar,Cuttack & Sunki,Koraput | Koraput | Cement & Cement Grinding | 1.40 | 29-May-09 |
| **Coal to Liquid** | | | | | |
| Jindal Synfuels Ltd | Durgapur, Chhendipada | Angul | Coal to liquid and Power | 420.00 | 22-Nov-10 |
| Strategic Energy Technology Systems Pvt. Ltd. | Angul | Angul | Coal to liquid and Power | 450.00 | 22-Nov-10 |
| **Downstream – Aluminium** | | | | | |
| Aditya Aluminium Ltd | Lapanga,Sambalpur | Sambalpur | Aluminum & CPP | 294.14 | 16-Oct-08 |
| Hindalco Industries | Hirakud, Dist.-Sambalpur | Sambalpur | Aluminium Rolled products | 44.30 | 10-Aug-10 |
| National Aluminium Co Ltd (NALCO) | Jharsuguda | Jharsuguda | Aluminium Smelter & CPP | 163.46 | 25-Nov-08 |
| RSB Metal Tec P Ltd | Aluminium smelter at Kamashyanagar,Dhenkanal & Alumina in Koraput | Koraput | Alumina & Aluminium | 120.50 | 25-Nov-08 |

| | | | | | |
|---|---|---|---|---|---|
| Vedanta Aluminium Ltd | Brundamal,Burkhamunda, Jharsuguda | Jharsuguda | Aluminium Smelter | 271.20 | 10-Aug-10 |
| Vedanta Aluminium Ltd | Lanjigarh, Kalahandi | Kalahandi | Alumina Refinery | 103.20 | 10-Aug-10 |
| **Downstream – Aluminium Park** | | | | | |
| Deepak Cables (India) Ltd. | Dulampur | Baragarh | Integrated Aluminium Downstream Project | 1.55 | 02-Dec-11 |
| Gupta Power Infrastructure Ltd. | Khurda | Khurda | HT Cables Project | 1.92 | 24-Mar-11 |
| Hindusthan Vidyut Products Ltd. | Jharsuguda | Jharsuguda | Wire Drawing of Aluminium, Insulated Wires & Cables | 3.89 | 10-Jun-10 |
| Sterlite Technologies Ltd. | Bhurkamunda | Jharsuguda | ACSR & Alloys Conductor, EC & Alloy Wire Rod | 0.52 | 10-Jun-10 |
| Vedanta Aluminium Ltd | Jharsuguda | Jharsuguda | Aluminium Park | 13.92 | 12-Mar-10 |
| **Downstream – Steel** | | | | | |
| IRC Tubes P Ltd | Somnathpur,Balasore | Balasore | Automobile tube & Flap | 0.21 | 23-Aug-07 |
| ITW India Limited | Khurda Industrial Estate | Khurda | Steel Strapping & Associated Metal Products Manufacturing Unit | 0.66 | 18/08/2011 |
| Larsen & Toubro Ltd. | Kansbahal | Sundergarh | Transmission Line Tower Unit | 0.60 | 01-Oct-10 |
| Nezone Tubes Ltd. | Kalinga Nagar | Jajpur | API Grade Steel Pipe Plant | 3.00 | 02-Dec-11 |
| SMS India Pvt. Ltd. | Bhubaneswar | Khurda | Manufacturing Unit of Steel Plant Equipments | 1.74 | 08-Feb-12 |
| **Ferro products** | | | | | |
| Bajaj Steels & Industries Ltd | Somnathpur,Balasore | Balasore | Ferro Alloys | 1.01 | 28-Jul-08 |
| Balasore Alloys Ltd. | Balgopalpur, Balasore | Balasore | Ferro Alloys and CPP | 9.11 | 02-Feb-08 |
| Dhananjai Industries | Choudwar,Cuttack | Cuttack | Ferro Alloys | 1.80 | 26-Aug-09 |
| Orissa Manganese & Minerals Pvt. Ltd | Sankarpratpur | Dhenkanal | Silica Manganese & Ferro Manganese | 4.92 | 27-Nov-07 |
| Rashmi Cement Ltd | Haridaspur,Jajpur | Jajpur | Ferro Manganese & Power Plant | 3.00 | 26-Aug-09 |
| Rohit Ferro Tech Ltd.(Expansion) | Kalinganagar,Jajpur. | Jajpur | Ferro Chrome & Manganese Alloys | 5.16 | 23-Aug-07 |
| Tata Steel Ltd. | Gopalpur | Ganjam | Ferro Chrome Complex & Rebar Mill | 8.00 | 04-Feb-11 |

| | | | | | |
|---|---|---|---|---|---|
| Tata Steel Ltd. | Nayagarh | Keonjhar | Silico Manganese | 1.38 | 01-Oct-10 |
| Visa Bao Limited | Village Manatira, Kalinganagar, Sukinda | Jajpur | Ferro Chrome & CPP | 9.80 | 29-May-09 |
| **Mining** | | | | | |
| NTPC Limited | Hemgiri | Sundergarh | Coal Mining | 6.72 | 09-May-11 |
| U C M Coal Company Ltd. | Chhendipada | Angul | Coal Mining | 78.46 | 25-Jul-11 |
| Radhikapur (West) Coal Mining Pvt. Ltd. | Barapada | Angul | Coal Mining | 4.00 | 30-Jul-11 |
| **Pelletization** | | | | | |
| Ankit Metal & Power Ltd. | Manoharpur | Jajpur | 1.2 MTPA Pellet Plant | 7.39 | 02-Dec-11 |
| Bhushan Steel Ltd | Muktapur | Keonjhar | Iron Ore Pelletisation | 8.51 | 16-Oct-08 |
| Brahmani River Pellets Ltd. | Duburi,Jajpur & Tonto Barbil | Keonjhar | Iron Ore Pelletisation | 14.85 | 20-Dec-06 |
| Chandalavada Odhisha Pellets Pvt. Ltd. | Kalinga Nagar Industrial Complex | Jajpur | Iron Ore Pelletisation Plant | 6.83 | 24-Mar-11 |
| Essel Mining & Industries Limited (2) | Jajanga,Keonjhar | Keonjhar | Iron Ore Pelletisation & Beneficiation | 7.51 | 27-Nov-07 |
| Jayaswal NECO Industries Ltd | Horomoto,Barbil,Keonjhar | Keonjhar | Iron ore Benefication & Pelletisation Plant | 4.52 | 24-Dec-08 |
| JSW Steel Limited | Koira | Sundergarh | Iron Ore Pelletisation | 14.50 | 25-Nov-08 |
| Kashvi International (P) Ltd | Vill- Champadihi, Joda, keonjhar | Keonjhar | Iron Ore Pelletisation | 0.56 | 04-Feb-11 |
| Rungta Mines Ltd | Jajang, Nayagarh, | Keonjhar | Iron ore Benefication & Pelletisation Plant | 6.24 | 29-May-09 |
| Shri Mahavir Ferro Alloys Pvt. Ltd. | IDC Kalunga Industrial Estate | Sundergarh | 1.2 MTPA Iron Ore Pelletisation Plant | 2.25 | 02-Dec-11 |
| Shyam Steel Industries Ltd. | Thiabarna & Juniyan | Sundergarh | Iron ore Benefication & Pelletisation Plant | 7.55 | 26-Aug-09 |
| Sree Metaliks Ltd | Anra,Upparrayagada, Keonjhar | Keonjhar | Iron Ore Pelletisation | 2.60 | 16-Oct-08 |
| Vikram Pvt. Ltd. | Tumkela | Sundergarh | Expansion of 0.85 MTPA Iron Ore Beneficiation Plant & 0.6 MTPA Pelletisation Plant | 2.76 | 02-Dec-11 |
| Welspun Power & Steel Ltd.(Welspun Orissa Ltd.) | Dhamra & Nayagarh, Keonjhar | Keonjhar | Iron ore Pelletisation & Benefication | 19.63 | 25-Nov-08 |
| **Power** | | | | | |

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|---|---|---|---|---|---|
| Aarti Steels Ltd. | Ghantikhal | Cuttack | Power - Thermal | 20.65 | 01-Dec-07 |
| Action Ispat & Power (P) Ltd | Pandaripathar, Marakuta | Jharsuguda | Power - Thermal | 7.96 | 22-Oct-09 |
| Adhunik Power & Natural resources | Biramaharajpur | Sonepur | Power - Thermal | 44.00 | 14-Aug-07 |
| Arati Steels Ltd | Ghantikhal, Athagarh | Cuttack | Power - Thermal | 20.65 | 01-Dec-07 |
| Astaranga Power Company Ltd | Astaranga,Puri | Puri | Power - Thermal | 112.00 | 17-Oct-07 |
| BGR Energy Systems Ltd | Bhapur | Nayagarh | Power - Thermal | 57.16 | 06-May-08 |
| Bhubaneswar Power (P) Ltd | Anantapur, Athagarh, Cuttack. | Cuttack | Power - Thermal | 6.49 | 08-Jan-08 |
| Bhushan Energy Limited | Ganthigadi & Nuahata | Angul | Power - Thermal | 84.83 | 16-Oct-06 |
| CESC Ltd. | Neulapoi, Dhenkanal | Dhenkanal | Power - Thermal | 40.43 | 29-Apr-05 |
| Chambal Infra & Venture Ltd | Siaria, Dhenkanal. | Dhenkanal | Power - Thermal | 49.94 | 23-May-07 |
| Dr. Ramakrishna Prasad Power (I) Ltd. | Gopalpur | Ganjam | Power - Thermal | 5.25 | 09-Dec-09 |
| ESSAR Power (Orissa) Ltd. | Paradip | Jagatsinghpur | 4 X 30 MW Captive Power Plant | 6.83 | 16-Jun-11 |
| Essar Power Ltd. | Near Nisha Town, Angul | Angul | Power - Thermal | 46.02 | 28-Aug-06 |
| FACOR Power Limited | Randia | Bhadrak | Power - Thermal | 2.00 | 02-Dec-09 |
| GMR Energy Ltd. | Kamalanga, Dhenkanal. | Dhenkanal | Power - Thermal | 42.00 | 03-Feb-05 |
| GMR Kamalanga Energy Ltd. | Kamalanga, | Dhenkanal | Power - Thermal | 16.50 | 26-Jun-09 |
| Hind Metals & Industries Pvt Ltd | Meramundali, Dhenkanal | Dhenkanal | Power - Thermal | 2.37 | 14-Jun-07 |
| Ind-Barath Energy (Utkal) Ltd.(Expn) | Sajbahal near Banharpal | Jharsuguda | Power - Thermal | 64.50 | 12-Nov-09 |
| IND-Bharath Energy(Utkal) Ltd | Sajbahal near Banharpal,Jharsuguda | Jharsuguda | Power - Thermal | 31.50 | 05-Apr-07 |
| Jindal Photo Ltd.(Jindal India Thermal Power Ltd.) | Derang | Angul | Power - Thermal | 59.40 | 06-Jun-05 |
| Jindal Stainless Ltd.(JSL Limited) | Gajamara, Luni | Dhenkanal | Power - Thermal | 40.90 | 30-May-07 |
| Jindal Steel & Power Ltd (Jindal Power Ltd.) | Badkarganj | Angul | Power - Thermal | 59.40 | 10-Mar-08 |
| JR Power Generation Private Ltd | Kukudabahal, Redhakhol | Sambalpur | Power - Thermal | 79.89 | 13-Aug-08 |
| Kalinga Energy & Power Ltd. | Sodamal | Jharsuguda | Expansion of Power Project ( 1000 MW to 1320 MW ) | 65.00 | 18-Jan-11 |
| Kalinga Energy & power | Sodamal, Kuchinda | Jharsuguda | Power - Thermal | 42.61 | 10-Jan-07 |

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| Ltd. | | | | | |
| Konark Kanti Energy (P) Ltd. | Joranda, Dhenkanal | Dhenkanal | Power - Thermal | 4.33 | 19-Nov-09 |
| KU Projects Pvt. Ltd. | Thakurpur | Sonepur | Power - Thermal | 72.60 | 21-Apr-10 |
| KVK Nilachal Power Pvt. Ltd. | Gurudijhatia, Athgarh, Cuttack | Cuttack | Power - Thermal | 25.80 | 06-Jun-06 |
| Lanco Babandh Pvt. Ltd.(Lanco Group - earlier sanctioned on 20.9.2006) | Kurunti & Kharagprasad,Dhenkanal | Dhenkanal | Power - Thermal | 114.02 | 15-Apr-08 |
| Lanco Industries Ltd. | Badabandha,Dhenkanal | Dhenkanal | Power - Thermal | 45.00 | 04-Sep-06 |
| Larsen and Turbo Ltd | Dhamra Port, Bhadrak | Bhadrak | Power - Thermal | 102.00 | 10-Mar-08 |
| Maa Durga Thermal Power Company Ltd. | Mahakalabasta | Cuttack | Power - Thermal | 13.61 | 10-Nov-10 |
| Maa Durga Thermal Power Company Ltd. | Baichua, Tangi, Choudwar | Cuttack | Power - Thermal | 2.97 | 03-Sep-09 |
| Maadurga Thermal Power Company Ltd | Loc: Bainchua, Tangi,Choudwar,Cuttack | Cuttack | Power - Thermal | 2.97 | 13-Feb-09 |
| Mahanadi Aban Power Co. Ltd. | Talcher | Angul | Thermal Power Plant ( Expansion - 1030 MW to 1320 MW) | 65.42 | 10-Nov-10 |
| Mahanadi Aban Power Co. Ltd. | Vill-Ghantapada,Talcher, Angul | Angul | Power - Thermal | 42.57 | 25-Feb-05 |
| Monnet Power Company Ltd | Malibrahamani & Nisa,Angul | Angul | Power - Thermal | 41.07 | 17-Jul-06 |
| Nav Bharat Ferro Alloys Ltd. | Kharag Prasad, Odapada | Dhenkanal | Power - Thermal | 2.53 | 21-Nov-09 |
| Navabharat Ventures Ltd | Kharagprasad in Dhenkanal District | Dhenkanal | Power - Thermal | 2.53 | 06-May-09 |
| Navbharat Power (P) Ltd. | Nuahat, Meramundali, Dhenkanal | Dhenkanal | Power - Thermal | 46.75 | 15-Nov-05 |
| NSL Nagapatnam Power Co. Pvt. Ltd. | Boinda, Athamalik,Angul | Angul | Power - Thermal | 66.00 | 19-Feb-10 |
| NSL Nagapatnam Power Co. Pvt. Ltd. | Burhpal | Angul | Power - Thermal | 66.00 | 19-Feb-10 |
| NTPC | Gajmara,Dhenkanal | Dhenkanal | Power - Thermal | 198.40 | 20-Sep-08 |
| NTPC Ltd - (National Thermal Power Corporation Ltd) | Darlipali, | Sundergarh | Power - Thermal | 180.00 | 06-Nov-07 |
| Orissa Thermal Power Corporation Limited(OTPCL) | Annapurnakhamar | Dhenkanal | Power - Thermal | 82.50 | 13-May-09 |

