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(Part- I : GENERAL REVIEWS)

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INDIAN MINERAL INDUSTRY AND NATIONAL ECONOMY

(ADVANCE RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
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1 Indian Mineral Industry & National Economy

NATIONAL ECONOMY

India continues to remain the fastest growing major economy in the world in 2018-19, despite a slight moderation in its GDP growth from 7.2 per cent in 2017-18 to 6.8 per cent in 2018-19. On the other hand, the world output growth declined from 3.8 per cent in 2017 to 3.6 per cent in 2018. The slowdown in the world economy and Emerging Markets and Developing Economies (EMDEs) in 2018 was mainly due to escalation of trade tensions between US and China, tighter credit policies in China and financial tightening alongside the normalisation of monetary policy among the larger advanced economies. In 2019, the growth rate of the world economy and EMDEs are projected to slowdown by 0.3 and 0.1 percentage respectively, whereas the Indian economy is forecast to increase. India forms part of 30 per cent of the golbal economy, whose growth is not projected to decline in 2019, as per the World Economic Outlook of IMF published in April, 2019.

India is the seventh largest economy in terms of Gross Domestic Product (GDP) in current US$ and has emerged as the fastest growing major economy. The average growth rate of India was not only higher than China's during 2014-15 to 2017-18 but much higher than that of other top major economies (measured in terms of GDP at current US$ terms) as well. With Purchasing Power Parity (PPP) adjustments, India's GDP at current international dollar, ranks third in the world.

India's growth of real GDP has been high with average growth of 7.5 per cent in the last 5 years (2014-15 onwards). The Indian economy grew at 6.8 per cent in 2018-19, thereby experiencing some moderation in growth when compared to the previous year. This moderation in growth momentum is mainly on account of lower growth in 'agriculture & allied', 'trade, hotel, transport, storage, communication and services related to broadcasting' and 'public administration & defence' sectors.

There was contraction in 'Agriculture & allied' sector in the last quarter of 2018-19, though growth was reasonable in the previous three quarters. Growth of industry sector also experienced tempering in successive quarters of 2018-19 mostly on account of growth deceleration in the manufacturing sector.

On the external front, current account deficit (CAD) increased from 1.9 per cent of GDP in 2017-18 to 2.6 per cent in April-December 2018. The widening of the CAD was largely on account of a higher trade deficit driven by rise in international crude oil prices (Indian basket). The trade deficit increased from US$ 162.1 billion in 2017-18 to US$ 184 billion in 2018-19.

Nominal growth of both merchandise exports and imports declined in US dollar terms in 2018-19, as compared to 2017-18. However, the decline was much sharper in merchandise imports, which reduced from 21.1 per cent to 10.4 per cent. Growth of merchandise imports declined as oil price driven increase in growth of oil imports was more than offset by contraction in value of gold imports and lower growth in the value of non-oil non-gold imports.

Growth in service exports and imports in US dollar terms declined to 5.5 per cent and 6.7 per cent respectively in 2018-19, from 18.8 per cent and 22.6 per cent respectively in 2017-18.

Net Foreign Direct Investment (FDI) inflows grew by 14.2 per cent in 2018-19. Among the top sectors attracting FDI equity inflows, services, automobiles and chemicals were the major categories. By and large, FDI inflows have been growing at a high rate since 2015-16. This pick-up indicates the improvement in confidence of the foreign investors in the Indian economy.

As per Provisional Actuals (PA) for 2018-19, fiscal deficit stood at 3.4 per cent of GDP. In 2018-19, direct taxes grew by 13.4 per cent (PA) owing to improved performance of corporate tax. However, indirect taxes fell short of budget estimates by about 16 per cent, following a shortfall in GST revenues (including CGST, IGST and compensation cess) as compared to the budget estimates. GST was implemented in July 2017. After the initial transitional issues following the roll-out of GST, revenue collection picked up from annual average of ₹ 89.8 thousand crore in 2017-18 to ₹ 98.1 thousand crore in 2018-19. Accordingly, Gross Tax Revenue as a proportion of GDP declined to 10.9 per cent of GDP in 2018-19 (PA), lower by 0.3 percentage points as compared to 2017-18.

Government stood by its path of fiscal consolidation in 2018-19. The new targeting framework was adopted in 2018-19 which rests on the twin pillars of reducing debt and fiscal deficit. There has been consolidation of revenue expenditure while expenditure quality has improved with gradual tilt towards capital spending of the Central Government in 2018-19.

There has been a progressive reduction in primary and fiscal deficits. Primary deficit (amount

by which a government's total expenditure exceeds its total revenue, excluding interest payments on its debt) of the central government has been consistently declining and now stands at 0.3 per cent of GDP in 2018-19 (PA) from 0.7 per cent in 2015-16.

Gross Value Added (GVA), reflects the supply or production side of the economy to which net indirect taxes on products are added to get GDP at market prices. Growth of GVA reflected a decline in economic activity, registering a growth of 6.6 per cent in 2018-19, lower than 6.9 per cent in 2017-18. Growth of net indirect taxes was 8.8 per cent in 2018-19, lower than that of 2017-18, on account of loss of momentum in economic activity.

Real growth in 'Agriculture & allied' sector was lower in 2018-19 at 2.9 per cent, after two years of good agriculture growth. As per the 3rd Advance Estimates released by Ministry of Agriculture & Farmers Welfare, the total production of food grains during 2018-19 is estimated at 283.4 million tonnes, as compared to 285 million tonnes in 2017-18 (final estimate). There was a significant decline in food prices in 2018-19 as indicated by nearly zero per cent consumer food price inflation, with prices contracting straight for five months in the year. This is reflected in the decline of the nominal growth rate of GVA in agriculture from 7.0 per cent in 2017-18 to 4.0 per cent in 2018-19. Share of agriculture sector in total GVA has been consistently falling and now stands at 16.1 per cent in 2018-19.

Growth in industry accelerated during 2018-19 on the strength of improving manufacturing and construction activity, which have more than offset the deceleration in the other two sub sectors, 'mining & quarrying' and 'electricity, gas, water supply & other utility services'. Manufacturing accounted for 16.4 per cent of total GVA in 2018-19, marginally higher than that of 'Agriculture & allied' sector.

The growth in manufacturing sector picked up in 2018-19, although the momentum slowed down towards the end of the financial year with a growth of 3.1 per cent in fourth quarter of the year, as compared to 12.1 per cent, 6.9 per cent and 6.4 per cent in first, second and third quarter, respectively.

Construction sector growth is estimated using growth of production of cement and consumption of finished steel. Production of cement and consumption of finished steel grew at 13.3 per cent and 7.5 per cent respectively in 2018-19, higher than their growth rates in 2017-18 and this reflects in higher growth of construction sector in 2018-19.

Service sector is the most dynamic sector in the economy and has remained the key driver of economic growth along with being a major contributor to GVA and export basket of the Indian economy. Service exports has become one of the mainstay of India's total exports increasing manifold, from ₹ 0.746 lakh crore in 2000-01 to ₹ 14.389 lakh crore in 2018-19, raising its share in total exports from 26.8 per cent to 38.4 per cent. Share of India in world service exports has also increased from 2 per cent in 2005 to 3.5 per cent in 2017. This share is much higher than that of manufacturing exports, which stands at 1.8 per cent in 2017.

The share of services sector in overall economy has been increasing and now stands at a little over 54 per cent.

The 'Financial, real estate and professional services' sector grew at 7.4 per cent in 2018-19, higher as compared to 6.2 per cent in 2017-18. This sector accounts for more than 20 per cent of overall GVA of the economy. Major component of this sector is the 'Real estate and professional services', which has a share of more than 70 per cent

India's Merchandise Trade

Exports

India's merchandise exports including re-exports had reached the level of US$ 329.53 billion in 2018-19.

The growth in merchandise exports from 5.2 per cent in 2016-17 to 8.8 per cent in 2018-19 mainly resulted from high growth in Petroleum, Oil & Lubricants (POL) exports, which increased from 3.1 per cent in 2016-17 to 24.2 per cent in 2018-19, while non-POL exports grew modestly from 5.4 per cent to 7.0 per cent during the same period. However, from Q1 of 2018-19, the growth rate of POL exports has been declining continuously and turned negative in Q4. Be that as it may, petroleum products continue to have the largest share in India's export basket at 14.1 per cent in 2018-19.

Imports

Merchandise imports fell from a high of US$ 490.7 billion in 2012-13 to US$ 381 billion in 2015-16 and thereafter registered a sharp increase of 10.4% to US$ 514.03 billion in 2018-19 as compared to previous year.

The growth in merchandise imports from 0.9 per cent in 2016-17 to 10.4 per cent in 2018-19 can also be attributed to a sharp rise in growth rate of POL imports from 4.8 per cent in 2016-17 to 29.7 per cent in 2018-19. The non-POL imports also increased from (-)0.2 per cent in 2016-17 to 4.5 per cent in 2018-19, possibly depicting a downturn in the economy. This appears to be all the more so as in Q4 of 2018-19 both POL and Non-POL imports registered negative growth rate. Even then, Crude petroleum continues to be the largest imported commodity in 2018-19 with

a share of 22.2 per cent, followed by Gold/Silver; Pearl, Precious, Semi-Precious Stones; and Petroleum Products having share of 6.4 per cent, 5.3 per cent and 5.2 per cent respectively, in the import basket.

Trade deficit

The trend in merchandise trade deficit reflect the movement of merchandise exports net of merchandise imports. For the recent period, growth of both merchandise exports and merchandise imports accelerated from 2016-17 to 2017-18. However, thereafter the annual growth rate of merchandise exports fell from10 per cent in 2017-18, to 8.8 per cent in 2018-19. Annual growth rate of merchandise imports also fell from 21.1 per cent in 2017-18 to 10.4 per cent in 2018-19. In Q4 of 2018-19, merchandise imports registered negative growth that has led to slight improvement in the trade and current account deficit.

Placing the trends of merchandise exports and imports in the global context , it appears that growth of India's merchandise imports fell on the back of lower GDP growth in 2018-19 among other factors, while slower growth of merchandise exports may have resulted from slower growth of world output and trade.

Major Products Exchanged in 2018-19

In 2018-19, petroleum products continued to be the largest exported commodity, in value terms, with a share of 14.1 per cent of the country's export basket. Other major exports included pearls, precious, semi-precious stones as also gold and other precious metal jewellery besides drug formulations, biologicals. However, it was exports of organic chemicals which grew the highest at 30.6 per cent in 2018-19.

In the import basket of 2018-19, petroleum crude, at 22.2 per cent had the largest share followed by gold and other precious metal jewellery at 6.4 per cent and pearls precious/semi-precious stones at 5.3 per cent. Growth rates of gold and pearls (including precious and semi-precious stones) however declined in 2018-19. Electronic components grew the fastest at 54.6 per cent in 2018-19, followed by petroleum crude and iron & steel.

Major trading partners in 2018-19

India's largest export destination country continues to be the United States of America (USA), which accounted for 16 per cent of India's exports (in value terms) in 2018-19, followed by United Arab Emirates (UAE), China and Hong Kong . However, in 2018-19, growth of India's exports to the Netherlands was the highest (40.7 per cent), followed by China (25.6 per cent) and Nepal (17.4 per cent).

China continues to be the largest source of imports of India accounting for 13.7 per cent of the total imported value in 2018-19. The other important countries from which India imports are the USA, UAE and Saudi Arabia. In terms of growth rates, imports from Singapore grew the highest at 118.1 per cent in 2018-19, followed by Hong- Kong (68.5 per cent) and UAE (37.0 per cent). Further, though China continues to be the largest exporter to India, India's imports from China fell from US$76.4 billion in 2017-18 to US$70.3 billion in 2018-19, registering a negative growth.

MINING INDUSTRY

The index of mineral production (excluding atomic minerals) (with base year 2011-12=100) for 2017-18 at 104.9 displayed a growth of 2.3% as compared to the previous year.

The total value of mineral production (excluding atomic minerals and fuel minerals) was at ₹ 1,12,632 crore during 2017-18.

The value of metallic minerals in 2017-18 at ₹ 50,440 crore increased by about 27% over the previous year. Among the principal metallic minerals, iron ore contributed ₹ 34,263 crore or 68%, lead (concentrate) & zinc (concentrate) together ₹ 6,123 crore or 12%, chromite ₹ 3,211 crore or about 6%, manganese ore ₹ 1,972 crore or about 4%, silver ₹ 2,118 crore or 4%, bauxite ₹ 1,502 crore or 3% and the remaining value was from copper (ore & concentrate), gold (ore & metal), lead & zinc ore and tin concentrates (Table-1).