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|---|---|---|---|---|---|
| Primo Power & Infra Pvt. Ltd. | Gobindpur | Cuttack | Power - Thermal | 3.00 | 25-Jan-10 |
| Rajratna Energy Holdings Pvt. Ltd. | Bideipur | Bhadrak | Power - Thermal | 9.65 | 22-Nov-10 |
| Reliance Industries Ltd | Tamando,Khurda | Khurda | Solar Park | 1.25 | 04-Mar-08 |
| Rohit Ferro Tech Ltd. | Kalinga Nagar Industrial Complex | Jajpur | Power - Thermal | 3.87 | 07-May-10 |
| Sahara India Power Coporation Ltd | Gantabahal, Mahada & Valegaon | Bolangir | Power - Thermal | 56.04 | 13-Sep-07 |
| Salivahana Green & Energy Ltd | Nimidha, Dhenkanal | Keonjhar | Power - Biomass | 0.80 | 14-Nov-07 |
| SPI Ports Pvt. Ltd. | Mahakalapada | Kendrapara | Power - Thermal | 66.10 | 14-Jan-10 |
| Sterlite Energy Ltd. | Basantpur, Chiplima, Sambalpur | Jharsuguda | Power - Thermal | 132.00 | 05-Oct-09 |
| Sterlite Energy Private Limited | Bhurkamunda, Dist:Jharsuguda | Jharsuguda | Power - Thermal | 74.81 | 07-Jul-05 |
| Tata Power Co. Ltd. | Naraj,Marthapur, Barang,Cuttack. | Cuttack | Power - Thermal | 43.48 | 30-Nov-05 |
| Vijaya Ferro & Power (P) Ltd. | Turlakhamar | Sambalpur | Power - Thermal | 5.50 | 25-Jul-09 |
| Visa Power Ltd. | Brahmanbasta, Athagarh | Cuttack | Power - Thermal | 73.74 | 29-May-10 |
| Visa Power Ltd. | Brahmanabasta,Athagarh | Cuttack | Power - Thermal | 36.98 | 21-Dec-06 |
| Visakha Thermal Power Ltd | Bhadrak(Location changed to - Rairakhol on 01/10/10) | Sambalpur | Power - Thermal | 53.95 | 10-Sep-07 |
| **Steel** | | | | | |
| Action Ispat & Power(P) Ltd | Pandripathar & Markutta, Jharsuguda | Jharsuguda | Steel | 2.70 | 01-Oct-10 |
| Adhunik Metaliks Ltd | Kuarmunda near Rourkela | Sundergarh | Steel | 81.25 | 01-Oct-10 |
| Adhunik Metaliks Ltd. | Chandrihariharpur, Kuarmunda, Rourkela | Sundergarh | Steel downstream | 2.34 | 31-Dec-09 |
| Amtek Metals & Mining Ltd | Tangi, Choudwar | Cuttack | Auto parts and accessories | 158.20 | 27-Jan-10 |
| Arcelor Mittal India Limited | Patna, Keonjhar | Keonjhar | Steel | 400.00 | 20-Dec-06 |
| Aryan Mining & Trading Corporation Pvt. Ltd. | Koira | Sundergarh | Beneficiation | 4.09 | 04-Feb-11 |
| Atha Mines (P) Ltd. | Vill-Barsingha & Thokar,Dhenkanal | Dhenkanal | Steel billets Power | 2.38 | 20-Mar-07 |
| Bajrang Ispat Ltd | Sundergarh | Sundergarh | Sponge Iron | 4.66 | 23/08/2007 |

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|---|---|---|---|---|---|
| Bhaskar Steel & Ferro alloy Ltd | Tumkela, Rajamunda | Sundergarh | 0.6 MTPA Pelletisation Plant | 1.58 | 02-Dec-11 |
| Bhaskar Steel & Ferro alloys Ltd | Kela in Sundergarh | Sundergarh | Steel | 3.12 | 15-May-06 |
| Bhusan Power & Steel Ltd | Lapanga,Sambalpur | Sambalpur | Steel downstream | 16.50 | 25-Nov-08 |
| Bhushan Steel (P) Ltd | Meramundali | Sambalpur | Steel - Expansion from 3 to 6mtpa | 208.04 | 03-Jun-08 |
| Bhushan Steel Ltd. (Bhushan SME Steel Park) | Meramandali, Odapada | Dhenkanal | Steel Park | 30.00 | 10-Aug-10 |
| Bhuvee Profiles & Stainless (P) Ltd | Khurunti,Dhenkanal | Dhenkanal | Hot rolled plates & coils | 4.93 | 19-Jul-08 |
| Bonai Industrial Co. Ltd. | Kankalu,Dhenkanal | Dhenkanal | Steel | 3.02 | 23-Aug-07 |
| Brand Alloys Ltd | Near Palaspanga,Keonjhar | Keonjhar | Steel | 3.08 | 21-Sep-05 |
| BRG Iron & Steel Co(P) Ltd | Kurunti, Meramundali | Sambalpur | Steel | 9.60 | 24-Dec-08 |
| Crackers India (Alloys) Ltd | Govardhanpur, Keonjhar | Keonjhar | Steel | 7.55 | 14-Jul-06 |
| Cronimet Alloys India Ltd. | Kolathpangi | Cuttack | High Carbon Ferro Chrome Plant | 5.86 | 02-Dec-11 |
| Dinabandhu Steel and Power Ltd | Kalinga Nagar, Jajpur | Jajpur | Steel | 2.74 | 24-Dec-08 |
| Eastern Steel & Power Ltd | Jharsuguda | Jharsuguda | Steel | 2.54 | 21-Sep-05 |
| Essar Steel Orissa Ltd. | Paradeep,Kasia/Nalda,jagatsinghpur & Barbil,Keonjhar | Keonjhar | Steel | 107.21 | 03-Jun-08 |
| Fee Grade & Co. (P) Ltd. | Baramunda,Dhenkanal. | Dhenkanal | Steel | 6.03 | 23-Aug-07 |
| GM Iron & Steel Company Ltd | Vill-Dhakota,Tehsil-Karanjia, Mayurbhanj | Mayurbhanj | Steel | 3.23 | 01-Oct-10 |
| Grewal Associates (P) Ltd | Sadasivpur,Dhenkanal | Dhenkanal | Steel | 2.11 | 24-Dec-08 |
| International Minerals Trading Company(P) Ltd | Barbil,Keonjhar | Keonjhar | Iron ore Benefication | 1.75 | 24-Dec-08 |
| Jay balaji Jyote Steel Ltd | Tanisar near Birkera, Sundergarh | Sundergarh | Steel | 3.21 | 21-Sep-05 |
| Jindal Stainless Ltd. | Kalinga Nagar, Jajpur | Jajpur | Steel | 162.66 | 25-Nov-08 |
| Jindal Stainless Ltd. | Kalinga Nagar | Jajpur | Steel - SEZ | 7.04 | 31-Dec-09 |
| Jindal Steel & Power Ltd | Nisa, Chhendipada, Angul | Angul | Steel | 224.20 | 27-Jan-09 |
| Jindal Steel & Power Ltd. | Barbil to Aungul | Angul | Slurry Pipeline Project | 5.30 | 08-Feb-12 |

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| Jindal Steel & Power Ltd. (Industrial Complex) | Paranga | Angul | Industrial Complex - Down stream Park | 5.00 | 01-Oct-10 |
| JSL Limited | Kalinga Nagar | Jajpur | Steel Park | N.A. | 31-Dec-09 |
| Kaushal Ferro Metals Pvt Ltd | Sundergarh | Sundergarh | Steel Re-rolling mill, Sponge Iron | 0.82 | 26-Aug-09 |
| Maithan Ispat Ltd | Kalinganagar,Jajpur. | Jajpur | Steel | 6.27 | 07-Feb-07 |
| MGM Steels Ltd. | At:Nimidha, Dhenkanal. | Dhenkanal | Sponge Iron, MBF Steel Billets Power Plant | 2.08 | 14-Jul-06 |
| Monnet Ispat & Energy Ltd. | Chendipada | Angul | Fabrication Shop | 0.65 | 08-Feb-12 |
| MSP Metaliks Ltd | Jhasuguda | Jharsuguda | Steel | 12.06 | 03-Jun-08 |
| Navayuga Steel Ltd | Astaranga,Puri | Puri | Steel | 340.00 | 25-Nov-08 |
| Neepaz B C Dagara Steels (P) Ltd. | Rairangpur | Mayurbhanj | Steel & CPP | 9.45 | 01-Oct-10 |
| OCL Iron & Steel Ltd. | Khutnia | Rajgangpur | Steel | 28.34 | 04-Feb-11 |
| Orion Ispat Limited. | Kashipur,Keonjhar. | Keonjhar | Steel | 2.85 | 23-Aug-07 |
| Penguin Trading & Agencies Ltd. | Bonai,Sundergarh. | Sundergarh | Steel | 2.54 | 23-Aug-07 |
| POSCO India Pvt ltd | Paradeep,Jagatsinghpur | Jagatsinghpur | Steel | 500.00 | 17-Jun-05 |
| Pradhan Steel & Power Pvt. Ltd. | Dhurusai, Athgarh,Cuttack. | Cuttack | Steel | 7.77 | 20-Mar-07 |
| Rabirun Vinimay (P) Ltd | Khurunti,Dhenkanal | Dhenkanal | Cold rolled Steel products | 4.33 | 19-Jul-08 |
| Rasmi Metaliks Ltd | Nayagarh | Keonjhar | Iron Ore Benefication | 3.61 | 29-May-09 |
| Ravi Metallics Pvt. Ltd. | Sansinghari,Sambalpur. | Sambalpur | Steel,Biomass | 0.86 | 27-Nov-07 |
| Reliable Sponge (P) Ltd. | Bonai | Sundergarh | Steel | 2.27 | 17-Mar-08 |
| Rohit Ferro Tech Ltd. | Kalinga Nagar | Jajpur | Steel | 24.87 | 10-Aug-10 |
| Rungta Sons (P) Ltd. | Baramunda,Dhenkanal. | Dhenkanal | Steel | 9.30 | 23-Aug-07 |
| Rupa Ispat Pvt Ltd | Banspal, Keonjhar | Keonjhar | Steel | 6.21 | 04-Feb-11 |
| Scan Steel Ltd | Baghiajhor &Rambahal near kuarmunda, Sundergarh | Sundergarh | Steel | 5.93 | 20-Mar-06 |
| Shree Ganesh Metaliks Ltd | Kuaramunda near Rourkela,Sundergarh. | Sundergarh | Steel | 2.08 | 24-Dec-08 |
| Shri Bajrang Power & Ispat Ltd. | | Deogarh | Steel | 5.00 | 04-Feb-11 |
| Shri Mahavir Ferro Alloys (P) Ltd. | Phase-I Kalunga Industrial Estate, Rourkela, Sundergarh. | Sundergarh | Steel | 4.35 | 15-May-06 |
| Shyam Steel Industries | Sambalpur | Sambalpur | Steel & CPP | 9.25 | 04-Feb-11 |

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| Ltd. | | | | | |
| SMC Power generation Ltd | Hirma,Jharsuguda. | Jharsuguda | Steel | 13.66 | 03-Jun-08 |
| SPS Steel & Power Ltd. | At:Industrial Growth Center, Kukurjanga, Badmal, Jharsuguda | Jharsuguda | Sponge Iron, Pig Iron Billets | 7.03 | 23-Aug-07 |
| Sree Metaliks Ltd | Anra,Keonjhar | Keonjhar | Steel | 7.09 | 24-Dec-08 |
| SSL Energy Ltd | Palur,Ganjam | Ganjam | Steel | 86.09 | 20-Dec-06 |
| Suraj Products Ltd. | Barpali. Kesarmal | Sundergarh | Mini Integrated Steel Plant & Cold Briquette Plant | 0.52 | 01-Oct-10 |
| Surendra Mining Industries Pvt Ltd | Barahamusa, Bonai,Sundergarh | Sundergarh | Steel | 2.22 | 14-Jul-06 |
| Swastik Ispat Pvt. Ltd. | Kuarmunda | Sundergarh | 0.12 MT Integrated Steel Plant | 2.66 | 02-Dec-11 |
| Tata Sponge Iron Ltd. | Belipada, Joda | Keonjhar | Steel & CPP | 31.01 | 27-Jan-10 |
| Tecton Ispat (P) Ltd | Tarkabeda,Dhenkanal | Dhenkanal | Steel | 2.14 | 07-Feb-07 |
| Uttam Galva Steels Ltd. | Palaspanga/Parjanpur,Keonjhar & Gopalpur,Ganjam | Keonjhar | Steel,CPP & Bicycle | 80.87 | 13-Oct-06 |
| Welspun Power & Steel Ltd. | Tangi,Choudwar,Cuttack | Cuttack | Steel | 61.04 | 10-Oct-06 |

*Source: Odisha State Profile - 2013-14, MSME Development Organisation, Ministry of Micro, Small & Medium Enterprises, Govt. of India, Odisha*

# Policy Initiatives by the state

To prevent increased level of production including that of iron ore beyond the permitted limit by irregular operations, Govt. of Odisha has taken following suitable steps:

- Creation of State Level Task Force and State Level Enforcement Squad
- Integrated Mines and Mineral Management system (I 3Ms)
- Formation of Interstate Committee with state of neighbouring Jharkhand to prevent illegal transportation.
- Provision of E-governance through-
  - Creation of web based database
  - Online issue of transit permit
  - Online grant of trading license
  - Digitization of lease maps
  - Online issue of Mining Dues Clearance Certificate
- Regulated entry and exit to railway sidings
- Infrastructure of integrated checking of ores by commercial department

Regarding Illegal Mining, Smuggling, Trading and Storage of Minerals, the State Govt. has framed Orissa Minerals (Prevention of Theft, Smuggling, Illegal Mining and Regulation of Possession Storage, Trading and Transportation) Rules, 2007.