In metallic ores, production increased in respect of copper concentrate (5%), gold (3%), lead concentrate (14%), zinc concentrate (4%), manganese ore (8%), silver (21%), tin concentrate (38%), and iron ore (3%). The production of chromite decreased by about 7% and bauxite by 10% during 2017-18.

The value of production of non-metallic minerals at ₹ 8,197 crore during 2017-18 decreased by 2% as compared to the previous year. Limestone with a contribution of 91% of the total value of non-metallic minerals, retained its leading position in 2018-19 in the group. The other important non-metallic minerals in value terms, were phosphorite/rock phosphate (5%) and garnet (abrasive) (2%).

Table – 1 : Indian Mineral Industry : Value of Production*
2015-16 to 2017-18

(In ₹ crore)

Sector	2015-16 (R)	2016-17 (R)	2017-18 (P)
Total : All Minerals	**95188**	**101783**	**112632**
Metallic minerals	33622	39760	50440
Non-metallic minerals	7572	8029	8197
Minor Minerals@	53994	53994	53994

** Excluding the minerals declared as prescribed substances under the Atomic Energy Act,1962; fuel minerals and minor minerals.*

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

Reporting Mines

Reporting mine is defined as "A mine reporting production or reporting 'nil' production during a year but engaged in developmental work such as, overburden removal, underground driving, winzing, sinking work, exploration by pitting, trenching or drilling as evident from the MCDR returns".

There were 1430 reporting mines (excluding atomic fuel and minor minerals) in India located in 21 states during 2017-18. Among them, 638 belong to metallic minerals and 792 to non-metallic minerals (Table-2). There were 146 mines in the Public Sector and the remaining 1,284 mines were under Private Sector.

Role of Public Sector

The public sector has played important role in the overall mineral production in 2017-18. The share of public sector in fuel minerals was dominant in 2017-18.

The entire production of copper ore & conc. among metallic minerals and diamond, fluorite, selenite and sulphur in respect of non-metallic minerals was reported from the public sector. By and large, the entire production of gold (primary) came from public sector during 2017-18.

Gross Value Added from Mining & Quarrying Sector

The Ministry of Statistics & Programme Implementation has released the new series of national accounts, revising the base year from 2004-05 to 2011-12 in the year 2015. The industry-wise estimates are now presented as Gross Value Added (GVA) at basic prics. Certain changes have been made in this series including for Mining & Quarrying industry. During 2017-18, Mining and Quarrying industry accounted for about 2.5% of the GVA at current prices. The GVA at current and constant prices for the period from 2015-16 to 2017-18 is furnished in Tables- 3 & 4.

Table – 2 : Number of Reporting Mines
2016-17 and 2017-18

Sector		2016-17*	2017-18# (P)
All Minerals		**2020**	**1430**
I	(i) Public sector	637	146
	(ii) Private sector	1383	1284
II	(i) Fuel Minerals (e)	512	-
	(ii) Metallic minerals	644	638
	(iii) Non-metallic minerals	864	792

**: Excluding atomic and minor minerals for 2016-17.*
#: Excluding atomic, fuel and minor minerals during 2017-18.

Employment

The estimated average daily employment of labour engaged in mining sector (excluding atomic and minor minerals) was 4,77,399 in 2017-18. Of this, 3,76,819 or 79% were in public sector and 1,00,580 or 21% in private sector. Fuel minerals accounted for 77%, metallic minerals 17% and non-metallic minerals 6% of the total labour force during the year.

India's ranking in 2017 in world production was 3rd in aluminium, steel (crude/liquid) & zinc (slab); 4th in chromite, iron ore, and lead (refined); 5th in bauxite, 6th in copper (refined), 7th in manganese ore, 14lh in magnesite and 16lh in apatite & rock phosphate. The statistics on indigenous and world production of principal minerals and metals are detailed in Table- 5.

Table - 3: Gross Value Added at Basic Price, 2015-16 to 2017-18 (At Current Prices) (31.05.2018)

(in ₹ crore)

Industry	2015-16 (NS)	2016-17 (NS)	2017-18 (PE)	% Change in 2017-18 over the previous
GVA (All)	**12566646**	**13841591**	**15182371**	**9.7**
Mining & Quarrying	301230	332947	374,689	12.5

***Source** : CSO, Kolkata NS : New Series Estimates PE : Provisional Estimates*

Table - 4: Gross Value Added at Basic Price, 2015-16 to 2017-18 (At 2011-12 Prices)

(in ₹ crore)

Industry	2015-16 (NS)	2016-17 (NS)	2017-18 (PE)	% Change in 2017-18 over the previous
GVA (All)	**10503348**	**11247629**	**11976155**	**6.5**
Mining & Quarrying	328453	371066	381965	2.9

***Source** : CSO, Kolkata NS : New Series Estimates PE : Provisional Estimates*

Table-5: Contribution and Rank of India in World Production of Principal Minerals & Metals, 2017

Sector	Unit of Commodity	Production quantity		Contribution (Percentage)	India's rank in World order $
		World	India*		
Metallic Minerals					
Bauxite	'000 tonnes	303800	22313	7.34	5th
Chromite	'000 tonnes	37500	3481	9.28	4th
Iron ore	million tonnes	3332	201	6.03	4th
Manganese ore	'000 tonnes	51600	2589	5.02	7th
Industrial Minerals**					
Magnesite	'000 tonnes	28700	195	0.68	14th
Apatite & Rock phosphate	'000 tonnes	253000	1534	0.61	16th
Metals					
Aluminium	'000 tonnes	60100	3401	5.65	3rd
Copper (refined)	'000 tonnes	23600	830	3.52	6th
Steel (crude/liquid)	million tonnes	1689	102.34	6.06	3rd
Lead (refined)	'000 tonnes	11300##	565#	5.00	4th
Zinc (slab)	'000 tonnes	13700	791	5.77	3rd

***Source:** World mineral production data compiled from World Mineral Production, 2013-2017; British Geological Survey.*
** Figures relate to 2017-18.*
***Note:** Data in respect of World Mineral Production is on calendar year basis, however the data on India's production is based on financial year.*
*** As per Government of India Notification S.O. 423(E) dated 10th February, 2015, following minerals have been declared as minor minerals: i) barytes ii) dolomite iii) felspar iv) fireclay v) quartz/silica sand and vi) talc/steatite/ soapstone & pyrophyllite, hence not included in the table due to non-availability of production data with respect to India.*
$: India's rank based on production mentioned in World Mineral Production 2013-17; British Geological Survey.
 # : Figures as published in World Mineral Production, 2013-17. However, the production of Lead (Primary) during 2017-18 is 168 thousand tonnes.
##: Figure relates to both primary and secondary refined lead and include the lead content of antimonial lead.

POLICY
National Mineral Policy

The Hon'ble Supreme Court in its judgement dated 2.8.2017 in the Writ Petition (Civil) No.114 of 2014 inter alia directed the Union of India to revisit the National Mineral Policy (NMP), 2008 and announce a fresh and more effective and meaningful policy.

In compliance with the directions of the Hon'ble Supreme Court, Ministry of Mines (MoM) vide its Order No. 15/1/2017-MV dated 14.08.2017 had constituted a Committee.

The Committee included representatives from Central Ministries, State Governments, Industry Associates, Professional Bodies and it also consulted NGOs and many other Stakeholders. The Committee went about the cosultative process with problem-solving approach and held four meetings wherein exhaustive discussions on the issues raised by the stakeholders were deliberated.

The Committee submitted its report to the Ministry on 31.12.2017. Based on the report submitted by the committee, Ministry of Mines prepared a draft National Mineral Policy (NMP), 2018 and uploaded it on the official website of the Ministry on 10.01.2018 for seeking comments/suggestions from the stakeholders.

Based on the Committee Report and the inputs received from stakeholders during subsequent consultations, the Ministry of Mines prepared the National Mineral Policy 2019. The Union Cabinet in its meeting held on 28.02.2019 approved the "National Mineral Policy 2019". The salient features of the "National Mineral Policy 2019" are as follows:

- It proposes to increase the production of major minerals by 200% in 7 years. It also proposes to reduce trade deficit in mineral sector by 50% in 7 years.
- It aims to attract private investment through incentives like financial package, right of first refusal at the time of auction etc. or any other appropriate incentive as per international practice.
- Introduces the concept of Exclusive Mining Zones having in-principle statutory clearances for grant of mining lease. It also proposes to identify critically fragile ecosystem and declare such areas as 'no-go areas'/inviolate areas.
- It emphasises implementation of all relevant Acts/ Rules related to rehabilitation & resettlement and welfare of tribal communities while grant of mineral concessions.
- Encourages states to auction mineral blocks with pre-embedded statutory clearances.
- To institutionalise the mechanism for ensuring sustainable growth of mining sector an inter-ministerial body is proposed.
- Endeavors shall also be made to grant mining the status of Industry.
- In case of small deposits of precious metals and base metals, the establishment of common smelting and refining facilities shall be encouraged.
- It seeks to align downstream regulations for the exploration, development and acquisition of overseas mineral assets for ensuring its adequate supply which are not available in the country.
- It focuses on a long term export-import policy for the mineral sector to provide stability for investing in large scale commercial mining activity.
- Efforts shall be made to benchmark and harmonize royalty and all other levies and taxes with mining jurisdiction across the world.
- It also introduces the concept of Inter-Generational Equity which is also recognised by the Hon'ble Supreme Court in various judgments.

The complete report of NMP-2019 is given in the review on 'Mineral Policy and Legislation' in "General Reviews'.

FDI Policy

(I) 100% FDI has been permitted via Automatic Route for mining and exploration of metal and non-metal ores including diamond, gold, silver and precious ores and the mining of coal and lignite for captive consumption for power projects, iron, steel and cement units.

(II)100% FDI has been permitted through Government Route for mining of titanium-bearing minerals and its ores, its value addition and integrated activities.

FDI Equity Inflow: As per DIPP "fact sheet on Foreign Direct Investment (FDI) from April 2000 to March 2018 Report" the FDI equity Inflow in the Mining Sector from April 2000 to March 2018 was ₹ 12636.98 crore.

National Mineral Exploration Policy (NMEP, 2016)

The National Mineral Exploration Policy of the government was notified in July, 2016. After presenting a detailed analysis of the status of mineral exploration in the country, it encapsulates number of measures for comprehensive and accelerated mineral exploration in the country. It includes making

available pre-competitive baseline geoscientific data free of charge in public domain; high resolution aero-geophysical survey of the prioritised mineral potential are in the country within three years; accelerated completion of geochemical and geophysical mapping of potential area; launching by GSI of high-technology special initiatives to probe deep-seated/concealed mineral deposits in collaboration with national and international agencies; setting up of a national geoscience data repository for facilitating access by exploration agencies to the available exploration data with all private and public exploration agencies; establishment of a National Centre for Mineral Targeting in collaboration with the central and state government agencies, industry, and the academia; etc. The recommendations of the NMEP are under various stages of implementation. NMEP, 2016 encourages Private Sector participation through its revenue sharing model. It also emphasises on generation and dissemination of baseline geo-scientific data of World Standards in the public domain and creation of National Geoscience Data Repository to promote exploration activities.

Hydrocarbon Exploration and Licensing Policy (HELP)

The Government approved Hydrocarbon Exploration and Licensing Policy (HELP) in March, 2016 in order to attract desired level of investment in petroleum exploration. The Government is strategically moving away from cost-sharing model to revenue-sharing model with marketing and pricing freedom for crude oil and natural gas produced by contractors under HELP. The new policy regime is expected to attract more investment to boost exploration and production of oil and gas from conventional and unconventional sources. Further, the HELP is designed to improve bidding for designated areas throughout the year in a very transparent manner.

Important Notifications notified/issued during the period under review are furnished below:

National Mineral Exploration Trust (Amendment) Rules, 2018

In the Notification issued by the Ministry of Mines, and published in the Gazette of India, Extraordinary, PART II-Section 3-Sub-section (i)G.S.R. 208(E), dated March 7, 2018, it reads-

In exercise of the powers conferred by sub-sections (2), (3) and (4) of section 9C of the Mines and Minerals (Regulation and Development) Act, 1957 (67 of 1957), the Central Government hereby makes the following rules to amend the National Mineral Exploration Trust Rules, 2015, namely:

1. (1) These rules may be called the National Mineral Exploration Trust (Amendment) Rules, 2018.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. In the National Mineral Exploration Trust Rules, 2015 (hereinafter referred to as the said rules), in rule 6, for subrule (2), the following sub-rule shall be substituted, namely:

"(2) The Fund shall be opened under the Public Account of India which shall be a non-lapsable and non-interest bearing account and shall be administered by the Central Government.

(3) The Fund shall comprise of payment of two per cent equivalent of royalty payable by the holders of the mining lease or prospective licence-cum-mining lease under sub-section (4) of the section 9C of the Act.

(4) The Fund shall be utilised for carrying out the objects and functions as specified in rule 9, including carrying out regional and detailed exploration for minerals under the scheme, namely,'Regional and detailed exploration and related activities under Fund'.

3. In the said rules, for rule 7, the following rules shall be substituted, namely:
"7. **Contribution to Fund.–** (1) The holder of mining lease or prospecting license-cum-mining lease shall, while making payment of royalty to the State Government, pay to the Trust a sum equivalent to two per cent of the royalty under sub-section (4) of section 9C of the Act by depositing the same in the Public Account of the State under the Head booked for this purpose.

(2) The State Governments shall transfer the amount so collected in the Public Account of the State under sub-rule (1) to the Consolidated Fund of India.

(3) The accretions in the Consolidated Fund of India shall be periodically transferred to the Fund by the Central Government, after due appropriation made by Parliament by law, in the financial year.
(4) The responsibility of collecting and transferring the amount referred in sub-rule (1) to Consolidated Fund of India and maintaining necessary accounts in this behalf shall be that of the State Government and it shall transfer such receipts to the Consolidated

Fund of India as early as possible and in any case, not later than the tenth day of the succeeding month in respect of the amount collected in any particular month.

(5) The State Government shall provide information regarding the amount collected under sub-rule (1) and the amount transferred to Consolidated Fund of India under sub-rule (2) to the Indian Bureau of Mines on a monthly basis.

(6) The Indian Bureau of Mines shall maintain an updated record of the amount transferred to the Consolidated Fund of India along with a database of royalty payments and provide such information to the Trust on a periodic basis".

4. In the said rules, in rule 8, for sub-rule (2), the following sub-rule shall be substituted, namely:
(2) The bank account of the Trust shall be closed as soon as possible after the publication of this notification and till such closure, the bank account of the Trust shall continue to be operated through the Member-Secretary or any other Member of the Executive Committee or any other officer of the Central Government as may be authorized by the Executive Committee."
5. In the said rules, in rule 19, in sub-rule (1), for the words "at the beginning", the words "before the beginning" shall be substituted.

6. In the said rules, for rule 20, the following rule shall be substituted, namely:

"20. Annual Budget.- (1) The Member Secretary of the Executive Committee shall, before the beginning of each financial year, cause preparation of an annual budget containing the details of the proposed income and expenditure on activities covered in the annual plan for that particular financial year, including the legal, administrative and other costs and expenditure proposed to be incurred by the Trust together with details of funding requirements in this regard, to be referred as the Annual Budget.

(2) Annual Budget provision shall also be made in the Demands for Grants of Central Government under appropriate Head for incurring expenditure under Fund and equivalent amount thereof shall be met from the Fund.

(3) After due appropriation of fund and receipt of sanction of the Competent Authority, the expenditure under the Fund shall be incurred from the relevant sub-major or minor heads and on the basis of the sanction issued by the Central Government, the Pay and Accounts Office of the Central Government shall make the payment as per the General Financial Rules, 2017.".

7. In the said rules, for rule 21, the following rule shall be substituted, namely:

"21. Approval of the Annual Plan and the Annual Budget.– (1) The annual plan and the annual budget shall be laid before the Governing Body for its approval thirty days before the beginning of each financial year.

(2) Any amendment in the annual plan or the annual budget subsequent to the approval of the Governing Body may be done with the approval of the Executive Committee and informed to the Governing Body in its next meeting."

8. In the said rules, for rule 24, the following rule shall be substituted, namely:

"24. Maintenance and Audit of Accounts.– (1) The Pay and Accounts Office in the Central Government shall maintain a broadsheet of accretions to and payment from the Fund and effect reconciliation on monthly basis thereof with the concerned divisions and shall ensure that there are no adverse balances in the Fund at any point of time.
(2) The account of the Trust shall be subject to the audit by the Comptroller and Auditor General of India and also to audit by internal audit wing of the office of the Chief Controller of Accounts, in the Central Government."

Mineral Conservation and Development (Amendment) Rules, 2018

In the Notification issued by the Ministry of Mines, and published in the Gazette of India, Extraordinary, PART II-Section 3-Sub-section (i) G.S.R. 289(E), dated March 27, 2018, it reads —

In exercise of the powers conferred by section 18 of the Mines and Minerals (Regulation and Development) Act, 1957 (67 of 1957), the Central Government hereby makes the following rules to amend the Mineral Conservation and Development Rules, 2017, namely:

1. (1) These rules may be called the Mineral Conservation and Development (Amendment) Rules, 2018.
(2) They shall come into force on the date of their publication in the Official Gazette.

2. In the Mineral Conservation and Development Rules, 2017, in rule 12, after sub-rule (4), the following sub-rule shall be inserted, namely:

"(4A) In case of mining leases covered under sub-section (6) of section 8A of the Act where the date of expiry of the period of such lease is on 31st March, 2020, the holders of such mining lease shall carry out General Exploration (G2) over the entire mineralised area under the mining lease before the 1st day of April, 2019 and for this purpose,–

(a) submit to State Government and the Indian Bureau of Mines, within forty five days of issue of this notification, a modified mining plan in accordance with the provisions of the Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016 for completion of General Exploration (G2) over the entire mineralised area under the mining lease as required under clause (a) of rule 5 of the Minerals (Evidence of Mineral Contents) Rules, 2015, in such manner that the plan for exploration is completed before 1st April, 2019, and such plan shall be approved by the Indian Bureau of Mines within thirty days of its submission, with or without any modification;
(b) prepare and submit to the State Government and the Indian Bureau of Mines, a Geological Study Report as required under clause (b) of rule 5 of the Minerals (Evidence of Mineral Contents) Rules, 2015, within one month after completion of exploration work:

Provided that the depth of exploration to be proposed in the modified mining plan for open cast mining shall be up to 300 meters or up to discontinuance of ore body, whichever is earlier, and in case of underground mines, the depth of exploration shall be decided by the Indian Bureau of Mines on case to case basis at the time of approval of such plan, depending upon the geological set up of the area:

Provided further that the State government shall conduct periodical technical audit of approved modified plan either by itself or through an agency nominated by it and in case lease holder fails to perform his duties as so specified, the State Government may, after giving the lease holder an opportunity of being heard, take such action for enforcing compliance, as it deems fit."

Threshold Value of Minerals

Indian Bureau of Mines is vested with the responsibility to review the threshold value of minerals periodically under sub rule 7 of rule 12 of Mineral Conservation and Development Rules, 2017. In order to take stock of the situation and assess the stakeholder's views through deliberations, IBM invited comments and suggestions from the stakeholders and general public and also organised a series of five workshops on "threshold value of minerals at Goa, Bhubaneshwar, Noamundi, Gandhinagar and Nagpur during the year 2017. After examination of the suggestions and comments of the stakeholders through an expert committee constituted for the purpose and based on the recommendations of the committee, the threshold value of eleven minerals are notified vide Notification issued by the Ministry of Mines, and published in the Gazette of India, Extraordinary, PART I-Section 1 **No.C-284/3/ CMG/2017** dated April 25, 2018, it reads **:**

1. Indian Bureau of Mines (herein after referred to as IBM) is vested with the responsibility to review the threshold value of minerals periodically under sub rule 7 of rule 12 of Mineral Conservation and Development Rules, 2017.

2. IBM, through notice published in the website of IBM on 24.3.2017, had invited comments and suggestions from the stakeholders and general public with regard to revision of the threshold value of minerals notified previously on 16th October 2009. In response to the notice many suggestions and comments were received from the stakeholders.

3. IBM also conducted five Regional Level technical workshops and a National Level workshop to discuss various issues and concerns raised by the stakeholders with regard to the revision of the threshold value of minerals.

4. After careful examination of the suggestions and comments of the stakeholders through an expert committee constituted for the purpose and based on the recommendations of the committee, the threshold value of following minerals are hereby notified under sub rule 6 of rule 12 of Mineral Conservation and Development Rules 2017. This notification supersedes the notification issued earlier vide file No.T-45031/CGBM/2007 (PF) dated 16th October 2009.

5. This notification shall be effective from the date of its notification in the gazette of India.

7. For the purpose of this notification :

a. "**threshold value of minerals"**will have meaning as defined in Minerals (Evidence of Mineral Contents) Rule, 2015.

b. **#"hematitic ore"** means Fe content in the ore is contributed predominantly by presence of hematite.

c. **^"hematitic siliceous ore"** means silica in the ore is contributed predominantly due to presence of quartz/chert in the gangue and Fe in the ore is contributed predominantly by presence of hematite and subordinate to minor amounts of martitised magnetite/maghemite.

d. ***"magnetite ore"** means Fe content in the ore is contributed predominantly by presence of magnetite and subordinate to minor amounts of martitised magnetite/ maghemite.

e. **"cut-off grade"** means the minimum economic assay grade of the mineral for a deposit below which the mining operations become unviable in the present market dynamics or end use quality. It may vary from deposit to deposit depending upon the market conditions.

6. Threshold Value of Minerals

S. No.	Mineral	Threshold Value
1.	Apatite & Rock Phosphate	P_2O_5-5% (Min)
2.	Bauxite	(i) For Aluminous laterite: Al_2O_3-20% (Min)
		(ii) For Bauxite: Al_2O_3- 30% (Min.) and SiO_2 (Total)-7% (Max)
3.	Chromite	Cr_2O_3-10% (Min.)
4.	Fluorite	CaF_2 - 5% (Min.)
5.	Graphite	(i) For flaky variety- 2% Fixed Carbon (F.C) (Min.)
		(ii) For amorphous variety - 10% Fixed Carbon (F.C) (Min.)
6.	Iron Ore	(i) Hematitic Ore - 45% Fe (Min.)
		(ii) ^Hematitic Siliceous Ore - 35% Fe (Min.)
		(iii) *Magnetite Ore-15% Fe (Min.)
7.	Kyanite & Sillimanite	35% (Min) Kyanite/*Sillimanite content
		* Not applicable to sillimanite of beachsand
8.	Limestone	CaO- 34% (Min.) and MgO-5% (Max.)
9.	Magnesite	MgO -35% (Min.), CaO-3% (Max.), Fe_2O_3- 3% (Max.)
10.	Manganese Ore	Mn - 10% (Min.)
11.	Wollastonite	35% (Min.) Wollastonite content

8. All the lessee's are hereby directed to comply with the following:

a. All resources shall be assessed up to the threshold value and the resources between the threshold value and the cut-off grade shall be reported separately. There will however be no restrictions in estimating resources below the threshold value if there is a ready market of such mineral/ore either directly or after beneficiation.

b. The non-saleable/un-usable minerals/ ores above the limit prescribed in the threshold value and below the cut-off grade shall be stacked separately in an area earmarked for the purpose.

c. The inventory of mineral/ ore stock above the limit prescribed in the threshold values of minerals and below the cut-off grade shall be maintained in a bound register indicating the quantity and quality of material stacked. The month wise inventory of such materials shall be updated.

d. The overburden and waste material obtained during mining operation shall not be allowed to be mixed with the materials above the threshold values of minerals stacked.