In a view to curb the illegal mining, the State Govt. has taken certain remedial measures as follows:

- Constitution of District and State Level Committees and Enforcement squads to frequently raid various mines to check various activities.
- Periodical review at the level of Chief Secretary.
- Use of high resolution Satellite data for delineating encroachments and illegal mining.

The state of Odisha having abundant mineral resources, however, does not have a State Mineral Policy although attempts have been made to formulate this since 2006. Based on certain salient features highlighted in National Mineral Policy 2008, the state government initiated preparation of draft mineral policy wherein various activities pertaining to mineral development to account for sustainable development, conservation of resources, community welfare have been suggested. Draft Mineral Policy also suggested various programmes leading to mineral exploration with the adoption of newer technologies and covering unexplored areas, areas applied for and under Mineral Concessions on the basis of United Nations Framework Classification (UNFC).

The Government of India meanwhile has promulgated an Ordinance on the 12th January, 2015 (MMDR Amendment Ordinance, 2015) under Article 123(1) of the Constitution. This amends certain provisions of MMDR Act, 1957. The salient provisions of the Ordinance are given below.

- All mineral concessions will be granted only through auction {Section 10 B &11}.
- Direct auction for mining leases for bulk minerals; auction of prospecting licences-cum-mining leases for deep-seated minerals {Section 10 B & 11}.
- Uniform lease period of 50 years; no renewals; auction at the end of lease period; will solve issues arising out of all SC judgments on second and subsequent renewals {Section 8 A (1), (2), (3) and (4)}.
- Transition period of minimum 15 years for captive mines and 5 years for other mines; no sudden stoppage as a result of amendment {Section 8 A (5) and 8 A (6)}. Central Government empowered to prescribe deadlines for various processes and to issue binding directions to States {Section 20 A}.
- Central Government to frame separate rules for atomic minerals {Amendment to Section 11 (B)}.
- The previous approval of the Central Government will not be required for grant of mineral concession except for Atomic Minerals, Coal and Lignite {Amendment to Section 5(1)}.
- Enabling powers for reservation for the public sector to continue {Section 17 A (2A)}.
- Higher penalties and jail terms for offences; special courts may be constituted, if necessary {Amendment to Section 21(1) & (2)}. .
- District Mineral Foundation to take care of people and areas affected by mining {Section 9 (B)}.
- National Mineral Exploration Trust to be set up for impetus to exploration {Section 9 (C)}.
- Easy transferability of concessions obtained through auctions so as to attract private investment and FDI {Section 12 (A)}.
- Powers to Central Government to intervene even where State Governments do not pass orders within prescribed time lines; this will eliminate delay {Amendment to Section 30}.

The promulgation of Ordinance became necessary to address the emergent problems in the mining industry since in the last few years, the number of new Mining Leases granted in the country have fallen substantially. In addition, second and subsequent renewals have also been affected by Court judgements. As a result, the output in the mining sector has come down, leading to import of minerals by users of those minerals.

The State government now come up with a Mineral Exploration Policy 2015 vide its resolution dated 4th July, 2015.

The objective of the Mineral Exploration Policy is to strengthen the institutional set up for the mineral exploration in the State and to upscale the mineral exploration activities in the State with an aim of upgrading the exploration level to G2 level in keeping with the UNFC norms within a reasonable time frame and eventually to G1 level so that the potential of mining sector is achieved through scientific exploitation of mineral resources.

This objective is proposed to be achieved through:

- Institutional mechanism by Strengthening and augmenting manpower and financial resource of the Directorate of Geology for intensifying the mineral exploration activities.

Tying up with central government exploration agencies. Setting up of Odisha Mineral Exploration Corporation.

- Updating Status Report on status of mineral exploration and mineral reserves in the State in short intervals for identifying exploration gaps and guiding the investment in mineral exploration.

- Preparing of Master Plan of ten to fifteen years for taking up reconnaissance and prospecting operations for mineral exploration

- Monitoring Role of Permit holders, licensees and lessees through annual reviews

to ensure that responsibilities are discharged with due diligence.

- Ensuring adequate financial support for mineral exploration to assure reasonable financial returns

- Prioritizing the exploration work to focus on early commencement of accrual of economic benefits by upgrading all existing G3 level explored areas to G2 level in bulk minerals and exploration in minerals with high employment and/or value addition potential.

The approved Odisha Mineral Exploration Policy is at Annexure

The Odisha Gazette

**Annexure**

**EXTRAORDINARY**
**PUBLISHED BY AUTHORITY**

**NO. 1040, CUTTACK, TUESDAY, JULY 07, 2015/ ASADHA 16, 1937**

[ No. 6065–IV(Misc.)SM-100/2015/SM.]

**STEEL & MINES DEPARTMENT**

RESOLUTION

The 4th July, 2015

**SUBJECT: Approval of the Odisha Mineral Exploration Policy,2015.**

Government have been pleased to approve the following Odisha Mineral Exploration Policy, 2015 with the objective of realizing the potential of mining sector through scientific exploration of mineral resources:—

## 1. Introduction:

Odisha is a State rich in mineral resources. Major minerals such as asbestos, basemetal, bauxite, chinaclay, coal, cobalt, chromite, fireclay, graphite, iron ore, limestone, manganese, minerals sand, nickel, Platinum Group Metals (PGM), tin ore and vanadium with established resources occur in the State. The minor minerals found in the State include dolomite, dunite, pyrophyllite, quartz/ silica sand, quartzite, talc-steatite-soapstone, laterite and sand. The State accounts for 20% of the country's iron ore, 32% of the hematite iron ore, 54% of bauxite, 44% of manganese, 87% of the chromite and 25% of the coal reserves. A statement of estimated volume of mineral resources in the State vis-à-vis the country is given in ANNEXURE-I.

## 2. Importance of mineral exploration for the economy of the State:

2.1. Mining sector accounts for about7% of the Gross State Domestic Product. However, considering the vast reserves of minerals in the State, there is substantial scope of

increasing the contribution of the mining sector to the State's GSDP. The mining sector provides substantial fiscal resources as taxes as well as royalties. Though the current direct employment in the mines is only about 0.60lakh, it generates substantial employment in ancillary activities like transportation and downstream activities in the mineral based industries.

2.2. Accurate assessment of the mineral resources through scientific exploration is a pre-requisite for optimum exploration of these valuable natural resources. This assumes greater importance in view of the necessity of judicious distribution of these resources among the applicants, especially those who want them as captive mines, and need foreffective planning for value addition as well as for conservation of minerals.

2.3. The MMDR Amendment Act, 2015 provides for auction of major mineral concessions which can be taken up only after proving the mineralization in the proposed lease areas.

2.4. Therefore, there is an urgent need to step up the scientific mineral exploration in the mineral bearing areas of the State for augmenting the estimated mineral resources, systematic planning of mining activities and conservation of minerals.

3. **Status of Mineral Exploration in the State**:

3.1. The State has a full-fledged Directorate of Geology headed by a Director and consisting of 102 trained and qualified Geoscientists working in the posts of Joint Director of Geology, Deputy Director of Geology, Geologist, Geophysicist and Petrologist.

3.2. Mineral exploration in the State has been carried out by a number of agencies such as the State Directorate of Geology, Odisha (DGO), Geological Survey of India (GSI), Mineral Exploration Corporation Limited (MECL), Odisha Mining Corporation (OMC) and Atomic Mineral Exploration Directorate (AMED).

3.3. The current status of exploration of salient mineral blocks in the State is given in ANNEXURE-II.

## 4. Objectives of Mineral Exploration Policy:

The objective of the Mineral Exploration Policy is to strengthen the institutional set up for the mineral exploration in the State and to upscale the mineral exploration activities in the State with an aim of upgrading the exploration level to G2 level in keeping with the UNFC norms within a reasonable time frame and eventually to G1 level so that the potential of mining sector is achieved through scientific exploitation of mineral resources.

## 5. Strategy:

The above objective is sought to be achieved with the following strategy:–

### 5.1. Institutional mechanism:

5.1.1. Directorate of Geology of the State Government, the Geological Survey of India (GSI) and the Mineral Exploration Corporation Limited (MECL) of Government of India are major organizations mandated to undertake mineral exploration for the non-atomic minerals. These organizations are permitted under the proviso to Section 4(1) of the MMDR Act, 1957 to undertake mineral exploration without obtaining a reconnaissance permit, prospecting lease or prospecting license.

5.1.2. The Directorate of Geology will be strengthened with augmentation of manpower and financial resource allocation for intensifying the mineral exploration activities. Wherever required, the drilling and other exploration activities will also be outsourced to technically competent organizations following a transparent process of competitive bidding, who will undertake the exploration under the supervision and guidance of the Directorate.

5.1.3. The State Government will enter into Memorandum of Understanding with organizations like the GSI and / or the MECL for undertaking exploration activities in the State.

5.1.4. The GSI has already set up an office in the State. Efforts will be made to persuade the MECL to establish a field office in Odisha for exploration activities.

5.1.5. The possibility of setting up an Odisha Mineral Exploration Corporation with participation of the Odisha Mining Corporation, MECL and mineral resource based industries of the State will be explored in order to intensify the mineral exploration in the State.

5.1.6. There is need to build up the capacity, both institutional and manpower, to meet the challenges of the need to upscale the mineral exploration capacity. A comprehensive review of the manpower needs of mineral exploration sector will be carried out and steps will be taken to increase the capacity of educational institutions to meet these needs.

### 5.2. Updation of Status Report :

5.2.1. The Directorate of Geology shall publish a consolidated report on the status of mineral exploration and the estimated mineral reserves in the State within six months.

5.2.2. This report is expected to provide focus to mineral exploration activities and to help in identifying the exploration gaps and guiding the investment in mineral exploration.

### 5.3. Preparation of Master Plan:

The Directorate of Geology will, with technical assistance and support of experts, prepare a master plan for a time frame of ten to fifteen years for taking up reconnaissance and prospecting operations for mineral exploration, in consultation with all stakeholders.

## 5.4 Role of Permit holders, licensees and lessees:

5.4.1. The holders of mining leases have important role and responsibility for carrying forward the mineral exploration work. Their progress will be closely monitored and reviewed in order to ensure that such responsibilities are discharged with due diligence by them.

5.4.2. The Directorate of Geology will conduct annual review of all holders of reconnaissance permits, Prospecting licenses and mining leases and continuance of such permits/licenses or leases will be linked with their performance in the scientific exploration.

## 5.5 Financial support for mineral exploration:

5.5.1. Mining revenues and economic benefits are directly related to the extent of scientific mineral exploration. Adequate budgetary support will be provided for funding the mineral exploration activities.

5.5.2 Appropriate financial arrangement will be made for the proposed Odisha Mineral Exploration Corporation to assure reasonable financial return to the Corporation in view of the fact that mineral exploration, per se, is not a commercially profitable business.

## 5.6. Prioritization:

5.6.1. The mineral exploration work will be prioritized to focus on early commencement of accrual of economic benefits. While detailed prioritization will be finalized in the master plan, priority will be given for upgrading all the existing G3 level explored areas to G2 level, to the exploration in bulk minerals like iron ore, bauxite, manganese etc. Focus will be given to exploration in minerals with high employment and/or value addition potential like gemstones, decorative stones and other major / minor minerals and strategic minerals like atomic sands etc.

## 6. Miscellaneous:

6.1. The Department of Steel and Mines shall undertake an annual review of the progress in implementation of the mineral exploration policy.

6.2. Periodical reviews of the effectiveness of the policy will be carried out through third party experts at the interval of 3 to 5 years for appropriate modification and course-correction.

***Annexure – I***

| Sl No. | Name of mineral | Estimated resources (Odisha) in million tonnes* (01.04.20110 | Estimated Resources (India ) in million tonnes* (01.04.2010) |
|---|---|---|---|
| 1. | Asbestos | 0.057 | 22.166 |
| 2. | Basemetal | 7.940 | 1570.745 |

| | | | |
|---|---|---|---|
| 3. | Bauxite | 1878.808 | 3479.620 |
| 4. | Chinaclay | 280.912 | 2705.207 |
| 5. | Coal | 75073.000 | 301560.000 |
| 6. | Cobalt | 31.000 | 44.910 |
| 7. | Chromite | 176.749 | 203.346 |
| 8. | Dunite | 14.333 | 185.369 |
| 9. | Fireclay | 170.076 | 713.519 |
| 10. | Graphite | 8.608 | 174.849 |
| 11. | Iron Ore | 5737.142 | 28526.160 |
| 12. | Limestone | 1768.509 | 184935.112 |
| 13. | Dolomite | 676.384 | 7730.557 |
| 14. | Manganese | 190.350 | 429.980 |
| 15. | Mineral Sand | 240.341 | 632.000 |
| 16. | Nickel | 174.000 | 189.000 |
| 17. | PGM (Metal Content) | (Tones) 14.000 | (Tones) 15.700 |
| 18. | Pyrophyllite | 12.267 | 56.082 |
| 19. | Quartz/ Silica Sand | 74.058 | 3499.031 |
| 20. | Quartzite | 60.283 | 1251.248 |
| 21. | Talc-steatite-soapstone | 0.820 | 269.022 |
| 22. | Tin Ore | 0.016 | 83.726 |
| 23. | Vanadium | 6.480 | 24.718 |