Reservation of area for M/s FCI Aravali Gypsum and Minerals India Limited (FAGMIL)

In the Notification issued by the Ministry of Mines, and published in the Gazette of India, Extraordinary, PART II-Section 3-Sub-section (i) G.S.R. 1220(E), dated December 19, 2018, it reads—In exercise of the powers conferred by sub-section (1A) of section 17A of the Mines and Minerals (Development and Regulation) Act, 1957 (67 of 1957), the Central Government, after consultation with the Government of Rajasthan, reserves the area specified below except the area already held under prospecting licence or mining lease for purposes of said sub-section so as to undertake prospecting or mining operations through M/s. FCI Aravali Gypsum and Minerals India Limited (FAGMIL), a Public Sector Undertaking under administrative control of the Central Government in the Department of Fertilizers, Ministry of Chemicals and Fertilizers in respect of Minerals-Rock Phosphate and Dolomite in Districts Banswara, Jaisalmer and Jodhpur, in the State of Rajasthan, for a period of ten years lying within the boundary (demarcated by latitude and longitude) for such reserve area specified below:

S.No.	Name of block	Location	Area	Pillar	Latitutde	Longitude
1.	Rock Phosphate	Village : Sallopat Tehsil : Bagidora District : Banswara	135.00 He.	A	N23011'3.85"	E74008'31.28"
				B	N23010'36.75"	E74008'23.0"
				C	N23010'22.34"	E74009'13.30"
				D	N23010'49.96"	E74009'22.67"
2.	Rock Phosphate	Village : Birmania Tehsil : Fethagarh District : Jaisalmer	400.00 He.	A	N26013'47.95"	E70056'5.83"
				B	N26014'20.58"	E70055'3.66"
				C	N26015'16.66"	E70055'39.84"
				D	N26014'44.02"	E70056'42.03"
3.	Dolomite	Village Mahilo-ki Dhani,Tehsil Phalodi,District Jodhpur	1100.00 He.	A	N27007'3.07"	E72046'32.81"
				B	N27004'4.37"	E72046'32.79"
				C	N27004'4.38"	E72045'20.20"
				D	N27007'3.07"	E72045'20.20"

Meghalaya Minor Minerals Concession Rules

Government of Meghalaya has notified Meghalaya Minor Minerals Concession (Third Amendment) Rules, 2018 vide their notification No. MG.49/2011/pt-1/56 dated 24th January, 2019.

Gujarat Minor Mineral Concession Rules, 2017

Government of Gujarat, Industries and Mines Department, has notified Gujarat Minor Mineral Concession (Amendment) Rules, 2018 vide their notification No. GJ/2018/12/MCR-102018-325-chh:- dated 9th March, 2018.

Star rating of Minor Minerals in Gujarat State

Commissioner of Geology and Mining Gandhinagar issued circular on Star Rating of Minor Minerals in Gujarat State vide No. CGM/Lease/Policy/StarRating/2018-19/4935 dated 6.11.2018. With reference to the Circular issued by Ministry of Mines, Government of India dated 30th January 2018, system of "Star Rating" of mines in respect of "minor minerals" is desired to be implemented. The rating will be given to mines of minor minerals for the efforts and initiatives taken for implementation of the Sustainable Development Framework (SDF). One to five (1 to 5) stars will be given to the mines, with five star being allotted to the best performing mines on the of basis of laid down parameters. The star rating scheme is designed to have a built in compliance mechanism for environment and forest safeguards and will help in recognising good performer in the sector while encouraging all mining lease holders to strive for excellence.

Restrict the transporation of mineral Felspar outside the State of Rajasthan

The Government of Rajasthan, Mines (GR.II) Department issued notification vide F.14(25)Mines/ Gr.II/2017 dated 10.03.2019 which said : In exercise of the powers conferred by rule 82 of the Rajasthan Minor Mineral Concession Rules, 2017, the State Government, on the recommendations of Industry Department to protect the domestic industries and in public interest, hereby restrict the transportation of mineral felspar in the form of grains, chips and gitti out of the State for a period upto 4th October, 2021.

LEGISLATIVE FRAMEWORK

The Mines and Minerals (Development and Regulation) (MMDR) (Amendment) Act, 2015

MMDR Act, which governs the mineral sector, was overhauled by amendment in 2015, to bring in greater transparency, remove discretion and infuse greater ease of doing business. E-Auctions mandated for the grant of mineral concession to ensure bias-free allotments. Need of renewals and prior approvals removed for ease of doing business and removing discretions. District Mineral Foundation (DMF) for welfare of mining affected areas, established by contributions from the mining companies, addressing the long-time grievance of the neglected civil society. Penal provisions made extremely stringent to deter illegal mining activities - Higher penalties up to 5 lakhs per hectare of the area and jail term up to 5 years have been provided. Further, provision for constitution of special courts by the State Govt. for fast-track trial of cases of illegal mining. All requisite subordinate Rules for implementation of amendment formulated and notified by 2018 –

a) The Minerals (Evidence of Mineral Contents) Rules, 2015
b) The Mineral (Auction) Rules, 2015
c) The Mineral (Non- exclusive Reconnaissance Permits) Rules, 2015
d) The National Mineral Exploration Trust Rules, 2015
e) The Mineral (Mining by Government Company) Rules, 2015
f) The Mines and Minerals (Contribution to District Mineral Foundation) Rules, 2015
g) The Atomic Minerals Concession Rules, 2016
h) The Mineral Concession (other than Atomic and Hydrocarbon Energy Minerals) Rules, 2016
i) The Mineral Conservation & Development Rules, 2017
j) For further refinement of the legislation and to facilitate the better simplification MMDR Act, 1957 has been amended in May, 2016 and July, 2016. Minerals (other than Atomic and Hydrocarbon Energy Minerals) Concession Rules, 2016 has been amended in Dec., 2016, Mineral Auction Rules 2015, has been ammended in November 2017, The National Mineral Exploration Trust Rules, 2015 has been ammended in March 2018 and Mineral Conservation & Development Rules 2017 has been ammended in March 2018.

Measures taken to control illegal mining:

In order to bring a check on illegal mining, the MMDR Amendment Act, has made the penal provisions for illegal mining more stringent. Higher penalties and jail terms have been provided. A provision has also been made for constitution of Special Courts by State Governments for speedy trial of cases related to illegal mining.

Space Technology for checking illegal mining :

Mining Surveillance System (MSS)

Mining Surveillance System (MSS) is a satellite-based monitoring system which aims to establish a regime of responsive mineral administration by curbing instances of illegal mining activity through automatic remote sensing detection technology.

Ministry of Mines & Indian Bureau of Mines (IBM) have developed the MSS, with assistance from Bhaskaracharya Institute for Space Applications and Geo-informatics (BISAG), Gandhinagar and Ministry of Electronics and Information Technology (MEITY).

The system works on the basic premise that most minerals occur in the continuity and their occurrence is not limited to the lease area but is likely to extend in the vicinity. The MSS checks a region of 500 meters around the existing mining lease boundary to search for any unusual activity which is likely to be illegal mining. Any discrepancy is found is flagged-off as a trigger.

The MSS is a transparent & bias-free system, having a quicker response time and capability of effective follow-up. The deterrence effect of 'Eyes watching from the Sky' would be extremely fruitful in curbing instances of illegal mining.

A user friendly mobile app for MSS has been created and launched on 24th January, 2017 at Gandhinagar for enabling public participation in assisting the governments endeavor to curb illegal mining, which was being used by the inspecting officials to submit compliance reports of their inspections.

Mineral Concession System

The State Governments used to grant the mineral concessions [Reconnaissance Permit (RP), Prospecting License (PL) and Mining Lease (ML)] under the provisions of the pre-amended Mines and Minerals (Development and Regulation) (MMDR) Act, 1957. Prior approval of the Central Government was required under Section 5 (1) of the Act for grant of RP, PL and ML in respect of Atomic and Metallic & Non- Metallic Minerals specified in Parts 'B' and 'C' of the First Schedule to the Act. Subsequent to the prior approval of the Central Government, mining leases etc. are executed by the State Governments in favour of the applicants with the mining agencies after they obtain all statutory clearances and approvals as specified in the principal/LoI as the case may be. The metallic minerals which figure in Part 'C' of the First Schedule to the Act in which prior approval is required are Asbestos, Bauxite, Chrome ore, Copper ore, Gold, Iron ore, Lead, Manganese ore, Zinc and precious stones. The Central Government amended the existing MMDR Act and brought the amended Act into force w.e.f 12.1.2015. The State Government will continue to grant mineral concession but all these grants would be through auctions, thereby bringing in greater transparency and removing discretion. The tenure of the mineral concession has been increased from the existing 30 years to 50 years. Thereafter, the mining lease would be put up for auction (and not for renewal as followed in the earlier system).

District Mineral Foundation / Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY)

District Mineral Foundation (DMF) established by contributions from the mining companies, which addresses the long-time grievance of the neglected civil society consisting of people affected by mining activities. Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY) scheme is formulated for the welfare and development of the mining affected areas and people under DMF. About ₹ 23,606 crore have been collected till November, 2018. Under the PMKKKY, 26,201 projects have been completed, 41,792 projects are ongoing and 23,773 projects are being started shortly in the mining affected districts. Till November, 2018, funds to the tune of ₹ 5,726 crore have been utilised and about ₹ 18,189 crore is allocated. A portal for monitoring of PMKKKY implementation has been launched on 20.3.2018 at the 3rd National Conclave on Mines & Minerals. District wise portal was made live on 27th August, 2018. Thus, National PMKKKY portal will also function as DMF portal for each district. It captures the details from the collection and accrual of funds, to its utilisation and monitoring, for implementation of projects.

Sand Mining Framework

The Central Government stepped in to resolve the endemic problems in regard to high prices, illegalities, ecological sustainability, availability of sand across the country.In this regard a high-level committee under the chairmanship of Union Mines Secretary with officials from the States, upon issues raised in the conference of Mining Ministers in May, 2017, was set up to deliberate the issue. A 'Sand Mining Framework' was prepared and released on 20.3.2018 in the 3rd National Conclave on Mines & Minerals.This framework has been developed by study of best practices across the States and will be very useful for assisting States to arrive at an appropriate policy and administrative system.

Sustainable Development Framework (SDF)

Star Rating System: A good governance initiative is designed as a tool for evaluation of the performance of lease operators on the various parameters encompassed by the Principles of the Sustainable Development Framework (SDF) approved by Ministry of Mines in 2011 in line with the National Mineral Policy 2008. Thus it can be viewed as a mapping of mining footprints from the view point of Sustainability. The system has been developed primarily on the basis of self-assessment followed by validation by Indian Bureau of Mines along with provisions for third party auditing as may be considered fit by Ministry of Mines. The Star rating has been mandated by rule 35 of newly notified MCDR 2017. All the mine operators are mandated to achieve four or five star under rating system and the process implementation is also proposed.

Mining Tenement System (MTS)

MTS has been taken up by IBM during the programme year 2009-10. The objective of the Scheme is to develop an online National Mineral Information System for investors by linking Central and State organisations engaged in administration of mineral resources in the country. The mining tenement system would have graphical information database (GIS) as well as information in textual form. These two databases, i.e., non spatial database and spatial database would be seamlessly integrated so as to retrieve graphical information as well as relevant textual information. The system will be thus web- enabled and access to the system will be given online to prospective investors, government organisations, private and public organisations through Internet as per policy of the Government.

Constitution of Study Group on revision of rates of royalty and dead rent for minerals (other than coal, lignite, sand for stowing, and minor minerals)

Ministry of Mines has constituted a Study Group for revision of rates of royalty and dead rent for minerals (other than coal, lignite, sand for stowing and minor minerals) under the chairmanship of Additional Secretary, Ministry of Mines, vide order No. 9/1/2018-M.V dated 09.02.2018.

Terms of reference of the Study Group are as under:

a) To review the existing rates of royalty for minerals (other than coal, lignite, sand for stowing, and minor minerals) given in the Second Schedule to the MMDR Act, 1957 and to recommend the revision of rates of royalty;

b) To consider and recommend policies relevant to administration of royalty regime; and

c) To suggest appropriate revision in the existing rates of dead rent given in the Third Schedule to the MMDR Act, 1957.

EXPLORATION & DEVELOPMENT

GSI, DGMs of various States, Public Sector companies like NMDC, MECL, MOIL, etc., continued their efforts in respect of surveying, mapping and exploration of new deposits and re-assessment of old deposits/mines during 2017-18. The ONGC and OIL, the two National Oil Companies (NOC) and a few private and joint venture companies were engaged in exploration and production activities of oil and natural gas, including Coal-bed Methane in the country. The details of exploration carried out and discoveries found during the year 2017-18 are described in General Review on “Exploration & Development”. However, the exploration conducted by various organisations during 2017-18 is highlighted below:

Geological Survey of India (GSI)

GSI is vested with the responsibility of maintaining broad-based and uniform national approach to data generation in respect of mineral resources. With the near exhaustion of resources to the proximity of surface, it has become imperative to have multidisciplinary approach to mineral exploration which comprises large-scale and detailed geological mapping aided by interpretative analysis of aerogeophysical and remotely sensed data, ground geophysical survey, geochemical prospecting and surface & subsurface exploration through pitting, trenching & drilling. GSI’s activities in mineral exploration as well as baseline surveys have increased manifold in order to sustain the momentum of national economic development and to meet the increasing demands of various stakeholders. As per recent development towards Policy shift, GSI has been entrusted G2 level of investigations for M-IIA Items that were included in FS 2015-16. GSI also did engage in the task of upgrading the level of investigation in different important exploration items along with identification of resource potential of G3 level, for auctioning as per the recent policies of the Government. GSI has completed National Geochemical Mapping (NGCM) in the accessible part of the Obvious Geological Potential (OGP) areas of the country.

GSI pursued its most fundamental and basic mapping programme of systematic geological mapping in 2017-18 and had completed 9960.51 sq. km large-scale mapping, 112.3 sq. km detailed mapping and 1,29,710 m drilling as against previous year's achievement of 8043.10 sq. km large-scale

mapping, 145.63 sq. km detailed mapping and 1,39,071.98 m drilling. Out of the total mappable areas of 3.146 million sq km of the country, 3.119 million sq km has been covered so far by systematic mapping bringing the total coverage to 99.14%. The highlights of the resources assessed are as below:

Resources augmented by GSI during 2017-18 are furnished below:

i) A total resource of 113.53 million tonnes high grade iron ore (including 12.71 million tonnes low grade) has been estimated in Gandhalpada South-East, Part -B, Kendujhar district, Odisha.

ii) A total resource of 13.34 million tonnes of low grade iron ore (including 2.88 million tonnes high grade) has been estimated in Jhumka-Pathiriposhi, west block, Sundargarh district, Odisha.

iii) Iron ore resources of 16.20 million tonnes of high grade (including 1.13 million tonnes low grade) has been established in Rengalabehra North-East extension block in Kendujhar district, Odisha.

iv) Estimated iron ore resources in Gandhalpada South block, Kendujhar district, Odisha is 61.72 million tonnes at >45% Fe cut-off.

v) Estimated a net 361.909 million tonnes of limestone resources in Umkyrpong area, Litang Valley, East Jaintia Hills district, Meghalaya.

vi) Estimated 289.269 million tonnes of cement grade limestone resources in Samasi-Pala block, Litang Valley, East Jaintia Hills district, Meghalaya.

vii) Estimated 630.02 million tonnes of blendable/ beneficiable/portland cement grade limestone resources in East of Laphet area, Litang Valley, East Jaintia Hills district, Meghalaya.

MECL

MECL continued its core activities of regional and detailed mineral exploration involving exploratory drilling along with associated geological activities. During the year 2017-18, a total of 2,656 million tonnes of mineral resources have been established.

The highlights of exploration carried out by MECL during 2017-18 are given below:

i) The company has carried out 6.32 lakh meters of exploratory drilling for various minerals, out of which 5.12 lakh meters was through departmental resources and 1.19 lakh meter from outsourcing.

ii) A total of 215 sq. km area has been covered with detailed geological mapping for various minerals in different parts of the country. In addition to this about 3,447 sq km of regional geological mapping has also been carried out in various minerals block explored through National Mineral Exploration Trust (NMET) funding and also carried out 3.53 lakh meters of geophysical logging.

iii) In laboratories, a total of 85,614 samples were analysed for chemical analysis and mineralogical analysis and petrographic studies.

iv) A total of 63 geological reports of detailed exploration, geophysical survey, environmental & remote sensing studies for different minerals were submitted which led to addition of 2,656 million tonnes of mineral resources.

v) During 2017-18, a total of 2,656 million tonnes of mineral resources were established. Mineral-wise details of resources estimated by MECL are as under.

• Coal - A total of 1,037.73 million tonnes of coal resources were established in Godavari valley, Jharia, Sonhat & Singrauli Coalfield in the states of Telangana, Jharkhand, Chhattisgarh & Madhya Pradesh.

• Lignite - 672.25 million tonnes of lignite resources were established in Rajasthan & Tamil Nadu.

• Iron Ore - 136.74 million tonnes of iron ore resources were established in Sandur Schist Belt, & Chitradurga Schist belt, Karnataka; Sundargarh, Odisha; and Purbanera belt, Rajasthan.

• Copper - 36.32 million tonnes of copper resources were established in Singhbhum, Jharkhand.

• Molybdenum - 5.65 million tonnes of molybdenum resources established in Harur-Uttangarai belt, Tamil Nadu.

• Gold - 32.262 million tonnes of gold ore resources were established in KGF, Karnataka.

• Limestone - 700.93 million tonnes of limestone resources were established in Palnadu basin in Telangana, Bilaspur in Chhattisgarh and Satna in Madhya Pradesh.

•Manganese ore - 0.29 million tonnes of manganese ore resources were established in Mandri Panchala, Bhandara, Maharashtra.

•Bauxite - 33.29 million tonnes of bauxite resources were established in Kabirdham, Chhattisgarh.

Oil and Natural Gas Corporation Ltd (ONGC)

During 2017-18, ONGC was associated with Hydrocarbon Resource Re-assessment studies for all 26 sedimentary basins. A total of 14,621.16 Line Kilometer (LKM) of 2D data was acquired (besides ONGC's routine 2D/3D survey) during 2017-18. In total, the Company has acquired 19,655 LKM of data. Processing and interpretation of data is under progress. During the year, ONGC was pursuing basement exploration across most of the operational areas as a frontier exploration play and drilled 24 wells including 11 wells with primary objective as Basement. During the year 2017-18, ONGC has made 12 discoveries (1 in NELP, 11 in Nomination acreages). Of these, 5 are new prospects and 7 are new pool discoveries. Accretion to In-place Hydrocarbons (3P-Proved, Probable and Possible), from the company operated fields in India stood at 185.84 MMtoe, out of which about 79 per cent accretion has been due to exploratory efforts.

Oil India Ltd (OIL)

Oil India Ltd carried out 2D & 3D seismic survey to identify new prospects in the Petroleum Mining Lease (PML) areas and NELP Blocks. It has drilled 14 exploratory wells in PML areas and continued exploratory efforts in others blocks. During the year, OIL made 4 oil & gas discoveries in the Upper Assam Basin and established first commercial oil production from new formation (Narpuh) in Upper Assam Basin.

Indian Bureau of Mines (IBM)

Indian Bureau of Mines(IBM), as a facilitator to the Mineral Industry, provides technical consultancy services for conducting feasibility studies, environment impact assessments, environment management plans, etc; to play the role of National Repository of mineral data through maintaining a data bank of mines and minerals by developing advanced IT based Mineral Information System; carries out mining research project on need-based aspects of mining; conducts mineral beneficiation studies, including mineralogical testing and chemical analysis and prepares mineral maps.

During 2017-18 (up to September, 2017), 98 multi - mineral lease hold maps on a scale of 1:50,000, with corresponding forest overlays in respect of various states were under finalisation.

To encourage value addition and mineral conservation, IBM carried out 2,425 ore dressing investigations, 21,092 chemical analysis, 1,254 mineralogical examinations and 5 in-plant study.

The Project on Mining Surveillance System (MSS) was undertaken by the Indian Bureau of Mines. IBM undertakes preparation of National Inventory of mineral resources and updating of NMI as on 1.4.2015 was completed for all 71 minerals including 25 minor minerals.

Other Agencies

During 2017-18, MOIL carried out a total of 23,468 m exploratory drilling involving 98 boreholes in 12 manganese ore mines.

During 2017-18, HZL carried out about 140 km surface drilling and 6.5 km underground drilling across all its mines. Total ore resources of all mines owned by HZL in the country stands at 410.60 million tonnes with 26.70 millions tonnes of zinc metal, 8.90 millions tonnes of lead metal and 28.49 thousand tonnes of silver metal.

During 2017-18, a G2 level exploration for bauxite in Sarbhanja block, Mainpat tehsil, Surguja district, Chhattisgarh was carried out. Total resources estimated at about 0.60 million tonnes under indicated category.

In Gumla district, G2 level exploration was carried out in Lodhapat, Bisunpur block with an objective to demarcate and delineate the potential deposit of bauxite. About 4.0 million tonnes of bauxite resources under indicated category was estimated in the area.

A G2 level of exploration was carried out at Ballari district for iron ore jointly by MECL & NMDC. The iron ore resources estimated at 0.787 million tonnes over a strike length of 178.0 m with Fe 52.05%, SiO_2 14.01% and Al_2O_3 6.70% at 45% cut-off. Resources at 35% Fe cut-off has been estimated at 5.611 million tonnes with grade of Fe 39.99%, SiO_2 34.4% and Al_2O_3 4.29% under indicated category.

RESEARCH & DEVELOPMENT

The Science and Technology (S&T) programmes of the Ministry of Mines, Government of India, cover the disciplines of Geology, Exploration, Mining, Beneficiation and Mineral Processing, Rock Mechanics, Ground Control and Non-ferrous Metallurgy and Environmental issues related to Mining and Metallurgy. As per minutes of 48th meeting of SSAG held on 20.11.2017 at Shastri Bhawan, New Delhi, a total of 116 project proposals were received for the year 2017-18. Further, during 49th meeting of SSAG held on 31st July 2018 at Shastri Bhavan, New Delhi, the SSAG considered projects which were reviewed and

recommended by the PERC. A total of 100 project proposals was received under S&T programme scheme of MoM for the year 2018-19. The new project proposals and 6 proposals recommended by the 16th PERC for resubmission were considered and evaluated in the 17th PERC meeting held on 19-20th July 2018 at JNARDDC, Nagpur.

The Research & Development (R&D) work in the field of Ores & Minerals is being carried out by IBM, CSIR & allied laboratories, other research organisations relating to mineral/metal and various mining & mineral based industries. As per available information, brief of some of the R&D work conducted or completed by various organisations during 2017-18 are furnished below. However, the research & development details are given in the review of "Research & Development" in "General Review".

1. Indian Bureau of Mines (IBM)

R&D activities carried out by Mineral Processing Division, IBM during the year 2017-18 are summarised below:

(I) BASE METAL

(i.i) Bench Scale Beneficiation Studies on a Base Metal Mineralisation Sample from Jangaldheri Block, Betul Belt, Chhindwara district, Madhya Pradesh (G-2 Stage Investigation): A base metal mineralisation sample from Jangaldheri Block, Betul belt, Chhindwara district, Madhya Pradesh (G-2 Stage investigation) was received from Geological Survey of India, Madhya Pradesh. The objective of the investigation was to study the amenability of the sample for beneficiation to produce a suitable concentrate for metallurgical use.

(i.ii) Bench Scale Beneficiation Studies on a Base Metal Mineralisation Sample from Biskhan Block, Betul Belt, Betul district, Madhya Pradesh (G-2 Stage Investigation): A base metal mineralisation sample from Biskhan Block, Betul belt, Betul district, Madhya Pradesh (G-2 Stage investigation) was received from Geological Survey of India, Madhya Pradesh at the Modern Mineral Processing Laboratory and Pilot Plant, Indian Bureau of Mines, Nagpur. The objective of this investigation was to study the amenability of the sample to beneficiation and produce a concentrate suitable for end industrial use.

II. COPPER ORE

(ii.i) Bench Scale Beneficiation Studies on Copper Ore Sample from South of Gangutana, Mahendragarh district, Haryana: A Copper ore sample from South of Gangutana, Mahendragarh district, Haryana received from GSI, Northern Region, Faridabad, as a part of G-2 exploration at RMPL, IBM, Ajmer. The objective of the investigation was to evolve a process flow sheet for producing a copper concentrate assaying more than 18% Cu with maximum possible recovery.

(ii.ii) Bench Scale Beneficiation Studies on Copper ore sample from Toda-Ramliyas Block, Sikar district, Rajasthan: A Copper ore sample from Toda-Ramliyas, district-Sikar, Rajasthan collected by GSI, Western Region, Jaipur as a part of G-2 exploration was received at Regional Mineral Processing Laboratory, IBM, Ajmer for bench scale beneficiation studies to find the amenability of producing copper concentrate. The objective of the investigation was to evolve a process flow sheet for producing a copper concentrate assaying more than 18% Cu with maximum possible recovery.

III. COPPER BEARING CALC-SILICATE ROCK

(iii.i) Bench Scale Beneficiation Studies on Copper bearing Calc-silicate Rock sample from Kamalpura Block, Bhilwara district, Rajasthan: A Copper ore bearing calc-silicate rock sample from Kamalpura Block, district Bhilwara collected by GSI, Western Region, Jaipur as a part of G-2 exploration was sent to Regional Mineral Processing Laboratory, IBM, Ajmer. The objective of the investigation was to evolve a process flow sheet for producing a copper concentrate assaying more than 18% Cu with maximum possible recovery.