**Figures are in million tones except where mentioned.*

***Annexure-II***

## IRON ORE

| Sl. No | Name of the mineral block | Area in sq.km. | Period of exploration | Agency that conducted the exploration | Level as per UNFC | Resource in million tonnes |
|---|---|---|---|---|---|---|
| 1. | Malangtoli, Keonjhar | 4.94 | 1963-68 | GSI | G2 | 434 |
| 2. | Thakurani-A, Keonjhar | 10.48 | 1985 | GSI | G4 | 187 |
| 3. | Horomoto, Keonjhar | 2.07 | 1976-77 | GSI | G4 | 61 |
| 4. | Khandadhar, Sundargarh | 10.56 | 2002-05 | DG(O) | G2+G3 | 204 |
| 5. | Mankarnacha, Sundargarh | 2.3 | 1996-97 | TISCO &GSI | G2+G3 | 291 |
| 6. | Baliapahar, Sundargarh | 1.5 | 1971-74 and | DG(O) | G2+G3+G4 | 136 |
| 7. | BadamgarhPahar, Sundargarh | 10.72 | | GSI | G4 | 80 |
| 8. | Ghoraborani- Sagasahi, | 2.45 | 2007-10 | GSI | G4 | 46.2 |
| | Sundargarh | | | | | |
| 9. | Sagasahi East, Sundargarh | 0.8 | 2010-13 | GSI | G3 | 43.38 |
| 10. | DholtaPahar, Sundargarh | 0.6 | 2009-10 | DG(O) | G3 | 15.808 |
| 11. | Kalmang West Block, Sundargarh | | | GSI | G3 | 33.78 |
| 13. | Mithirda – Basada, Sundargarh | 2.81 | 1995-97+2004-05 | DG(O) | G3+G4 | 150 |
| 14. | Jumuka, Sundargarh | 2.995 | 1997-2000 | GSI | G3 | 98 |
| 15. | Mandajoda, Sundargarh | 1.93 | 2008-09 | DG(O) | G4 | 17.47 |

**BAUXITE**

| Sl No. | Name of the Mineral block | Area in sq.km | Period of exploration | Agency that conducted the exploration | Level as per UNFC | Resource in million tonnes |
|---|---|---|---|---|---|---|
| 1. | Maliparbat, Koraput Dist. | 1 | 1975-77 | GSI | G-3 | 9.8 |
| 2. | Ballada, Koraput Dist. | 3.35 | 1975-77 | GSI | G-3 | 11.5 |
| 3. | Kodingamali, Koraput Dist. | 6 | 1975-77 | GSI | G-3 | 81 |
| 4. | Kakrimali, Koraput Dist. | 0.52 | 2004 | DG(O) | G-3 | 5.2 |
| 5. | Chintamgundi, Koraput Dist. | 0.3 | 1981-82 | GSI & DG(O) | G-3 | 12 |
| 7. | Majhingamali, Rayagada Dist. | 2.3 | 2004 | DG(O) | G-3 | 19 |
| 8. | Indragiri, Rayagada Dist. | 1.8 | 1975-76 | DG(O) | G-3 | 6 |
| 9. | Baphilimali, Rayagada Dist. | 9.6 | 1975-77 | GSI | G2 | 195 |
| 10. | Sasbohumali – Pasangamali, Rayagada Dist | 12.74 | 1975-77 | GSI | G-3 | 81 |
| 11. | Sijimali, Rayagada Dist. | 6.34 | 1980-81to83-84 | GSI &L & T | G2 | 244.8 |
| 12. | Karlapat – Pullingpadar, Kalahandi Dist. | 9.6 | 1992-96 | DG(O) | G2+G3 | 207 |
| 13. | Kutrumali, Kalahandi Dist. | 4.6 | 1975-77 | GSI &L & T | G2 | 40 |
| 14. | Lanjigarh – Niyamgiri, Kalahandi Dist. | 1.6 | 1975-77,1979-81,2002-03 | GSI,MECL | G2 | 88 |
| 15. | Kishanmali, Kalahandi Dist. | 2.36 | 2004 | DG(O) | G-3 | 28.30 |
| 16. | Keluamali, Kalahandi Dist. | 2.95 | 2004 | DG(O) | G-3 | 49 |
| 17. | Gandhamardan, Bolangir-Bargarh Dists. | 7.5 | 1975-79 | DG(O) | G2 | 207 |

**LIMESTONE**

| Sl. No. | Name of the Mineral block | Area in sq.km | Period of exploration | Agency that conducted the exploration | Level as per UNFC | Resource in million tonnes |
|---|---|---|---|---|---|---|
| 1. | Kotametta- Nandiveda – Uskalvagu, Malkangiri Dist. | 5.48 | 1981-84 | DG(O) | G2+G4 | 240.00 |
| 2. | Kiringsera, Sundargarh Dist. | 0.199 | 1966-68 | DG(O) | G3 | 30.00 |
| 3. | Khairtala, Sundargarh Dist. | 0.259 | 1965-66 | DG(O) | G4 | 6.00 |
| 4. | Dublabera, Sundargarh Dist. | 0.31172 | 1964-65 | DG(O) | G4 | 3.00 |
| 5. | Dungri , Bargarh Dist. | 5.02 | 1957 | DG(O) | G3+G4 | 80.50 |
| 6. | Banjipalli , Bargarh Dist. | 3.04 | 1977-79 | DG(O) | G3 | 2.97 |
| 7. | Jampalli – Pikrijharan Bargarh Dist., | 4 | 1970-71, 1977-78, 1978-79 to1981-82 | DG(O) | G -3 | 10.60<br>5.29 |
| 8. | Nuapara – Putka, Bargarh Dist. | 4.35 | 1969-70 , 1974-76 | DG(O) | G3 | 23.80 |

**MANGANESE ORE**

| Sl No. | Name of the mineral block | Area in sq.km. | Period of exploration | Agency that conducted the exploration | Level as per UNFC | Resource in million tonnes |
|---|---|---|---|---|---|---|
| 1. | Lasarda, Keonjhar Dist. | | 2003-05 | GSI | G2 | 2.480 |
| 2. | Pacheri, Keonjhar Dist. | 0.55 | 2001-03 | GSI | G2 | 1.730 |
| 3. | Kendudihi- Parulipada, Keonjhar Dist. | 1.04 | 2001-03 | GSI | G2 | 0.700 |
| 4. | Kenamenta - Mandajoda, Sundargarh Dist. | 0.183 | 2008-09 | DG(O) | G4 | 0.446 |
| 5. | Nishikhal-Kutinga Rayagada Dist. | 8.26 | 1980-87 | GSI | G2 | 13.914 |
| 6. | Taladoshi– Upardoshi, Rayagada Dist. | 2.0 | 1988-90 | GSI | G2 | 2.982 |

**ORDER**

Ordered that this Resolution be published in an Extraordinary issue of *ODISHA GAZETTE*.

By Orders of the Governor

R.K.SHARMA

Principal Secretary to Government

# Recommendations

***Better governance and regulations in the mining sector***

There is a serious lack of capacity within the government, at all levels for assessment of mineral resources, development of mining plans and monitoring and enforcement of mining regulations. This is the prime reason for the huge gap between the mining regulations and their implementation and has led to large-scale irregularities in the mining sector. The SDF report has already noted the deficit in the capacity for monitoring by the Indian Bureau of Mines (IBM). There is, therefore, a major need to build capacity and reform the institutions for implementation of laws and regulations and better mineral development.

There is need for a technically and scientifically competent body at the state for regulating the mining sector. There is also a need of mining tribunals at the state level to ensure transparency in allocation of mining concessions. Moreover, there is a need to set up special courts at the local level to deal with egregious violations under the mining laws.

There is a need for reforming the institutions related to the environment and safety management in the mines. Currently, four regulatory institutions govern the environment, health and safety aspects of mining such as The Union Ministry of Environment, Forest and Climate Change (MoEF&CC) responsible for giving environmental and forest clearances; the IBM clears mining and Environment Management Plans (EMPs) whereas the MoEF&CC can also clear EMPs; State Pollution Control Boards are responsible for giving consent to establish and consent to operate under the Water and the Air Acts and the Directorate General of Mines Safety is responsible for monitoring the health and safety of workers. There is a lot of overlap in the responsibilities of these institutions, with each having very little capacity to monitor and enforce the law. Strengthening these institutions is required.

***Exploration***

With limited exploration, quantification of any significance would not be possible. As preliminary geological data (G3, G4 level) of GSI is not sufficient to make investment decisions in most of the cases, the detailed exploration is essential to attract investment in mining sector so as to establish feasibility of the prospect. Australia, with a similar potential of mineralisation, has an exploration budget of about three billion dollars, as per 2013 estimates. India's spend on mineral exploration is less than 0.5% of the global spending on exploration in 2010, much below its fair share given the size of mineral resource potential.

The Section 9C of the MMRD Ordinance proposes setting up of an exploration trust viz. the National Mineral Exploration Trust. The funds for the trust will be generated from the royalty paid by lease holders – a sum equivalent to two per cent of the royalty paid. However it is going to be a very limited fund and not likely to grow much even with the expected accelerated growth in the mining sector. It will not be sufficient for exploration of strategic minerals.

Advanced technology and best practices need to be adopted to ensure optimum exploration. While public sector exploration needs to be strengthened by making use of state-of-the-art technology, much of the investment needed for exploration and mining would have to come from the private sector. Given the high-risk nature of exploring and prospecting these minerals, requiring highly specialised human and technical resources, private players should be encouraged to venture in the exploration of the high-risk-high reward minerals.

There is incorrect definition of prospecting activity in Forest (Conservation) Act 1980. The provisions of guidelines 1.3 (v) of the handbook exempts certain activities like oil drilling, transmission of power lines etc from forest clearance but in case of prospecting though few drill holes are permitted (16 boreholes per 10 sq km) vide notification no 5-3/2007-FC dated August 19th, 2010 of Ministry of Environment and Forests, but the collection of surface samples through trenching / pitting are prohibited. In fact, the prospecting activity has not been defined properly in the notification and entry to forest land remains a big issue to the prospectors. As most of the mineral bearing lands overlap the forest lands in the country, the provisions of Forest (Conservation) Act 1980 need to be amended in the interest of detailed prospecting and exploration for mineral investigation, where no degradation of forest is involved; rather, prospecting activity needs to be exempted from forest clearance.

***Grant of Mineral Concessions***

Auctioning is the best way to allocate mining concessions where the deposits can be accurately established and a proper valuation can be done. This will capture the windfall profits as well as bring transparency in the allocation of concessions. However, in cases where mineralisation is not properly established, auctioning can lead to problems including undervaluation of minerals, in which case it would lower revenue for the government, or overvaluation, resulting in the inability of the concession- holder to meet commitments.

The criteria for selecting and evaluating companies through bidding can be discretionary if the conditions of bidding are not structured appropriately. Social and environmental safeguards should be made an integral part of the bidding proposal, and form a basis for the evaluation. Also, technical evaluation should be done separately from financial evaluation to ensure the viability of a project. Finally, all information related to bidding must be put in the public domain to increase accountability.

As per the Model Tender Document to carry out e-auction for grant of a mining lease/prospecting licence-cum-mining lease as circulated by the Ministry of Mines, Govt. of India, the following information regarding the Concession Area is included in a separate "Information Memorandum" attached along with this Tender Document as Schedule V,-

(i) precise map of the Concession Area identified including geographical co-ordinates, revenue survey particulars, demarcated using total station and differential global positioning system and divided into forest land, land owned by the State Government and land not owned by the State Government;
(ii) estimated mineral resources of minerals found in the identified Concession Area determined pursuant to the Minerals (Evidence of Mineral Content) Rules, 2015;
(iii)[an indicative list of clearances and permissions required to be obtained with respect to such area for commencing mining operations]; and
(iv) the geological report of the Concession Area.

As per the Minerals (Evidence of Mineral Content) Rules, 2015, where an application for grant of prospecting licence or mining lease to a holder of a reconnaissance permit or prospecting licence, as the case may be, has not been submitted before the 12th January, 2015, the holder of such permit or licence shall be deemed to have established the existence of mineral contents under sub-clause (i) of clause (b) of sub-section (2) of section 10A of the Act, if the holder has-

(a) In the case of grant of prospecting licence, -

(i) carried out Reconnaissance Survey (G4) to establish anomalous zones (areas) worthy of further exploration; and
(ii) prepared a geological study report conforming to Part IV of the Schedule and such geological study report has been submitted to the State Government;

(b) In the case of grant of mining lease, -

(i) carried out at least General Exploration (G2 level) over the area to establish Indicated Mineral Resource (332); and
(ii) prepared at least a Pre-Feasibility Study (F2) report to establish Probable Mineral Reserve (121 and 122) conforming to Part V of the Schedule, to plan mining

operation for a period of five years from the date of commencement of the mining lease, and such report has been submitted to the State Government.

Current status of exploration of some import minerals of the state as indicated at Annexures in the Exploration policy shows that G2 level exploration has been carried out in 1 block of Iron ore, 5 blocks of Bauxite ore and 5 blocks of Manganese ore. It is not clear if a Pre-Feasibility Study (F2) report has been prepared for these blocks to establish Probable Mineral Reserve (121 and 122) conforming to Part V of the Schedule. The state need to correctly assess the mineral content prior to auction of minerals.

Recently the Ministry of Mines has taken a decision to notify 31 additional minerals, presently under the list of major minerals, as minor minerals. As opposed to major minerals, the regulatory and administrative jurisdiction of minor minerals falls under the purview of State governments. These include the powers to frame rules, prescribe rates of royalty, contribution to District Mineral Foundation, the procedure for grant of mineral concessions etc. Considering the extensive local outreach of States, this decision empowers States to customise regulatory framework to suit local conditions.

The effect of mining on ecology is far-reaching and long-term. Therefore, regional/cumulative impact assessments should be an important tool in deciding the extent and method of mining that can be allowed. In fact there is a need to develop regional mining plans by taking into consideration the cumulative environmental and social impact.

The government should delineate mineral bearing areas, forest land, areas suitable for compensatory afforestation and no go areas so as to avoid clash of interest with other developmental activities.

District and State Level Committee/Task Force for timely processing and disposal of Mineral Concessions applications, Forest Diversion Proposals and Environmental clearance should be activated with Director of Mines as the Nodal Officer and Secretary, Steel & Mines as the Chairman. Other members should be representative of Forest and Environment and Revenue Department.

Demarcation of areas granted under PL/ML

Areas granted are demarcated on the basis of Cadastral Map16”=1 mile (RF 1:3960) scale where tenanted lands are involved. Cadastral maps do not have geographical coordinate. The boundaries of the lease areas are normally surveyed and demarcated on the basis of the Cadastral map and field reference prints duly inspected and certified by the authorized govt. surveyors. There is no possibility of encroachment beyond the boundary demarcated in the field. It is unwise to reconstruct the lease boundaries through satellite imageries depicted by DGPS on a projected and geo referenced GIS platform. Further fixing the lease boundary based on Google maps shall be highly controversial which has created problems to denote illegal mining in iron ore sectors.

The Dept. of Steel & Mines in its Resolution No. 7264 of 3rd October 2012 has decided to grant renewal of mining leases to captive users only. If so stand alone mines will not be considered for second and subsequently renewals where they have already invested a lot to develop the mines

and associated infrastructures. These policies need to be properly addressed and ratified to develop iron ore resources of the state.

***Renewal of Mining Lease***

Renewal of Mineral Concessions are governed by Rule 24 A(6) of MCR 1960 and all steps should be taken to dispose the applications before the expiry of the lease to avoid deemed extension clause which can substantially reduce irregular mining.

***Illegal mining***

To curb the menace of illegal mining and to ensure scientific mining, it would be necessary to strengthen and re-structure the Departments of Mines & Geology of the state government on a uniform pattern.

***Poor mining and environmental practices***

Given the poor assessment and monitoring of mines with respect to productivity and environmental impact. A long lease period, without any provision for periodic audit, means that regulatory supervision will be further downgraded. A mechanism must be put in place to ensure an intermittent assessment of a mine's performance. The most alarming aspect of allowing mines to operate for 50 years, which can be subsequently re-auctioned (without provision for periodic audit), is that mine closure will not be done properly.

***Sharing of mineral wealth with mining-affected communities***

Section 9B of the MMRD Ordinance provides for the establishment of District Mineral Foundations (DMFs) by state governments in mining districts. A DMF will be the nodal authority entrusted with the day-to-day matters of benefit-sharing. Holders of mining leases or prospecting licence-cum-mining leases are required to pay the DMF "not exceeding one-third of the royalty rates" of the respective minerals, in addition to the royalty paid to the state. To maintain transparency in fund disbursement by the DMF, a periodic audit of the DMF would be done by the state government in consultation with the Comptroller and Auditor General of India. The mechanism of fund disbursement by the DMF needs to be clearly laid out. The funds accrued must contribute to the long-term social and economic development of the communities affected by mining, in line with the vision of the SDF.

***Involvement of local communities***

Along with changes in land acquisition and environmental clearance policies, poor emphasis on peoples' participation may further alienate communities. Public consultation must not be restricted, but should be strengthened to ensure democratic decision-making.

***Long term ore linkage policy***

For the survival of mineral based industries of the states especially the small sized end user plants due to recent short supply of raw material there is need to enhance the supply of ores to the respective mineral based industries through the long term linkage policy. The alternative for

assured supply to domestic industries if not covered through the long-term linkage also need to be specified.

## Infrastructure

### *Rail*

The identified routes where existing rail network are to be strengthened or new routes are to be taken up in the state are given below:
Doubling – 874 Km
Third Line – 101 Km
Connectivity of future iron ore mines in Odisha to East Coast Railway - 90 Km

Completion of these lines in times need to be ensured

## Roads

As compared to rest of India, the road connectivity in the eastern region of India in terms of quality and last mile connectivity is still lagging behind. The road density of Odisha is 0.16 Km/ Sq.Km is far less than the national average of 1.48 Km/ Sq.Km. As such the road infrastructure in Odisha needs augmentation. Keeping in view the proposed industrial development, the roads in the Odisha needs focus in the form of maintenance and upgradation to four lane carriageway depending on the traffic projections.

Based on the existing and probable steel plant locations the following important routes have been identified and are to be taken up on priority:

- Rajamunda to Roxy to Keonjhar to Chandikhol (NH-215) – Strengthening and Widening to be implemented
- Angul to Cuttack (NH-42) – Strengthening and Widening to be implemented
- Talcher to Chandikhol (NH-200) – Strengthening and Widening to be Implemented
- Dhamra Port to NH-5 – new road to be developed
- Gopalpur Port to NH-5 - new road to be developed

Specific concerns for the mineral based industry in road transportation include low road density and poor quality of roads in the state resulting in high transaction costs due to delay and loss of materials in transit. A second source of problem is the inadequate network of state and district level roads connecting mines and plants to the National Highways, especially in the mining areas.

### *Ports*

Paradip Port Trust, Dhamra Port Company Limited, are the major operational ports on the eastern coast of Odisha. Apart from these ports there are other non-major upcoming ports viz. Subarnarekha, Chudamani, Astaranga in the state of Odisha which are in various stages of planning/development.

With the opening up of economy and formulation of new policy guidelines, there has been Significant and notable contribution of non-major ports in recent years. However there is still a lot of untapped potential and efforts have to be made by all concerned agencies to ensure that the ports are ready with the planned capacity in time.

***Land***

One of the major impediments to growth for the Indian steel industry in the past decade has come in the form of delays in acquisition of adequate 'Land' at the preferred locations.

Big mines and Steel plants, alumina/aluminum refineries of capacities with adequate economies of scale require vast stretches of contiguous land. Land acquisition in the country has been a strenuous process. The new law in the country has sought to ensure adequate compensation to the landowners and also that no land is acquired forcefully against the will of the owners. This is going to making land acquisition a difficult and expensive task for the private sector in particular. More than this, the government has not been able to acquire land even for the private sector in various states because of absence of land records which in turn has brought in multiple claimants. Unless the land records are straightened, land acquisition will remain difficult. Also, since there is no realistic market price for land to be acquired, it is up to the land owners collectively decide whether they will accept any price. This decision will depend on many market or non-market factors and in the process the buyer of the land is likely to be left in a state of uncertainty despite being willing to pay an asking price. The process of generating consent as per law is a long drawn and tedious process and most of the delays and failures have been on account of this rather than on inability to reach a price agreement.

There have been delays in acquiring environmental and forest clearances. The delays in such clearances can be seen in two areas: one, procedural and bureaucratic delays and two, the non compliance of the applicant to the existing law while making a proposal, that is, the applicant fails to meet the necessities as per law. This problem is not going to go away even if there is a strong government intent to cut procedural delays as the laws are themselves getting increasingly difficult in line with rising domestic consciousness and popular demand and compulsions to remain aligned to remain aligned with the norms set by the developed world and various commitments made by the country in international forums.

The government may pursue the concept of creation of SPVs to facilitate quicker acquisition of land, site development and getting necessary government clearances within the overall framework of the government policy in respect of land acquisition.

**Mineral specific recommendations**

***Bauxite***

Many of the existing leases are on the verge of expiry. While reserves in the existing mines are reported to be depleting, new leases are not being granted. No timely action has been considered for allocation of bauxite deposits to meet the Greenfield as well as Brownfield expansion of the alumina refineries. This needs to be developed.

***Iron ore***

The iron ore industry of the state is highly fragmented. The average size of the mining areas has dropped sharply and these are very small in global comparison. Operating very small mines involves high degree of material wastes. The government will have to ensure that productivity of the mines is improved with greater economies of scale. For that the state may bring in policies to consolidate mines which are significantly fragmented.

The iron ore mining industry, including the steel producers holding iron ore on captive basis will have to pay utmost attention to resource conservation of resources by making maximum use of low grade materials by engaging required beneficiation technologies and reducing wastes to the minimum. A lot of research is still required in this area, especially involving iron ore of Fe content less than 50 per cent and where the iron ore contains high alumina.

Since generation of fines is an integral part of the process of iron ore mining, it is imperative that the fines are either consumed by the domestic steel industry (after beneficiation and agglomeration) or sold in the export market. Otherwise huge stockpiles of fines can be an environmental hazard, besides being a loss in monetary terms. Very low grade of iron ore, if not beneficiated at present, should be encouraged to be exported.

Beneficiation and Pelletisation technologies need to be incentivised and capacity augmentation of pelletisation and sintering facilities to utilize low grade fines should become a priority area. Mostly fines are used in sintering or pelletisation and this step will enable use of the low grade ores. During last few decades of selective mining (lumos and concentrates) a substantial chunk of sub-grade or marginal grade ores (-60 +45% Fe) is lying unused in situ or staked in dumps. Together with the staked fines (-10 mm) and slimes (in tailing ponds) where significant tonnages of valuable hematite are presently locked up, value addition for its utilisation is the need of the hour.

The demand of iron ore at present has kept aside the reserves of Banded Iron Formation (BIF) in the inferior category resulting in huge piles of BIF as rejects. Utilization of these inferior grade materials by adopting suitable beneficiation techniques may reduce the burden on land and environment.

***Manganese Ore***

Due to increasing demand of manganese ore in ferro-manganese and silico-manganese industry, it is required to set up more facilities for sintering, briquetting and pelletizing of Manganese ore fines, which will also help in optimal utilization of manganese ore resources of the country.

***Chromite***

More than 95 per cent resources of chromite are in Odisha. India has been a net exporter of chromite and export volumes are fairly high compared to the reserves available. The projections of requirement of chromite by domestic steel and alloy industry in the coming years clearly indicate that with the present trends in exports continuing, the resources of chrome ore in the country may not last very long leaving the domestic end use industry to rely on imports.

Therefore, there is an urgent need to conserve this critical input for survival of domestic stainless and alloy steel industry and bring in effective fiscal/ other restrictive measures to curb exports of chromite. It is necessary that extensive exploratory drilling through national agencies i.e GSI/ MECL and state agencies are carried out to convert the remaining resources of chrome ore into the reserves category and to explore new areas for addition of mine reserves.

The ore deposits of Sukinda Valley of Odisha are generally of friable nature and all of them are open pit mines, which have reached the optimum pit limit. The stripping ratio in some cases has reached 1:20. Many open pit mines are required to be made underground and appropriate method of mining should be adopted for exploitation of medium as well as for friable ore. R and D efforts need to be intensified for using low grade ore, with or without blending, in the ferro alloys industry for overall increase in the resource base.

Odisha has 106 million tonnes of reserves and the ore is friable at 200-300 meter depth which cannot be mined with the present technology. Therefore, there is a need to focus on deep drilling for converting resources into the reserves particularly in Sukinda Valley. Development of underground mining technology for mining of friable and deep seated chrome ore reserves is required. Further, 65% of the resources remain yet to be explored and developed to establish the additional reserves and this need to be given priority by the state.

For mining one tonne of chrome ore, 15 tonnes of Over Burden (OB) is excavated in open cast mines. Management of waste lumps in Sukinda Valley is therefore a major environmental concern. These overburden lumps modify the land topography, affect the drainage system and prevent natural succession of plant growth resulting in acute problems of soil erosion and environmental pollution.

The contamination of hexavalent chromium in the local water bodies is a major concern and a source of environmental pollution in Odisha. The pumped out water from the mine therefore needs to be doused with ferrous-sulphate solution before being discharged.

The existing policy of reservation of chrome ore mining areas in favour of PSUs need to be discontinued. Rather, such areas may be de-reserved and thrown open for allotment to private sector to carry out exploration and development.

***Manganese Ore***

Improvement in quality and recovery of manganese ores by means of beneficiation and sintering process is required. Import of low phosphorous high grade manganese ore could be considered for blending, as the Indian ores by-and-large contain high phosphorous.

***Limestone***

Incentives on utilization of mineral beneficiation techniques with better recovery from low grade limestone and mine rejects may be considered by incentives such as reduction in royalty rates on such material.

***Nickel***

Nickel is used in the production of certain grades of stainless steel as well as special alloy steel. Since production of nickel in the country is negligible, the demand of the domestic end use industry is being met from imports. Domestic stainless and alloy steel industry has to face the vagaries of the widely fluctuating prices of nickel in international market. In view of this, there is a need for development of nickel resources in the country for exploring possibilities of nickel production from available resources of associated minerals.

There is a good potential of nickel in chromite overburden dumps of Sukinda Valley in Odisha and therefore, extraction of nickel from these chromite overburden dumps of Sukinda Valley need to be given a priority. Extraction of nickel is an energy intensive process and also involves environmental hazards associated with it. More intensive R and D efforts are required for finding economically and technically viable methods for the exploitation of nickel for chromite overburden dumps of Sukinda Valley.

***Copper Ore***

Odisha has only 6 million tonne of copper ore resources and have not been upgraded to reserve category. Therefore, there is an urgent need for detailed exploration by increased investment.