IV. COPPER BEARING GARNETIFEROUS MICA SCHIST ROCK

(iv.i) Bench Scale Beneficiation Studies on Copper bearing Garnetiferous Mica Schist Rock sample from Kamalpura Block, Bhilwara district, Rajasthan: A Copper bearing Garnetiferous Mica Schist sample from Kamalpura block, district-Bhilwara, collected by GSI, Western Region, Jaipur as a part of G-2 exploration was sent to Regional Mineral Processing Laboratory, Indian Bureau of Mines, Ajmer for bench scale

beneficiation studies. The aim of bench scale beneficiation study was to evolve a process flow sheet producing a copper concentrate assaying more than 18% Cu with maximum possible recovery.

V. GLAUCONITE

(v.i) Bench Scale Beneficiation of Glauconite from the rock sample (OB-1) of Vindhyan Super Group in Bihar for Geological Survey of India, Patna, Bihar: A glauconite rock sample from the rock samples (OB-1) of Vindhyan Super group, village Adia Chutia, Bihar was received at the Modern Mineral Processing Laboratory and Pilot Plant, IBM, Nagpur through Geological Survey of India for conducting bench scale beneficiation studies. The objective of the study was to enrich glauconite content present in the sample for its use as potash fertilizer.

VI. GOLD ORE

(vi.i) Heap Leaching Studies on a Gold ore sample from Jonnagiri, Andhra Pradesh: A gold ore sample from Jonnagiri, Andhra Pradesh was received from M/s Geo-Mysore Services (India) Pvt. Ltd, Bengaluru for seven days bottle roll cyanidation to simulate heap leaching at the Regional Mineral Processing Laboratory, Indian Bureau of Mines, Bengaluru.

(vi.ii) Beneficiation Studies on a Gold ore sample from Tanzania: A gold ore sample from Tanzania was received from M/s Shiva Analyticals (India) Private Limited, Bengaluru for beneficiation studies at the Regional Mineral Processing Laboratory, Indian Bureau of Mines, Bengaluru.

(vi.iii) Beneficiation Studies on a Gold ore sample from Ajjanahalli Block- C, Sira Taluk, Tumakuru dist., Karnataka: A Gold ore sample was received from Geological Survey of India, Bengaluru for gold recovery studies at RMPL, IBM, Bengaluru.

VII. IRON ORE

(vii.i) Beneficiation Studies on an Iron ore sample from MSPL Limited, Hospet: An iron ore sample was received from M/s. MSPL Ltd, Hospet for bench scale beneficiation studies at Regional Mineral Processing Laboratory, Indian Bureau of Mines, Bengaluru. The objectives of the test work was to develop a process flow sheet to produce pellet grade concentrate. The Fe(T) grade is >63.5% with ~2% Al_2O_3, ~ 5% (Al_2O_3+ SiO_2).

(vii.ii) Beneficiation Studies on a low grade Iron ore sample from Huldool Dongor Bimbol Mine: A low grade iron ore sample of Huldool Dongor Bimbol Mine was received from M/s Eyestar Finance and Leasing Private Limited, Goa for beneficiation studies at the Regional Mineral Processing Laboratory, Indian Bureau of Mines, Bengaluru. The objectives of the investigation were to characterise the sample through chemical analysis and mineralogical studies and upgrade the iron content >63% with maximum possible iron recovery and reduce the SiO_2 content as much as possible.

(vii.iii) Bench Scale Beneficiation Studies on an iron ore sample (BMQ-2, OBS-3, 4, 5) from Yerabali Block, Karimnagar district, Telangana: An iron ore sample designated as (BMQ-2, OBS-3, 4, 5) from Yerabali block, Karimnagar district, Telangana was received from Geological Survey of India, Southern Region at the Modern Mineral Processing Laboratory and Pilot Plant, Indian Bureau of Mines, Nagpur for bench scale beneficiation studies with an objective to produce an iron concentrate suitable for end industrial use.

VIII. LIMESTONE

(viii.i) Limited studies on a Limestone sample (-40 mm screen fraction) from Emami Cements: A -40 mm screen fraction reject Limestone sample from M/s Emami Cements Pvt. Ltd, Chhattisgarh state was received for conducting limited studies for upgrading CaO% with maximum recovery.

(viii.ii) Limited studies on a Limestone sample -2 (-40 mm screen fraction) from Emami Cements: A -40 mm screen fraction reject Limestone sample-2 from M/s Emami Cements Pvt. Ltd, Chhattisgarh state was received for conducting limited studies for upgrading CaO% with maximum recovery.

IX. MANGANESE ORE

(ix.i) Bench Scale Beneficiation Study on a Manganese ore sample from Balaghat Mines, Madhya Pradesh for recovery of sand and manganese separately: A manganese ore sample from Balaghat Mines of M/s MOIL was received at Modern Mineral Processing Laboratory & Pilot Plant, Indian Bureau of Mines for carrying out bench scale beneficiation studies with an objective to recover sand from manganese ore fines.

X. PLATINUM GROUP MINERALS

(x.i) Bench Scale Beneficiation Studies on a Low Grade Platinum Group Minerals Sample (G2 Stage) from T2 Sector, Tasampalayam Block in Sittampundi Anorthite Complex in Tamil Nadu: A Platinum group minerals sample (G2-stage) from T2 sector, Tasampalayam block in Sittampundi Anorthite complex in Tamil Nadu for GSI, Chennai was received at the Modern Mineral Processing Laboratory and Pilot Plant, Indian Bureau of Mines, Nagpur for conducting bench scale beneficiation studies. The objective of the study was to assess the possibility of enriching platinum group mineral present in the sample and to evolve a suitable process flow sheet for recovery of PGM concentrate and chromite.

2. CSIR-National Metallurgical Laboratory (CSIR-NML), Jamshedpur

Following Investigations were carried out in the area of Mineral Processing during the year 2017-18:

I. Studies on Recovery of Chromite Values from Tailings of Chromite ore Beneficiation Plant: With the advancement in beneficiation technology to maximise recovery, the low and lean grade chromite ore are to be exploited with a renewed resource management plan. In addition to exploiting the new resources, it is also important to maximize recovery of chromite values in the existing beneficiation plants. The process route for chromite ore beneficiation involves comminution, classification followed by gravity separation.

II. Beneficiation Study on Recovery of Iron Values from Iron ore Slimes: CSIR-NML had undertaken study on characterisation and beneficiation of iron ore slime from Iron Ore Washing Plant from eastern part of India and developed process technology for recovering of iron values from slimes.

III. Pilot Scale Flotation Studies of Iron Ore Slime: Hematitic iron ore from northern part of India is subjected to washing and the fines released as slime is disposed in the slime pond, which subsequently leads to environmental threat besides the loss of iron values.

IV. Briquetting of Chrome Concentrate Micro-fines for Ferro-alloy Production: An attempt was made to convert the chrome micro-fines to briquette for use as raw material in ferro-alloy making. The briquettes developed under optimised conditions attained a CCS of with 126 kgf and 25 drop number.

V. Development of Stationary Bed Pellet Induration Furnace: In pelletisation plant, the induration is carried out in straight travelling grate and grate-kiln, which occupies large space. Travelling grate facilitates both up draft and down draft facility. To simulate the firing zone of pellet induration, CSIR-NML in collaboration with Tata Steel designed and developed a gas based stationary grate induration strand with down draft facility.

VI. Desliming Hydrocyclone Simulation Studies: A study was carried out to achieve a cut size between 5-10 micron with a 4" hydrocyclone through pilot scale test at varied combination of parameters such as vortex finder, apex followed by development of steady state model and simulation analysis.

VII. Modelling and Simulation Analysis of Comminution Circuit: Objective of the present study was to predict the maximum throughput of the crushing circuit along with the optimum parameter to achieve that throughput.

VIII. Beneficiation of Siliceous Limestone for Cement Industries: CSIR-NML has taken up a research project on beneficiation of argillaceous limestone containing 39% CaO, 19% SiO_2, 23% total insoluble and 0.8% Fe(T) and minerals with fine texture. Based on the process mineralogical information, the ore was subjected to comminution followed by flotation in bench scale and a limestone concentrate of cement grade with 11% SiO_2 was generated.

IX. Development of Process Flowsheet for Beneficiation and Extraction of Tungsten Metal from Mines Waste: CSIR-National Metallurgical Laboratory is working on development of indigenous technologies for production of tungsten metal from domestically available resources such as lean grade ores and mines waste.

X. Dry Beneficiation of High Ash Non-coking coal for Application in Thermal Power Plants and DRI Making: CSIR-NML has developed an expertise and pilot scale facility for dry beneficiation of non-coking coal.

3. CSIR-Central Glass & Ceramic Research Institute (CGCRI)

I. R&D for recovery and utilisation of wastes, marginal materials and byproducts, substitution of one mineral by other or of mineral by other commodities, etc: CSIR-CGCRI is working for the proper utilisation of Industrial Solid Wastes (ISW) materials for value added product development like pavement tiles, blocks etc.

II. R&D (Coal, Hydrocarbons & Energy): CSIR-CGCRI has developed process technology for making solid oxide fuel cell (SOFC) stack using indigenously developed planar anode-supported SOFC single cells (10 cm x 10 cm x 1.5mm), glass-based high temperature thermally cyclable sealant and ferritic stainless steel based bipolar plates and current collection plates having a novel flow field for the reactant gases (both fuel and oxidant) to produce electrical power through electrochemical reaction of the fuel gas (e.g. hydrogen) with the oxidant (e.g. oxygen/air).

III. R&D for development of ceramics, refractories and glass based on minerals or mineral-substitutes: Over the years the CSIR-CGCRI has developed expertise in new generation bioceramics, glass, metal and composite materials for variety of biomedical applications.

4. CSIR – Institute of Minerals & Materials Technology, Bhubaneswar

A. R&D (Ore preparation & process)

I. Characterisation and Beneficiation Studies on Hematite iron ore for preparation of DRI Pellet Feed Material: Two iron ore fines samples from IP and Serajuddin mine from Odisha were collected to beneficiate the ore to produce super grade concentrates.

II. Characterisation and beneficiation studies on hematite iron ore from Sagasahi Mine, Odisha: The objective of the project was to provide appropriate process flow sheet for different Fe ranges of raw materials to maximise the iron recovery with high Fe content to utilise powdery and fragile types of hematite iron ores resources.

III. Process development for the recovery and extraction of Nb and Ta from carbonatites of Sevattur deposit, Tamil Nadu: A typical beneficiation flow sheet of niobium ore consists of size reduction, classification, magnetic separation, flotation and leaching of the final concentrate.

IV. Characterisation and beneficiation study of low grade PGE ores from Boula mine: The characterisation of the feed material and comminution work were completed.

V. A preliminary study of recovery of nickel value from chromite overburden and to optimise and undertake technology development in COB plant operation: At present, the work is in progress.

B. R& D activities in Building materials

I. Mineral cementation technology for cold setting building brick: CSIR–IMMT, Bhubaneswar has developed a non-fired process for utilisation of industrial and mining wastes in the manufacture of building material named as mineral cementation technology.

II. Cement free fly ash geopolymer technology: Geopolymer is a green chemistry of making cementitious binding materials like hydraulic cement through alkaline reaction of alumino-silicious minerals.

III. Treatment and utilisation of jarosite a waste of Zn extraction plant in the manufacture of cold setting building brick: Under the exploratory research programme, a successful innovative process has been developed for toxic leachable elements stabilisation and manufacture of cold setting building brick/block using jarosite.

IV. Preparation of Calcium sulfo-aluminate cement: In context to the environmental point of view, Calcium sulfo-aluminate cement is an option to develop alternate low lime clinker to substitute Portland cement to reduce CO_2 emission.

5. National Mineral Development Corporation Ltd (NMDC)

NMDC undertakes various projects related to the operational problems In-house and Collaborative Programmes with various institutes. Some of the R&D projects are given below:

I. Development of an entrained flow gasification system using non-coking coal (F-grade) blended with dolo-char for thermal applications (IMMT, Bhubaneswar).

II. Characterisation and beneficiation studies on laterite/goethite Iron ores, Development of dry beneficiation technologies for processing of hydrated iron ores.

III. R&D for alternative Iron making Technology.
IV. Improving the efficiency of dense medium cyclone separating the high NGM coal samples using GPU based CPM and PERT methods (IIT, Hyderabad).