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**AN ACCOUNT OF INDIVIDUAL MINERAL RESOURCES OF THE STATE**

| BAUXITE | | |
|---|---|---|
| 1 | Chemical composition | |
| 2 | Types of Ores/Minerals | Bauxite is a mixture of Gibbsite Al(OH)3, Bohemite AlO(OH) and Diaspore (HAlO2) |
| 3 | Uses | For production of Alumina and as refractories, abrasives, minor quantities areused in ceramics, chemicals and ferroalloys industries. |
| 4 | Distribution | |
| | Koraput district | Panchpatmali, Pottangi, Maliparbat, Ballada, Kodingamali, Hatimali, Kakrimali, Chintamgundi, Kornapadikonda, Gurji, Medamgundi etc. |
| | Raygada district | Baphilimali, Sasubohumali, Pasangmali, Majhigaonmali, Sijimali, Tikrimali, Budharajamali, Taljhir, Dabuguda, Nunapaimali, Nangalghatmali. |
| | Kalahandi district | Karlapat- Pollingpadar, Kutrumali- Tangridongar, Lanjigarh Niyamgiri, Keluamali, Krishanmali. |
| | Kandhamal district | Anamini Parbat, Rukunicuttack, Deomal, Ushabali. |
| | Keonjhar District | Dholkata pahar, |
| | Sundargarh Dist. | Tantra, Kodalia , Jaldihi, Kusumdihi etc |
| | Malkangiri Dist. | Korkanda |
| 5 | Reserve/Grade | Total resources-1968582 Thousand tonnes (Reserves-516971 + Remaining Resources -1451611)<br>with >40% Al2O3 and <0.5% SiO2 |
| 6 | Mineral based industries in the State | Alumina plant at Damanjodi and Angul of NALCO, HINDAL Co., L&T, Vedant, L&T, Utkal Alumina. |
| 7 | Remarks | Orissa has 52.65 percent of all India bauxite resources |

| IRON ORE | | |
|---|---|---|
| 1 | Chemical composition | Haematite (Fe2O3), Magnetite (Fe3O4) |
| 2 | Types of Ores/Minerals | Haematite, Magnetite, Goethite, Siderite |
| 3 | Uses | Production of Iron and Steel & Sponge iron, Manufacture of Pigments used in drilling mud. |
| 4 | Distribution | |
| | Keonjhar District | Roida-Bhadrasahi, Unchabali, Jajang, Jurudi, Belkundi, Bolani, Khandbandh, Katamati, Thakurani, Gandhamardan, Sakradihi, Joda-East, Haromoto, Guali, Kasia, Malangtoli etc. |
| | Sundargarh District | Barsuan,Taldihi, Kalta, Khajuridihi, Palbeda, Ganua, Koira, Kurmitarpahar, Rantha, Mankarnacha, Baliapahar, Badamgarh pahar, Mithihurda-Basada etc. |
| | Mayurbhanj District | Suleipat, Ghusura, Gorumahisani, Badampahar, etc. |
| | Jajpur District | Daitari |
| 5 | Reserve/Grade | Total resources – (Hematite) 7182582 Thousand tonnes (Reserves- 3342003 + Remaining Resources - 3840579 )<br>Total resources – (Magnetite) 153 Thousand tonnes (Reserves- 0 + Remaining Resources - 153 ) |
| 6 | Mineral based industries in the State | Rourkela Steel Plant of SAIL. Kalinga Iron Works, Barbil, NINL(Dubri), MESCO(Jajpur Road) |
| 7 | Remarks | Odisha has 34.91 percent of all India iron ore resources |

| CHROMITE | | |
|---|---|---|
| 1 | Chemical composition | FeO Cr2O3 |
| 2 | Uses | Production of a variety of Steel and alloys , viz. Ferrochrome, charge chrome, ferro- silicon, chrome based refractory, chemical industries etc. |
| 3 | Types of Ores/Minerals | Stratiform type – Occurs as Bands, Lenses & Xenoliths. |

| | | |
|---|---|---|
| | | Varieties are friable ore, lumpy and granular ore, ferrugin ous ore, banded ore, disseminated ore. |
| 4 | Distribution | Confined to 3 belts such as<br>(1) Sukinda Ultramafic complex.<br>(2) Boula- Nuasahi Igneous complex. (3) Bhalukasuni<br>Important deposits –<br>Kamardah, Saruabil, Sukrangi, Kaliapani, Bhimtangar, Kalrangi, Chingripal, Gurjang, Kathpal, Birsal, Boula, Bangur, Nuasahi etc. |
| 5 | Reserve/Grade | Total resources-308381 Thousand tonnes (Reserves-106397+ Remaining Resources -201985) |
| 6 | Mineral based industries in the State | Charge Chrome Plant – Bamnipal, Randia & Choudwar.<br>Ferro Chrome Plant – Jajpur Road, Theruvali.<br>Refractory Plant – Rajgangpur, Belpahar, Lathikata. |
| 7 | Remarks (Indicate Orissa position with respect to India) | Odisha ranks first in term of resource and production of chrome ore. |

| **MANGANESE** | | |
|---|---|---|
| 1 | Mineral Composition | Chief manganese ore of commercial importance are:<br>Pyrolusite – $MnO_2$ Psilomelane – $MnO_2.n.H_2O$<br>(Hydrated manganese dioxide) |
| 2 | Uses | In iron & steel industries – 90 to 95% Ferromaganese industries Dry cell batteries Photography, leather, matchbox, paints textile, chemical industries |
| 3 | Type of Ore/Minéral : | Nodular, spherulitic, oolitic, laminated, soft, powdery |
| 4 | Distribution : | Manganese ore deposits of Orissa are associated with different Precambrian formations |
| | | Iron Ore Group – Bonai-Keonjhar Belt |
| | | Gangpur Group – Ghoriajor-Monmunda Area |
| | | Eastern Ghat Super Group – In Koraput, Kalahandi, Bolangir, Rayagada Dist. |

| | | |
|---|---|---|
| | Keonjhar district | Joda, Chormalda, Katasahi, Jurudi, Parelipado, Roida, Sidhamata,<br><br>Dubna, Jaribahal (Palsa), Katasahi-Kolha-Rudkela, Gurda |
| | Sundargarh district | Orahari, Patamunda, Malda, Mahulsukha, Nuagaon, Teheral, Sarkundo, Kusumdihi, Gonua, Dendulo, Kanthor-Koira, Oraghat, Kolmong |
| | Rayagada district | Nishikhal, Podakana, Khurigaon, Anajori, Liliguma, Ambadola, Rukunibari, Loharapara, Bhalumaska |
| | Balangir district | Champasar, Bharatbahal, Rengali, Tamiya, Babja, Ucchabapali, Banipali, Biarpali, Gadashankar, Bhaludungri |
| 5 | Reserve/Grade : | Total resources- 213142 Thousand tonnes (Reserves-34386 + Remaining Resources -178756) |
| 6 | Mineral based industries in the State: | Tata Iron & Steel Co. Ltd. Joda dist. Keonjhar VBC Ferro Alloys Ltd.- Rayagada Balasore Alloys Ltd.- Balgopalpur, Balasore Rourkela Steel plant,- Rourkela Kalinga Iron Works (by IDC)- Barbil |
| 7 | Remarks: | Odisha has 36.49 percent of all India Manganese resources |

| **LIMESTONE** | | |
|---|---|---|
| 1 | Chemical composition | Calcium carbonate, CaCO3: have some argillaceous/Siliceous material. |
| 2 | Uses | Cement industries, iron & steel industries including sponge iron & fertilizer industries, paper & pulp industries, water purification, alkali manufacturing etc. |
| 3 | Types of Ores/Minerals | Bedded/crystalline |
| 4 | Distribution | |

| | | |
|---|---|---|
| | Sundargarh District | Biramitrapur-Raibaga, Hatibari-Purnapani, Gatitangar, Lanjiberna, Khatkurbahal, Kiringsera, Bimta, Khairtola. |
| | Koraput District | Sunki, Dumajodi-Kundajodi, Parasagudi, Binsuli, Gupteswar. |
| | Malkangiri District | Kottametta, Nandiveda, Uskalvagu. |
| | Nuapada District | Chandpala, Sagundunguri, Deobahal, Rohapadar, Gorramura |
| | Balangir District | Dhamandanga, Kuliadaha, Hial |
| | Bargarh District | Dungri, Banjipalli,-Jampalli |
| | Nuapada District | Putka-Saramsil |
| 5 | Reserve/Grade | Total resources- 1782987 Thousand tonnes (Reserves-873932 + Remaining Resources -909055 ) |
| 6 | Mineral based industries in the State | Bisra Stone Lime Company (BSL), IDCOL, Orissa Cement Ltd., Rourkela Steel Plant (RSP) |
| 7 | Remarks | Odisha has limestone resources of 1782.99 million tones against country's resource of 184935.11 million tonnes |

| **DOLOMITE** | | |
|---|---|---|
| 1 | Chemical composition | Carbonate of Calcium and Magnesium containing 30.4% CaO, 21.7% MgO and 47.9% CO2 in purest form with SiO2, Al2O3, Fe2O3, Alkalies P & S etc. |
| 2 | Uses | Iron and Steel making, Ferroalloys, glass, foundary, cosmetics, refractory material. |
| 3 | Types of Ores/Minerals | Bedded type |
| 4 | Distribution | |
| | Sundargarh District | Biramitrapur-Raibaga, Gamardihi, Turmura, Lefripara, Dublabera, Sapai river section, Litibera. |
| | Bargarh District | Nuapara - Putka |

| | | |
|---|---|---|
| 5 | Reserve/Grade | Total resources-673045 Thousand tonnes (Reserves-167112 + Remaining Resources -505933) |
| 6 | Mineral based industries in the State | |
| 7 | Remarks | Odisha has Dolomite resources of 673.05 million tones against country's resource of 8084.57 million tonnes |

| **BASE METAL** | | |
|---|---|---|
| 1 | Chemical composition | PbS, ZnS , CuFeS2(Lead , Zinc ore, Copper sulphide ore) |
| 2 | Uses | Used in production of various alloys (brass, german silver & white metal), metallurgical industries, galvanization, pigments, dyeing, glue making etc. Lead is also used for construction of accumulators, cable covers, bronze, ammunition, and foil. Oxide of lead is used in glass making as flux, rubber industries. The nitrate of lead is employed in calico dyeing & printing. The acetate is used in medicine. |
| 3 | Types of Ores/Minerals | Galena, Sphalerite, Chalcopyrite as specks, stringers, pockets. |
| 4 | Distribution | |
| | Sundargarh District | Sargipalli – Galena, Chalcopyrite, Sphalerite, Cerussite, Azurite, Malachite, Covelite. |
| | Balangir District | Saintala Area –Galena, Malachite, Chrysocola & Pyrite. |
| | Bargarh District | Kermeli Area – Galena, Chalcopyrite. Malachite. Chrysocola, Pyrite. |
| | Kalahandi District | Sisakhal – Galena, Chalcopyrite, Malachite, Chrysocola, Pyrite |

| | | |
|---|---|---|
| | Deogarh District | Gangajal – Galena. Adas , Kesarpur – Chalcopyrite, Pyrrhotite |
| 5 | Reserve & Grade | Total resources (Copper ore)-6051 Thousand tonnes (Reserves-0 + Remaining Resources -6051)<br><br>Total resources ( Lead-zinc ore)- 1750 Thousand tonnes (Reserves-0 + Remaining Resources -1750) |
| 6 | Mineral based industries in the State | |
| 7 | Remarks | |

| **COAL** | | |
|---|---|---|
| 1 | Chemical composition | Coal is composed of Carbon, Hydrogen, Oxygen, Nitrogen, and Sulpher with some trace elements. |
| 2 | Uses | Thermal Power Plants |
| 3 | Types of Ores/Minerals | The Gondwana Coal of Orissa is non coking with grade varying from E to G. |
| 4 | Distribution | |
| | Angul - Dhenkanal District | Talcher Coalfield. |
| | Sambalpur- Jharsuguda District | Ib River coalfield |
| | | Uneconomic coal occurrences are found in following basins - Athgarh basin, Gaisilat basin, Athmallick basin, Katrinjia Basin. |
| 5 | Reserve/Grade | Total resources-75072.62 million tonnes (Proved -27791.30 + Indicated -37873.24+ Inferred-9408.08 )<br><br>Non- coking coal. |
| 6 | Mineral based industries in the State | TTPS – NTPC, Talcher NTPC - Kaniha |

| | | |
|---|---|---|
| | Remarks | Odisha has 24.89 percent of all India Coal resources |

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|---|---|---|---|
| **GRAPHITE** | | | |
| 1 | Mineral Composition: | Carbon 'C' (soft crystalline form of carbon) also known as plumbago, Black lead | |
| 2 | Uses: | Refractory industries – 45%<br>Crucible industries – 30%<br>Foundary – 9%<br>Others<br>(Dry cell battery, electrodes – 16%<br>Pencil, paint paper<br>Pesticides, asbestos products, graphite based sealing gasket graptitised greased etc.) | |
| 3 | Type of Ore/Mineral : | Flaky (crystalline) graphite Amorphous (crypto crystalline) graphite | |
| 4 | Distribution : | Confined to Precambrian Eastern Ghat complex. Distributed as follows | |
| | | Belt | Districts |
| | West Zone | i) Sargipali Belt<br>ii) Titlagarh Belt | Bargarh,<br>Nuapara Bolangir |
| | South Zone | iii) Tumudibandh Belt | Kalahandi, Kandhamal, Rayagada, Gajapati |
| | East Zone | iv) Dandatopa Belt | Angul |
| | District | Important Location | |
| | Angul | Dandatopa, Akharkata, Adeswara, Kamalpur, Girida | |
| | Bargarh | Temrimal,Tentulikhunti, Hardatal, Ranjitpur,Dahigaon, Menaramunda | |

| | | |
|---|---|---|
| | Balangir | Magur jungle, Gerdi, Fulmati, Ganjaudar, Rengali, SargipalliGolomunda,Dhandamunda, Godgadbahal, Mahulpati, Banjipali, Dukukamal, Beherapani, Beheramunda, Sapmunda, Mohanilaha, Malisira, Sargibahal |
| | Kalahandi | Sargipada, Gaidar, Singjharan, Lamer, Badibahal |
| | Kandhamal | Madagurha (Tumudibandh), Bargaon, Dhursi, Mahabali |
| | Nuapada | Kirkita, Dharamsagar, Gandabahali |
| | Rayagada | Lakhajharan, Bandhamandi, Sanamaturu, Malimunda, Kumbhibhata, Gundrugaon |
| | Nayagarh | Narajpada |
| 6 | Reserve/Grade: | Total resources- 18977420 tonnes (Reserves-485447 + Remaining Resources -18491973) |
| 7 | Mineral based industries in the State | Clay bounded graphite crucibles are in Titilagarh (Bolangir Dist.) Sambalpur (Sambalpur Dist.) |
| 8 | Remarks: | Low grade graphite of the state is beneficiated and sold to different firms inside & outside the state to make graphite products. Resource of graphite in Orissa is very less as compared to that of India, Orissa (4.467 million tones) share only about 3% of total resource of India (169 million tonnes) |

| **NICKEL ORE** | | |
|---|---|---|
| 1 | Chemical composition | Ni, Occurs in nature as Nickel Sulphide and Nickel Silicate/Nickel laterite. |
| 2 | Uses | Wide application in metallurgical industries for production of Stainless steel, special alloys, coinage, electroplating, chemical & petroleum refining industries, production of nickel catalysts. |
| 3 | Types of Ores/Minerals | Sulphidic ore and Oxidic ore as commonly associated with the weathered residium of ultramafic rocks in the lateritic profile. |

| | | |
|---|---|---|
| 4 | Distribution | Confined to Sukinda valley :- Kansa, Saruabil-Sukrangi, Kamarda, Kaliapani, Bhimtangar(TISCO) Simlipal Complex: - Bhilapoga Sector of Gurguria block |
| 5 | Reserve/Grade | Total resources-174.63 million tonnes (Reserves-0 + Remaining Resources -174.63)<br><br>Avg. grade-0.8% |
| 6 | Mineral based industries in the State | Nickel Technology Proving Plant at IMMT, Bhubaneswar |
| 7 | Remarks | Odisha has 92.40 percent of all India Nickel resources |

| **PYROPHYLLITE** | | |
|---|---|---|
| 1 | Chemical composition | Al2O3, 4 SiO2, H2O, (Al2O3 = 28.3%, H2O = 5%) |
| 2 | Uses | Used as high grade ceramic product, electric insulator and refractory material. Also used as filler in rubber paint, cosmetic, soap, cotton, paper and plastic manufacturing. |
| 3 | Types of Ores/Minerals | |
| 4 | Distribution : | |
| | Keonjhar District | Rebra-Palaspal belt. Deposits are Dhobakuchuda, Balabhadrapur, Amjore, Baliadihi, Madrangajodi, Nitigothe, Sidhamath, Uchkabeda, Rodvan, Rebna, Palaspal etc |
| | Mayurbhanj District | Joshipur, Gorumahisani |
| 5 | Reserve/Grade | Total resources- 12292135 tonnes (Reserves-4856180 + Remaining Resources -7435955)<br><br>(Al2O3 20-23%, SiO2 65-75%, Fe2O3 – 0.77, LOI – 3-4% |
| 6 | Uses | Used as high grade ceramic product, electric insulator and refractory material. Also used as filler in rubber paint, cosmetic, soap, cotton, paper and plastic manufacturing. |

| | | |
|---|---|---|
| 7 | Mineral based industries in the State | Four Crushing and Pulverizing Plants near Keonjhargarh and Joda. |
| 8 | Remarks | Odisha holds about 22% of the all India Pyrophillite resources. |

| **TIN ORE (Cassiterite)** | | |
|---|---|---|
| 1 | Chemical composition | $SnO_2$, sp.gr. - 7 |
| 2 | Uses | Tin and terne plate, alloys (bronge & brass), solder, babbittmetal, tinning, bare tin, foil, chemicals, tubing. |
| 3 | Types of Ores/Minerals | Occurs in primary source i.e. hydrothermal/pegmatite veins as well as secondary source in the form of alluvial deposits.Secondary deposits are economical for mining purpose. |
| 4 | Distribution | |
| | Malkangiri District | Bijapadar, Vederupalli, Durmaguda, Mohapadar, Kurumpalli, Gurupada, Permanasu |
| 5 | Reserve & Grade | Total resources- 15494 tonnes (Reserves-0 + Remaining Resources -15494) |
| 6 | Mineral based industries in the State | |
| 7 | Remarks | Odisha has resource of 15494 tonnes against country's resource of 83726166 tonnes |

| **PLATINUM GROUP OF ELEMENTS** | | |
|---|---|---|
| 1 | Chemical composition | Platinum Group of Elements (P.G.E) includes Platinum (Pt), Palladium (Pd), Rhodium (Rh), Ruthenium (Ru), Osmium (Os) & Iridium (Ir). |
| 2 | Uses | Auto catalyst, Jewellery, dentistry, industrial application. |
| 3 | Types of Ores/Minerals | PGE are strongly Siderophile & combine with iron to form metal alloys. Occur as (i) Free independent |

| | | |
|---|---|---|
| | | minerals in size range of 10 μ-40 μ (ii) inclusion in sulphides with size range of 5 μ to 10 μ. (iii) Solid solution in sulphides, silicate sand oxides. (iv) very fine (5 μ or less)particles in silicate-oxide gangue. |
| 4 | Distribution | Confined to three Geological Provinces, viz. : |
| | | Singhbhum – Orissa Craton |
| | | Bastar Craton |
| | | Eastern Ghats Granulitic terrain |
| | | Deposits/Prospective areas-<br>Balasore- Bhalukasuni, Jajpur- Sukinda valley, Keonjhar- BaulaNuasahi complex, Dhenkanal- Bhuban, Asurbandha, Maulabhanj- Keonjhar- Amjori sill |
| 5 | Reserve & Grade | Total resources-14.2 million tonnes (Reserves- 0+ Remaining Resources -14.2)<br>In Sukinda valley Pt values range between 2 to 400 ppb Pd values range between 1to 500 ppb In Amjori sill Pt value – up to 200 ppb Pd value – up to 60 ppb |
| 6 | Mineral based industries in the State | Nil |
| 7 | Remarks | |

| **DIAMOND** | | |
|---|---|---|
| 1 | Chemical composition | Carbon (C), S.G. 3.516 to 3.525, Hardness-10 |
| 2 | Uses | Jewellery, oil drilling, grinding, cutting & polishing, |
| 3 | Types of Ores/Minerals | Pure carbon in the form of Octahedral or Hexoctahedral or Dodecahedral occurs in colourless, pale |
| 4 | Distribution | Both primary and secondary diamond occurrences are reported in the State |

| | | |
|---|---|---|
| | | Primary – Kalamidadar valley in Nuapada district (64 L/5). It is under exploration by D.G. (O) |
| | | Secondary – Rocky river bed of Mahanadi river particularly from Binika in Sonepur dist. to Madhapur in Boudh dist., is reported to contain good quality gem diamonds. Important locations are Binika, Sonepur, Amuda, Sahupada, Boudh, Ramgarh, Madhupur, Morjakud |
| 5 | Reserve & Grade | Not estimated |
| 6 | Mineral based industries in the State | NIL |
| 7 | Remarks | Following the discovery of primary source of diamond, several prospective areas in the districts of Malkangiri, Kalahandi, Sambalpur, and Bargarh are under active R.P. by MNCs. All India resources of diamond is placed at 31.861million carats. |

| **GEMSTONE** | | |
|---|---|---|
| 1 | Chemical composition | Ruby – Aluminium oxide (Red/pink colour) |
| | | Sapphire- Aluminium oxides (bluish colour) |
| | | Aquamarine- Beryllium Aluminium Oxide (light blue) |
| | | Chrysoberyl – Beryllium Aluminium Oxides (yellow, green, brown) |
| | | Garnet – Magnesium, iron or calcium aluminium silicates |
| | | (colour – garnet of different colour depends on composition pyrope & almandine – Red, spessartite & hessonite-orange, rhodolite - purple |
| 2 | Uses | Ornamental stone, precious & semi-precious stone |
| 3 | Types of Ores/Minerals | Occurs as primary as well as secondary colluvial/alluvial deposit |

| | | |
|---|---|---|
| 4 | Distribution | Ruby – Kalahandi dist. -Jhillingdhar, Hinjlibahal, Kerumurda |
| | | Sapphire – Nuapara dist.- Katamal, Babebir, Amera |
| | | Aquamarine - Sambalpur dist.- Charbati, Beldihi |
| | | Bolangir dist -Saraibahal, Sakalimuri |
| | | Subarnapur dist.- Badmal, Mursundi |
| | | Chrysoberyl : Sambalpur dist. -Meghpal (Ranchipada) |
| | | Rayagada dist.- Paikadakalguda, Hata-Muniguda, Karlaghati |
| | | Koraput dist.- Turia |
| | | Kandhamal dist. -Belghar |
| | | Bolangir dist.- Ghumsar, Dehli |
| | | Kalahandi dist.- Sirja, Tandla |
| | | Garnet – Angul dist.- Magarmuhan-Jhili |
| | | Deogarh dist. -Budido, Palsoma, Jharposi |
| | | Subarnapur dist.- Siali, Nakatamunda, Binka, Sonepur |
| | | Boudh dist.- Boudh, Ramgarh, Kantamal, Manamunda |
| | | Kalahandi dist.- Banjipadar, Sargiguda |
| | | Nuapara dist.- Sardhapur, Patialpara, Budhapara, Mantritaria |
| | | Sambalpur dist.- Bagdhopa, Tabloi |
| 5 | Reserve/Grade | Not assessed |
| 6 | Mineral based industries in the State | |
| 7 | Remarks | |

| QUARTZ & QUARTZITE | | |
|---|---|---|
| 1 | Chemical composition | SiO2 |
| 2 | Uses | Ceramic, fertilizers, abrasives, electrical, paint, rubber, chemical and textile industries with different specifications. Transparent varieties of quartz such as rock crystals, amethyst, citrine, rose quartz and smoky quartz are used as semiprecious gem stones. Quartz is a piezoelectric material and is used in radio circuit, radars, ultrasonic devices, chronometers etc. Quartzites are used in refractory, iron and steel making, ferro-silicon, glass & ceramics etc |
| 3 | Types of Ores/Minerals | Quartz is found as either quartz crystals or as crystalline to cryptocrystalline quartz or as granular form. Quartzite is monomineralic rock constituted predominantly of quartz. |
| 4 | Distribution | Quartz occurs in the form of veins and as a constituent of pegmatites. In Orissa, quartz and silica sand deposits are located in the Precambrian terrains occurring in the districts of Boudh, Bargarh, Kandhamal, Keonjhar, Jharsuguda, Kalahandi, Mayurbhanj, Nuapada, Sonepur, Nabarangpur, Rayagada & Koraput. Quartzite occurs as beds interstratified with other metasedimentaries. Quartzite deposits in Orissa are located in Bolangir, Kalahandi, Koraput, Mayurbhanj, Keonjhar, Sambalpur, Sundargarh, Kandhamal, Angul and Bargarh districts. |
| 5 | Reserve/Grade | Total resources (Quartz Silica sand) - 73940 Thousand tonnes (Reserves-1367 + Remaining Resources -72573)<br><br>Total resources (Quartzite) - 60400 Thousand tonnes (Reserves- 6563 + Remaining Resources -53837)<br><br>Total resource about 70 million tonnes |
| 6 | Mineral based industries in the State | Ferro silicon plant - Theruvalli |

| | | |
|---|---|---|
| 7 | Remarks | Odisha has total resource of 60.4 mt. against that of India about 4383 mt |

| **MINERAL SAND** | | |
|---|---|---|
| 1 | Mineral Composition: | A group of commercial minerals found in beaches are known as mineral sand i) Ilmenite (FeO TiO2) ii) Rutile (TiO2) iii) Zircon (ZrO2, SiO2) iv) Monazite Phosphate of rare earth with variable amount of thorium v) Garnet (3ROR2O3, 3SiO2) vi) Sillimanite (Al2O3, SiO2) 2 |
| 2 | Uses | Ilmenite : Source of titanium, used for manufacture of titanium dioxide & ferro-titanium alloys |
| | | Rutile: Source of titanium used for titanium dioxide pigment, welding electrodes production of titanium sponge & metal |
| | | Zircon: Foundaries, ceramics, refractories |
| | | Sillimanite: Manufacture of high temperature refractories |
| | | Garnet: Used as abrasive |
| | | Monazite: Production of Rare Earth Compounds – Thorium, Uranium & Helium |
| 3 | Type of Ore/Mineral | Found as loose fragments (detrital grains) |
| 4 | Distribution | Found all along Orissa coast as placer deposit |
| | Ganjam Coast | All along Ganjam coast from A.P.-Orissa border to Ganjam-Puri border. Important Sector are: (i) Gopalpur Sector (ii) Chhatrapur Sector (iii) Prayagi Sector |
| | Puri Coast | On both side of Chilka lake (i) Paikirapur-Bajrakot Sector (ii) Brahmagiri Sector |
| 5 | Reserve/Grade | Total resource of 82 million tonnes. 12% approximately. |
| 6 | Mineral based industries in the State: | There is no industry in the state utilizing the mineral sand. All minerals after mineral separation are sold outside the state or export to other countries in raw state |

| | | |
|---|---|---|
| 7 | Remarks: | Orissa is a leading producer of mineral sand. It (82 million) shares about 14% of country's (632 million tones) heavy mineral resource. Chhatrapur deposit along Ganjam coast is the largest & richest deposit along east coast of India. Indian Rare Earth Ltd. (IRE) – a unit of Atomic Mineral Division, Govt. of India has been exploiting the natural resource of Chhatrapur coast since 1986 |

| **FIRE CLAY** | | |
|---|---|---|
| 1 | Chemical composition | Basically Kaolinite with Pyrometric Cone Equivalent – 18 |
| 2 | Uses | The only application of fire clay is as refractories. |
| 3 | Types of Ores/Minerals | Plastic, Semi-Plastic, Non-Plastic. |
| 4 | Distribution | Confined to 3 geographical belts Viz. (a) Talcher Coalfields, (b) Ib River Coalfield, (c) Upper Gondwana Athgarh Formation |
| | Angul District | Jagannath Colliery, South Balanda Colliery, Kaniha, Telisinga. |
| | Cuttack District | Talbasta, Brahmabasta, Ghantikhal. |
| | Khurda District | Jagannath Prasad, Andharua, Bantala |
| | Bargarh District | Telipali, Buramunda, Gaisilat. |
| | Ib River Coalfield area | Belpahar, Jurabaga, Darlipali, Rampur, Kuropali, Baria pahar, Lukopoli, Khinda, Rail, Ainlapali, Kirwara, Belpur, Siarmal, Kulda, Ratansera, Lakhanpur, Bundia, Bholamal etc. |
| 5 | Reserve & Grade | Total resources- 170076 Thousand tonnes (Reserves-911 + Remaining Resources -169166) |
| 6 | Mineral based industries in the State | Tata Refractories Ltd. – Belpahar. Orissa Cement Ltd. – Rajgangpur. Orissa Industries Ltd. – Lathikata. IPITATA Refractories Ltd. – Dhenkanal |

| | | |
|---|---|---|
| 7 | Remarks | Resource of India 713.52 million tones |

| **CHINA CLAY** | | |
|---|---|---|
| 1 | Chemical composition | Al2O3 2SiO2 2H2O, Fusion point 1785ºc |
| 2 | Uses | Ceramic, textile & paper coating, rubber, filler in paper, insecticide, calcinations industries |
| 3 | Types of Ores/Minerals | Lenses & pocket type |
| 4 | Distribution | |
| | Mayurbhanj District | Joshipur, Chanchbani, Dumuria, Jamda, Kadodiha, Jamkeswar & Thakurmunda .Dhobadiha, Kalapathuria, Sorisbari, Jamkesar, Kalikapur, |
| | Keonjhar District | Ramchandrapur, Kathkaranjia, Nanua, Nijli, Mangalpur, Tikasil etc. |
| | Nawarangpur District | Unchheibera, Guras, Bholpara, Pradhanpara |
| | Rayagada District | Devdhara, Sorispadar, Ambagan |
| | Bargarh District | Kudingmali Khola |
| 5 | Reserve & Grade | Total resources- 280926 Thousand tonnes (Reserves- 3901+ Remaining Resources -277025) |
| 6 | Mineral based industries in the State | |
| 7 | Remarks | |