6. Manganese Ore India Ltd (MOIL)

MOIL has carried out R&D activities to improve the safety, productivity and environmental standards in the mines by introducing newer technologies in consultation with reputed academic and CSIR-R&D Institutions of the country. Significant R&D projects in MOIL are listed below:

I. Mine Environment;

II. Mines Safety: (a) Mining Subsidence and (b) Stope Design;

III. Mineral conservation;

IV. Mining Technology: (a) Decline and (b) Alternative to Cartage Explosives;

V. Collaborative work with Academic and Research Institutions;.

VI. In-house R&D works: (a) Substitute of fill material and (b) Pre-cast RCC Columns & Sections;

VII. Mineral Beneficiation;

VIII. Metallurgical Studies.

7. Steel Authority of India Ltd (SAIL)

Three projects are being pursued with assistance of Ministry of Steel: (a) Development of Pilot scale pelletisation technology for Indian Goethitic/hematite ore with varying degree of fineness (completed in September 2017); (b) Indigenous development of model based breakout prediction system for Continuous Casters; and (c) Development of automation system for optimum coal blending at coal handling plant of coke oven batteries.

8. Tata Steel Ltd

Tata steel R&D (Ore beneficiation), Jamshedpur involved in High Intensity Magnetic Separation, Dry Magnetic Separation, Developed Comprehensive/deep beneficiation flow sheet, Reduction in specific water consumption at wash plant; R&D (Agglomeration, Ferro Alloys, Blast Furnace and Waste Utilisation), Jamshedpur involved in Development of carbon composite briquette, Implementation of lime excess framework, Physio chemical characterisation of Manganese ore, etc.; and R&D Kalinganagar involved in the process of solid wastes from Blast Furnaces, Steel Melt Shop and Hot Strip Mill are mixed and processed in various proportions and are utilised as by-products in Sinter making at Kalinganagar.

9. Hindalco Industries Ltd

Hindalco Industries Ltd associated with various R&D process like Optimisation of Bauxite Blending for Bayer Plants, Improvement of Oxalate Productivity of Bayer Plant, Grinding Aids for Bauxite Milling Process, Utilisation of Bauxite Residue in different Applications, Separation of Unburnt Carbon from Fly Ash of Cogen plant and Development of Precipitated Super Fine Hydrate.

10. Hindustan Zinc Ltd

Hindustan Zinc Ltd undertook various R & D task related to Ore preparation & Process, Product development and Waste Utilisation. The projects are Pre-graphite flotation to remove graphitic carbon of SK-6 Ore, Grade & Recovery optimisation of Zawar Ores, Paste Filling Test by using power plant waste, Bismuth Oxy-chloride & Copper sulphate, Antimony Tri oxide, Sodium Sulphate and utilisation of HZL wastes in construction sector.

11. Indian Rare Earths Ltd (IREL)

IREL associated with following R&D (Ore preparation & process) projects :

Development of process flow sheet using OSCOM raw sand to separate Very Heavy Minerals, Light Heavy Minerals & Light Minerals with HM content in tails <1% at IREL, OSCOM, Chatrapur, Odisha.

Test works on Separation of minerals using REDMS, RERMS & Floatex within various process samples at IREL, Chavara, Kerala.

Feed to Garnet section test on Coronastat HTS, Feed to Ilmenite circuit test on Coronastat HTS and HUS output test on Coronastat HTS, REDMS, IRMS at IREL, OSCOM, Chatrapur, Odisha.

12. NALCO

R&D Projects

1. Extraction of Alumina from Partially Lateritized Khondalite (PLK) at laboratory scale" has been

completed and the basic flow sheet for the process has been developed by CSIRO, Australia.

2. NALCO & IIT, Bhubaneswar have jointly developed a process for "Synthesis, Characterisation and Development of Red mud-Fly ash based Geopolymer concrete" which has a potential for application in civil activities.

13. Hindustan Copper Ltd (HCL)

R&D Projects

1. Recovery of Copper through leaching from ESP dust of flash smelter has been successfully carried out.

2. Experiments on bismuth removal from electrolyte were carried out at GCP using barium carbonate at different dosage and temperature. Optimum dosage of Barium Carbonate has been established at lab scale. Further the same experiment has been scaled up and done in refinery using commercial grade in existing operational conditions, it is observed that removal of Bi up to 58.5% was observed at 6 kg/m^3 dose.

FOREIGN TRADE

India's Trade and Economic Situation

Indian trade scenario for the year 2017-18 exhibits a positive growth. India's overall exports (Merchandise and Services combined) in 2017-18 were USD 498.61 billion, exhibiting a positive growth of 13.31 per cent over the same period last year. Overall exports recorded a Compound Annual Growth Rate (CAGR) of 6.16 per cent from April-March 2008-09 to April-March 2017-18.

A number of concerted steps/measures have been taken up for promoting exports. These relate to measures for improved trade facilitation and support, including focus on logistics, trade facilitation, increased digitisation to increase transparency and reduce human interface, implementation of GST, skilling, promoting Ease of Doing Business Measures etc. Merchandise exports have exhibited a rising trend in the post 2015-16 period, with merchandise export growth in dollar terms of 5.17% and 10.03% in 2016-17 and 2017-18 respectively, despite an adverse global scenario.

In spite of a possibility of fresh global economic slowdown, Indian exports are on a positive growth trajectory with merchandise exports likely to breach USD 314 billion mark in 2018-19, which were India's highest merchandise exports recorded in 2013-14.

India's merchandise exports as a percentage of GDP are 12.89 per cent in April-March 2017-18 (P).

As per the World Trade Statistics 2018, India's ranking amongst the leading exporters in the world merchandise trade improved from 30 in 2004 to 20 in 2017 with a share of 1.70%. Similarly, India's ranking amongst the leading importer in world merchandise trade was 11 in 2017 as compared to 23 in 2004 with a share of 2.50%.

Exports

The total exports (including re-exports) of all merchandise in 2016-17 and 2017-18 were ₹ 18,49,433 crore and ₹ 19,56,514 crore, respectively. During the year 2017-18, the total value of exports (including re-exports) of ores and minerals was ₹ 1,99,120 crore. The export value of ores & minerals rises from ₹ 1,70,946 crore in 2015-16 to ₹ 2,00,131 crore in 2016-17 and then declined to ₹ 1,99,120 crore in 2017-18. The value of mineral exports decreased about 0.50% in 2017-18 as compared to that in the previous year.

Diamond (total) continued to be the largest constituent item with a share of 81.37% in the total value of mineral exports in 2017-18. Next in order of share were iron ore with the contribution of 4.77% followed by granite 4.64% and alumina 1.66%. The individual share of remaining minerals in the total value of exports of ores and minerals from India during the year under review was less than one per cent.

The export of selected mineral-based products during 2016-17 and 2017-18 was valued at ₹ 2,00,522 crore and ₹ 2,31,822 crore, respectively. The exports of petroleum products, e.g., light distillates (naphtha and others), middle distillates and heavy ends, earned foreign exchange of ₹ 1,94,893 crore and ₹ 2,25,139 crore in 2016-17 and 2017-18, respectively, with more than 97% share in both the years in the export of selected mineral-based products.

India also exported metals and alloys valued at ₹ 1,82,186 crore and ₹ 1,90,293 crore during 2016-17 and 2017-18, respectively. Iron & steel, with a share of 52.39%, continued to hold the top position in the total value of metals & alloys. Gold (non-monetary & monetary) accounted for 5.08%, aluminium and alloys including scrap 16.18%, copper & alloys (including brass & bronze) accounted for 11.58% . The contribution of ferro-alloys was 7.53%, zinc & alloys including scrap was 3.24%, precious metals/metals clad with precious metals 1.58%, lead & alloys including scrap was 1.34% and the individual share of other remaining metals and alloys was less than 1 per cent in the total value of metal and alloys.

Imports

The total imports of all merchandise in 2016-17 and 2017-18 were ₹ 25,77,675 crore and ₹ 30,01,033 crore, respectively. The value of imports of ores and minerals in 2017-18 increased by 27.06% to ₹ 10,28,501 crore from ₹ 8,09,445 crore in 2016-17. Petroleum (crude) continued to be the largest constituent item with a share of 54.75% in the total value of minerals imported in 2017-18. Next in order of importance was diamond with a share of 18.49% followed by coal (excluding lignite) with the contribution of 13.46%, natural gas 5.09% and copper ores & concentrates 2.71%. The combined share of these five minerals was 94.5% in 2017-18 as against 94.24% in the previous year.

The import of selected mineral-based products during 2016-17 and 2017-18 was valued at ₹ 95,153 crore and ₹ 1,14,309 crore,respectively. The imports of petroleum products (total) in 2017-18 increased by 21.49% in terms of value over the preceding year to ₹ 86,946 crore and had a share of 76.06% in the value of import of selected mineral-based products during 2017-18.

The value of imports of metals and alloys at ₹ 4,11,825 crore showed an increase of 21.92% in 2017-18 from ₹ 3,37,788 crore in 2016-17. Gold, non-monetary & monetary (total) with a share of 52.71% continued to occupy the top position in the total import value of metals & alloys in 2017-18 followed by iron & steel with a share of 21.10%, aluminium & alloys including scrap 7.08%, copper & alloys (including brass & bronze) 7.06%, silver 5.03%, ferro-alloys 1.61%, zinc & alloys including scrap 1.29% and lead & alloys including scrap 1.27%. The individual share of remaining metals and alloys was less than 1% of the total value of metals & alloys imports.

VALUE-ADDED EXPORT TRADE

India's foreign trade includes exports of minerals, both in the raw form and semi-processed & processed forms like mineral-based primary manufactured products.

Ores and minerals contributed significantly to India's exports trade in 2017-18 with a share of about 10% (i.e., ₹ 1,99,120 crore) in the total value of all merchandise. The contribution of minerals in exports in raw/unprocessed forms was about ₹ 20,501 crore and in semi-processed/processed forms was about ₹1,78,619 crore. The manufactured mineral-based products contributed about ₹ 4,21,364 crore to the total value of exports of all merchandise. The value-added semi-processed/processed minerals figuring in India's foreign trade included cut & polished diamond/emerald, pulverised barytes, steatite, felspar (cut), garnet, calcined magnesite, magnesia (fused), magnesite (dead-burnt), magnesium oxide, slate (worked), processed mica & manufactured mica products, coke, cut & polished dimension stones, alumina, etc. The manufactured mineral-based commodities included metals & alloys and products thereof, cement, firebricks & other refractory materials, clay-bonded graphite crucibles & silicon carbide crucibles, manganese dioxide, asbestos-cement products, inorganic chemicals like lime & fluorine chemicals, refined borax & borates, elemental phosphorus & phosphoric acid, titanium dioxide, petroleum products, phosphatic & potash fertilizers, etc. Table-6 provides data on contribution of various value-added minerals and mineral-based products to India's exports during 2015-16 to 2017-18.

INFRASTRUCTURE

Infrastructure

In Economic literature, infrastructure is popular by the name "Overhead Capital" or "Social Overhead Capital". The role of infrastructure development in economic growth has been well recognised in the literature. The correlation of investments in inland, road, rail and airport infrastructure to GDP are higher than 0.90 indicating that there exists a strong correlation between GDP and investment in infrastructure. This further reiterates the fact that massive investment is needed in infrastructure to achieve targeted economic growth in the country.

India needs to spend 7-8 per cent of its GDP on infrastructure annually, which translates into annual infrastructure investment of US$200 billion currently. However, India has been able to spend only about US$100-110 billion annually on infrastructure, leaving a deficit of around US$90 billion per annum. With the aim of boosting investment in infrastructure, National Investment and Infrastructure Fund has been created with a capital of approximately ₹ 400 billion to provide investment opportunities to commercially viable projects. A new Credit Rating System for infrastructure projects, based on Expected Loss approach, has also been launched which seeks to provide additional risk assessment mechanism for informed decision making by long-term investors.