| **DIMENSION STONE** | | |
|---|---|---|
| 1 | Chemical composition | |
| 2 | Types of Ores/Minerals | Hard rocks occurring as sheets or mounds mainly – |

| | | |
|---|---|---|
| | | Charnokite, Quartzofelspathic gneiss, Granite gneiss, Augen gneiss, Granulites, Dolerite, Gabbro & Stromatolitic limestone, Marble. |
| 3 | Distribution | |
| | Angul District | Gobinda Pana Sahi, Durgapur Panasahi |
| | Dhenkanal District | Mahapada, Haripur, Radhadeipur. |
| | Gajapati District | Raghunathpur, Sanadola, Sanatundi, Baguda, Lubarsingi,Sundaraba, Sabarapalli, Kankargurha, Taraba, Ranala, Nuasahi,Ragaisingi, Bhramarpur, Tundari & Sauri, Marlaba, Barahapadar, Mahulpadar, Kuddada, Jhingiriguda, Puigurha, Hatimunda, Kharia, Burhamali, Guruduma, Laxmipuram, Venkatpuram, Salkijeypore, Addanguda, Appanayupeta, Antarba, Jamudiha,Poibandha, Khariguma, Bariabandha, Dengama, Kandha Adaba, Narayanpur, Khariaguda, Mandimera. |
| | Ganjam District | Gudiapalli area, Dakhinpur, Lanja, Sukunda, Lathi, Bada Dumula,Kandasara, Dasipur, Mathura, Radhamohanpur, Gobinda nagar, Krushnanagar, Nuaparha, Baranga, Dutipur, Gopalpur, Sarahanaipalli, Manikyapur, Hinjlicut, Pathan Punji, Kirtipur, Sahaspur, Butasarsingi, Purusottampur, Khetapalli, Patapur, Gudiali, Mandalpur, Matisahi, Kohibiradi, Nuamundia, Bishnuchakra, Kanteipalli, Laxmipur, Jahada, Thurathora,Olamba, Chakunda, Baragarh, Badangi, Ekatapur, Matisahi etc. |
| | Nawarangpur District | Cheptiamb, Karlapada, Samarcharan, Hatibari, Tohra. |
| | Nuapada District | Bhaira, Dalipathara, Damarkhol. |
| | Cuttack District | Murdamekh, Paikregeda, Jagannath Prasad, Saradapur Patna,Jogibahali, Kakuria, Pancham, Sukad, Sitarampur, Ghantapara, Bhejiapara, Basantpur, Ramachandrapur, Mulikata, Tagila, Rusigara, Kanpur. |
| | Nayagarh District | Chuapalli, Mardarajpur, Khuntabandha, Singhapara, Khandapara, Sunamuhi, Kantilo, Laxmiprasad, Bebartapur, Malisahi, Bhandar Parbat, Damasahi, Madhy |

| | | |
|---|---|---|
| | | akhand, Koilama. |
| | Kandhamal District | Pandimaha, Nilungia, Gambuli, Kurmungia, Kulakanda, Tudipaji. |
| | Boudh District. | Bakapalli, Chhatrang, Baisparha, Madhapur |
| | Sambalpur District. | Badmal, Chhanchanpalli, Sahaspur, Salhesingha, Bhoipali. |
| | Subarnapur District | Goudgad, Mahukhandi, Saraspadar. |
| | Khurda District | Khuamundia, Hatia. Kalinga, Kaluchua, Dhobui,Dhania, Bhogpur, |
| 4 | Reserve & Grade | Total resources- 1843060 Thousand cum (Reserves-80000 + Remaining Resources -1763060) |
| 5 | Mineral based industries in the State | 19 active industrial units in the district of Cuttack- 4, Khurda- 9,<br>Koraput- 2, Bolangir- 2, Ganjam- 1, Keonjhar- 1,<br>Major Entrepreneurs are -Laxmi Granites, Narayani Granites Bhubaneswar, Minakshi Granites- Titlagarh, Vishnu GranitesJeypore, Shekhawat Granites- Mahuda(Ganjam), Kalinga Granites- Cuttack. |
| 6 | Remarks | There is ample scope for development for dimension and decorative stone industries in the State. Besides, the wastes generated from mining have also end use as construction materials, filling materials, road materials, ballast for railways,manufacture of abrasives, stopes in coal mines to suppress coal dust, soil sweetener etc. |

## PRODUCTION OF MINERALS/ORES IN ODISHA DURING PAST FIVE YEARS

| Mineral/Ore | Unit | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 |
|---|---|---|---|---|---|---|
| Coal | '000t | 106409 | 102565 | 105476 | 110132 | 112914 |
| Bauxite | t | 4879580 | 4856808 | 5055269 | 5460037 | 7635195 |
| Chromite | t | 3419031 | 4317159 | 2917750 | 2827067 | 2851832 |
| Iron Ore | '000t | 80896 | 76128 | 67414 | 64439 | 76227 |
| Manganese Ore | t | 605313 | 655984 | 562013 | 527966 | 660438 |
| Dolomite | t | 1316371 | 1358156 | 1114724 | 992470 | 657211 |
| Fireclay | t | 51312 | 0 | 0 | 0 | - |
| Garnet (abrasive) | t | 11080 | 18474 | 19889 | 23898 | 19092 |
| Graphite | t | 46192 | 20472 | 18859 | 6530 | 10139 |
| Iolite | kg | 758 | 4 | 0 | 0 | 0 |
| Kaolin | t | 4558 | 2601 | - | | |
| Kyanite | | | | | - | - |
| Sillimanite | t | 14117 | 17889 | 17489 | 12314 | 11722 |
| Limestone | '000t | 2937 | 3923 | 3136 | 3912 | 3827 |
| Pyrophyllite | t | 11926 | - | | 0 | 10066 |
| Gemstone | kg | | | | 72.0 | 51.2 |
| Quartz | t | 1570 | 11414 | 6241 | 7720 | 6976 |
| Quartzite | t | 29886 | 4608 | 4715 | 26818 | 32026 |
| Silica Sand | t | 2800 | - | 54000 | | |
| Soap stone | | | | | - | - |

(Source: Indian Minerals Yearbook 2012, 2013 and Monthly Statistics of Mineral Production, March 2014, Indian Bureau of Mines, Nagpur)

## EXPORT OF MINERALS/ORES FROM ODISHA DURING PAST FIVE YEARS

(Quantity in lakh tons, value in Rs crore)

| Mineral/Ore | 2009-10 | | 2010-11 | | 2011-12 | | 2012-13 | | 2013-14 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Qty | Value | Qty | Value | Qty | Value | Qty | Value | Qty | Value |
| Chromite | 4.66 | 464.11 | 4.34 | 669.31 | 3.50 | 430.69 | | | 2.01 | 20.28 |
| Iron ore | 148.68 | 4224.00 | 241.02 | 15155.22 | 129.67 | 3748.68 | | | 88.15 | 2933.14 |
| Mineral sand | 2.55 | 72.32 | 2.25 | 63.81 | 1.56 | 52.42 | | | 1.35 | 432.03 |
| Manganese | - | - | 0.03 | 5.95 | 0 | 0 | | | - | - |
| Others | - | - | - | - | - | - | | | - | - |
| **Total** | | **4760.43** | | **15894.29** | | **4231.79** | | | | **3386.05** |

Source: Odisha Economic Survey, 2014-15

## DISTRICT WISE UNFC RESOURCES IN ODISHA
## (As on 01/04/2013)

| MINERAL | UNIT | DISTRICT | RESERVE | REMAINING RESOURCES | TOTAL |
|---|---|---|---|---|---|
| **BAUXITE** | **1000 TONNES** | BOLANGIR | 0 | 196224 | 196224 |
| | | KALAHANDI | 0 | 467216 | 467216 |
| | | KANDHAMAL | 0 | 40740 | 40740 |
| | | KEONJHAR | 0 | 28166 | 28166 |
| | | KORAPUT | 333027 | 562800 | 895827 |
| | | MALKANGIRI | 0 | 17000 | 17000 |
| | | RAYGADA | 182587 | 110422 | 293009 |
| | | SUNDARGARH | 1357 | 29043.00 | 30400 |
| | | **TOTAL** | **516971** | **1451611** | **1968582** |

| | | | | | |
|---|---|---|---|---|---|
| **CHROMITE** | **1000 TONNES** | BALASORE | 0 | 3 | 3 |
| | | DHENKANAL | 802 | 1724 | 2526 |
| | | JAJPUR | 100236 | 183541 | 283777 |
| | | KEONJHAR | 5359 | 16717 | 22075 |
| | | **TOTAL** | **106397** | **201985** | **308381** |

| | | | | | |
|---|---|---|---|---|---|
| **COBALT** | **MILLION TONNES** | JAJPUR | 0 | 30.91 | 30.91 |

| | | | | | |
|---|---|---|---|---|---|
| **COPPER (Ore)** | 1000 TONNES | MAYURBHANJ | 0 | 3430 | 3430 |
| | | SAMBALPUR | 0 | 2621 | 2621 |
| | | **TOTAL** | **0** | **6051** | **6051** |

| | | | | | |
|---|---|---|---|---|---|
| **COPPER (Metal)** | 1000 TONNES | MAYURBHANJ | 0 | 37.98 | 37.98 |
| | | SAMBALPUR | 0 | 25.46 | 25.46 |
| | | **TOTAL** | **0** | **63.44** | **63.44** |

| | | | | | |
|---|---|---|---|---|---|
| **DOLOMITE** | 1000 TONNES | BARGARH | 0 | 50000 | 50000 |
| | | KEONJHAR | 0 | 63 | 63 |
| | | KORAPUT | 0 | 80342 | 80342 |
| | | SAMBALPUR | 0 | 80100 | 80100 |
| | | SUNDARGARH | 190715 | 408539 | 599254 |
| | | **TOTAL** | **190715** | **619044** | **809759** |
| | | | | | |
| **APHITE** | TONNE | BARGARH | 6097 | 672684 | 678781 |
| | | BAUDH | 0 | 52000 | 52000 |
| | | BOLANGIR | 73946 | 5254678 | 5328624 |
| | | KALAHANDI | 0 | 1034756 | 1034756 |
| | | KANDHAMAL | 0 | 780030 | 780030 |
| | | KORAPUT | 0 | 227922.85 | 227923 |
| | | NAWAPARA | 0 | 555803 | 555803 |
| | | RAYGADA | 405404 | 9914099 | 10319503 |
| | | **TOTAL** | **485447** | **18491973** | **18977420** |

| | | | | | |
|---|---|---|---|---|---|
| **IRON ORE(HEAMATITE)** | 1000 TONNES | DHENKANAL | 0 | 1120 | 1120 |
| | | JAJPUR | 0 | 3510 | 3510 |
| | | KEONJHAR | 2312598 | 2100987 | 4413585 |
| | | KORAPUT | 0 | 2650 | 2650 |
| | | MAYURBHANJ | 34493 | 70991 | 105484 |
| | | SAMBALPUR | 0 | 50000 | 50000 |
| | | SUNDARGARH | 994911 | 1611322 | 2606233 |
| | | **TOTAL** | **3342003** | **3840579** | **7182582** |

| | | | | | |
|---|---|---|---|---|---|
| **IRON ORE(MAGNATITE)** | 1000 TONNES | KEONJHAR | 0 | 43 | 43 |
| | | MAYURBHANJ | 0 | 110 | 110 |
| **LATERITE** | 1000 TONNES | KORAPUT | 0 | 1227 | 1227 |

| | | | | | |
|---|---|---|---|---|---|
| **LEAD-ZINC ORE** | 1000 TONNES | SUNDARGARH | 0 | 1750 | 1750 |

| | | | | | |
|---|---|---|---|---|---|
| **LEAD METAL** | | | 0 | 76.96 | 76.96 |

| | | | | | |
|---|---|---|---|---|---|
| **MANGANESE ORE** | 1000 TONNES | BOLANGIR | 0 | 2094 | 2094 |
| | | KEONJHAR | 10286 | 130021 | 140307 |
| | | KORAPUT | 0 | 1248 | 1248 |
| | | MAYURBHANJ | 0 | 57 | 57 |
| | | RAYGADA | 0 | 318 | 318 |
| | | SAMBALPUR | 0 | 120 | 120 |
| | | SUNDARGARH | 24100 | 44898 | 68998 |
| TOTAL | | | **34386** | **178756** | **213142** |

| | | | | | |
|---|---|---|---|---|---|
| **NICKEL ORE** | MILLION TONNES | JAJPUR | 0 | 139.66 | 139.66 |
| | | KEONJHAR | 0 | 7.97 | 7.97 |
| | | MAYURBHANJ | 0 | 27.00 | 27.00 |
| | | **TOTAL** | **0** | **174.63** | **174.63** |
| | | | | | |
| **SILVER ORE** | TONNE | SUNDARGARH | 0 | 1749500 | 1749500 |
| **SILVER METAL** | | | 0 | 64.91 | 64.91 |

| | | | | | |
|---|---|---|---|---|---|
| **TIN ORE** | TONNE | KORAPUT | 0 | 14858 | 14858 |
| | | MALKANGIRI | 0 | 636 | 636 |
| | | **TOTAL** | **0** | **15494** | **15494** |

| | | | | | |
|---|---|---|---|---|---|
| **TIN METAL** | TONNE | KORAPUT | 0 | 66.83 | 66.83 |
| | | MALKANGIRI | 0 | 501 | 500.78 |
| | | **TOTAL** | **0** | **567.61** | **567.61** |

| | | | | | |
|---|---|---|---|---|---|
| **VANADIUM** | TONNE | BALASORE | 0 | 73920 | 73920 |
| | | MAYURBHANJ | 0 | 4790875 | 4790875 |
| | | **TOTAL** | **0** | **4864795** | **4864795** |

| | | | | | |
|---|---|---|---|---|---|
| **VANADIUM Contained V2O5** | TONNE | BALASORE | 0 | 236.54 | 236.54 |
| | | MAYURBHANJ | 0 | 13321.4 | 13321.4 |
| | | **TOTAL** | **0** | **13557.94** | **13557.94** |

*Indian Bureau of Mines, Nagpur, Government of India*

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