Table – 6 : Contribution of Value-added (Processed) Minerals & Mineral-based Products in India's Export* Trade, 2015-16 to 2017-18

Sl. No.	Commodity group	Value of exports (₹ million)			Contribution (percentage)		
		2015-16	2016-17	2017-18 (P)	2015-16	2016-17	2017-18 (P)
1.	All Merchandise	17163780	18413144	19565145	100.00	100.00	100.00
2.	Minerals	1709463	2001306	1991204	9.96	10.86	10.18
	2.1 Raw/Unprocessed form	182381	223701	205011	1.06	1.21	1.05
	2.2. Semi-processed/ processed forms (preliminary and intermediate stages of processing)	1527082	1777605	1786193	8.90	9.65	9.13
3.	Manufactured Mineral-based Commodities (final stage of transformation)	3342844	3820738	4213648	19.48	20.75	21.54
	3.1 Metals/Alloys	1529126	1821860	1902939	8.91	9.89	9.73
	3.2 Others	1813718	1998878	2310709	10.57	10.86	11.81

Figures rounded off.
** Including re-exports.*

Coal

Coal production (provisional) at around 675.40 million tonnes in 2017-18 was higher by 2.7% from that of 657.87 million tonnes in 2016-17. In 2017-18, out of the total production of coal, 5.9% (39.85 million tonnes) was of coking coal and the remaining 94.1% (635.55 million tonnes) was of non-coking coal. Of the 687.83 million tonnes despatches of raw coal in 2017-18, about 83.8% despatches were to Electricity Sector, 1.6% to the Steel Industry and 1.2% to the Sponge Iron Industry, 1.1% to the Cement Industry rest 12.3% to other Industries.

Electricity

Power sector in India has witnessed a paradigm shift over the years due to the constant efforts of Government to foster investment in the sector. As a result, India improved its ranking in the Energy Transition Index published by World Economic Forum (76th position).

The installed capacity has increased from 3,44,002 MW in 2018 to 3,56,100.19 MW in 2019. Total generation of energy during 2018-19 was 1376 BU (including imports and renewable sources of energy). The capacity of thermal power is 64 per cent followed by renewable energy. Further, more than 46 per cent of power generation comes from private sector. In addition, the peak deficit i.e. the percentage shortfall in peak power supply vis-à-vis peak hour demand has declined from around 9 per cent in 2012-13 to 0.8 per cent during 2018-19 (March 2019).

The Pradhan Mantri Sahaj Bijli Har Ghar Yojana (SAUBHAGYA) was launched in October, 2017 with the aim of universal household electrification by providing last mile connectivity and electricity connections to all remaining un-electrified households in rural and all poor households in urban areas. As on March 2019, 2.62 crore households have been electrified since the launch of SAUBHAGYA scheme.

Transport

Railways

Indian Railways (IR) has taken numerous steps such as provision of lifts/escalators, plastic bottle crusher machines, mechanised cleaning and housekeeping etc. at major stations. Freight and passenger performance: Revenue Earning Freight loading (excluding loading by Konkan Railways) by Indian Railways during 2017-18 was placed at 1159.55 million tonnes, as against 1106.15 million tonnes during 2016-17, registering an increase of 4.83 per cent, with incremental loading of 53.40 million tonnes over 2016-17. In 2018-19, IR carried 1221.39 million

tonnes of revenue earning freight showing an increase of 61.84 million tonnes over the freight traffic of 2017-18 and translating into an increase of 5.33 per cent. There is an increase of 2.09 per cent the number of passengers carried by IR during 2017-18 as compared to 2016-17 and 0.64 per cent increase in 2018-19 as compared to 2017-18.

IR has initiated a major electrification program for electrifying 100 per cent of its Broad Gauge network. As on 1st April, 2019, Indian Railways has 35,488 Route Kilometre (RKM) of network commissioned on electric traction which constitutes 51.85 per cent of total network and carries 64.50 per cent of freight and 53.70 per cent of coaching traffic. The pace of electrification accelerated and a total of 38,000 RKM has been identified for electrification by 2021.

'Swachh Rail, Swachh Bharat', mission focuses on cleanliness. In IR, there is an increasing competition among stations to obtain "Green Rating" and similarly IR has also encouraged Green Certification of Workshop and Production Units. So far 10 Railway Stations, 34 workshops and 4 production units have been green certified by CII.

Aviation

India's scheduled domestic air transportation for passengers and goods has grown by 14 per cent and 12 per cent respectively in 2018-19. Total domestic and international passengers were 204 million in 2018-19. Under "Ude Desh ka Aam Naagrik-UDAN", a total of 719 routes have been awarded in three rounds of bidding for regional connectivity, 182 of which are operational. Currently, connectivity has already been provided to more than 22 States/ UTs. UDAN (International) Scheme has been launched recently, under which Guwahati Airport will be connected to Bangkok and Dhaka shortly.

Impressive double-digit domestic air cargo growth of 12.1 per cent in 2018-19 over 2017-18 was achieved and air cargo handled reached 3.6 MMT. General cargo tonnage handled increased by over 10 per cent per year in last four years with courier services increasing by 17 per cent. The first National Air Cargo Policy's outline was released at the Global Aviation Summit in January 2019.

Ports and Shipping

Shipping plays a pivotal role in India's trade dynamics. As per the Indian Shipping Statistics 2018, "India had a fleet strength of 1400 vessels with gross registered tonnage (GRT) of 12.68 million as compared to fleet strength of 1371 vessels with 12.35 million GRT at the end of December 2017". As on January 31, 2019, India had a fleet strength of 1405 ships with dead weight tonnage (DWT) of 19.22 million (12.74 million GT) including Indian controlled tonnage, with Shipping Corporation of India (SCI) having the largest share of around 30.52 per cent. Of this, around 458 ships of 17.58 million DWT (11.26 million GT) cater to India's overseas trade and the rest to coastal trade.

Port sector development is very crucial for the development of any economy. Ports handle around 90 per cent of EXIM Cargo by volume and 70 per cent by value. In order to meet the ever increasing trade requirements, expansion of Port Capacity has been accorded the highest priority with implementation of well-conceived infrastructure development projects like Sagarmala, project Unnati etc. Towards facilitating Ease of Doing Business, Ministry of Shipping had identified various parameters for reducing dwell time and transaction costs in the major ports.

India's first inland waterway multimodal terminal (MMT) at Varanasi was inaugurated on 12 November 2018 by Hon'ble Prime Minister and the first container consignment on Ganga which had sailed from Kolkata was received at Varanasi MMT on the same day. The main focus of MMT is to promote inland waterways as it is cheap and environment friendly. To enhance the access and establish alternative connectivity to the North East through Indo- Bangladesh Protocol route, dredging works between Ashuganj and Zakiganj and Sirajganj and Daikhawa in Bangladesh through 80:20 sharing (80 per cent by India and 20 per cent by Bangladesh) have been awarded. In October 2018, a Standard Operating Procedure of MoU on Passenger and Cruise service on the Coastal and Protocol routes between India and Bangladesh has been signed to enhance bilateral movement of passengers/tourists. The cargo traffic on National Waterways was 55 million tonnes in 2017-18 and has increased by 31 per cent in 2018-19.

Roads

Road is the dominant mode of transportation in comparison with rail, air traffic and inland water-ways and accounts for about 3.14 per cent of GVA and 69 per cent and 90 per cent of the country wide freight and passenger traffic respectively. India has a road network of about 58.98 lakh kms as on 31 March, 2017 with rural roads constituting 70.65 per cent and National highways constituting 1.94 per cent. Ministry of Road Transport and Highways (MORTH) declared 2018-19 as the 'Year

of Construction', and has been making constant efforts to expand and upgrade the network of National Highways in the country as a result of which road construction in kms grew @ 30 kms per day in 2018-19 as compared to 12 kms per day in 2014-15.

Huge investments have been made in the sector with total investment increasing more than three times from ₹ 51,914 crore in 2014-15 to ₹ 1,58,839 crore in 2018-19. Major outcomes in Road sector during the period 2014-15 to 2018-19 were construction of Eastern Peripheral Expressway, Delhi-Meerut expressway and Dhola-Sadiya Bridge. Dhola-Sadiya Bridge connects Assam to Arunachal Pradesh and ensures 24X7 connectivity.

PERFORMANCE OF SELECTED MINERAL-BASED INDUSTRIES

Steel

Globally, India is the second largest producer of crude steel in the world surpassing Japan with a global share of 6 per cent. During 2018-19, crude steel's production stood at 106.56 million tonnes, witnessing a growth rate of 3.3 per cent over the corresponding period of 2017-18 at 103.13 million tonnes with utilisation capacity of 77.24 per cent. As per estimates, the Steel industry directly contributes to about 1.4 to 2 per cent of India's GDP and its weightage in the official IIP is 7.22 per cent and it accounts for 7.53 per cent of the Wholesale Price Index (WPI). India is the third largest consumer of the finished steel after China and USA, however, its per capita consumption is only 69 kg as against the global average of 214 kg. The total export with highest volume of 9.62 million tonnes during 2017-18 fell to 6.36 million tonnes during 2018-19 due to weakening of steel market fundamentals, increase in trade friction, imposition of protectionist measures and excess steel capacity. The National Steel Policy, 2017 gives broad policy directives to the industry for encouraging long-term growth for Indian steel on both supply and demand fronts.

Cement

As per DIPP Annual Report, 2018-19, production of cement in 2017-18 at 299.11 million tonnes and during 2018-19, it was 337.32 million tonnes and registered an increase of about 12.77%. The induction of advanced technology has helped the industry immensely to improve its efficiency by conserving energy, fuel and addressing the environmental concerns. Cement Industry has been undergoing a transition with modernisation and upgradation of technology particularly with a view to conserve energy. India exports cement including white cement and other cement clinker. The exports of cement (total) decreased marginally to 6.65 million tonnes in 2017-18 from 6.85 million tonnes in 2016-17.

Petroleum Oil and Refineries

Crude oil production in 2017-18 at 35.684 million tonnes registered a nominal decrease of 0.9 % as compared to that in 2016-17. The production of natural gas (utilised) including CBM was at 32,649 million cubic metres in 2017-18, 2.36% higher than 31,897 million cubic metres achieved in 2016-17. The refinery crude throughput of 251.935 million tonnes in 2017-18 was 2.68% higher than 245.362 million tonnes processed in 2016-17. The total refining capacity in the country was about 247.56 MMTPA as on 1.4.2018. Production of petroleum products (including LPG production from natural gas) was 254.40 million tonnes in 2017-18 as compared to 243.55 million tonnes in 2016-17.

SELF-RELIANCE IN MINERALS & MINERAL-BASED PRODUCTS

India continued to be wholly or largely self-sufficient in minerals which constitute primary mineral raw materials that are supplied to industries, such as, iron & steel, aluminium, cement, various types of refractories, china clay-based ceramics, glass. India is self-sufficient in bauxite, iron ore and sillimanite. India is about to become self-sufficient in chromite. India is deficient in kyanite, limestone, magnesite, rock phosphate, manganese ore, etc. which were imported to meet the demand for either blending with locally available mineral raw materials and/or for manufacturing special qualities of mineral-based products. To meet the increasing demand of uncut diamonds, emerald and other precious & semi-precious stones by the domestic Cutting and Polishing Industry, India is dependent on imports of raw uncut stones for their value-added re-exports. The degree of self-sufficiency in respect of various principal minerals and metals in 2017-18 is furnished in Table-7.

Table-7: Degree of Self-sufficiency in Principal Minerals & Metals, 2017-18 (P)

Sl. No.	Commodity	Apparent Demand* ('000 tonnes)	Supply/Domestic supply ('000 tonnes) (R)	Order of self-sufficiency (%)
Minerals				
1.	Bauxite	22244	22312	100
2.	Chromite	3559	3480	98
3.	Iron ore	185280	200954	100
4.	Kyanite	8.25	7.80	95
5.	Limestone	356565	338550 1/	95
6.	Magnesite	415	195	47
7.	Manganese ore	6112	2589	42
8.	Rock phosphate (including apatite)	9235	1534	17
9.	Sillimanite	65	81	100
Metals				
10.	Aluminium (primary)	3347	3400	100
11.	Copper (refined)	863 2/	830	96
12.	Lead (primary)	262 3/	168	64
13.	Zinc	696 4/	791	100

***Source: Production**: MCDR Returns for production data.*

** :Apparent demand (production+ import-export)*

***Note:** As per Government of India Notification S.O. 423(E) dated 10th February, 2015, the following minerals have been declared as minor minerals: i) barytes ii) dolomite iii) felspar iv) fireclay v) quartz/silica sand vi) talc/steatite/ soapstone & vii) pyrophyllite, these have not been included in the table due to non-availability of production data for the year 2017-18.*

Even in cases where almost entire domestic demand is satisfied by domestic supplies, some quantities of certain special quality/ types of minerals and metals/ferro-alloys are imported to meet the requirement in certain specific end-uses.

1/ Excludes production of limestone as a minor mineral, calcite & chalk and includes limeshell, limekankar and marl.

2/ Based on production of copper cathode and imports & exports of copper & alloys.

3/ Based on production of lead (primary), and imports & exports of lead & alloys.

4/ Based on production of zinc (ingots) and imports & exports of zinc & alloys.