

MINING INDUSTRY

PREFACE

‘If we remove metals from the service of man, all methods of protecting and sustaining health and more carefully preserving the course of life are done away with. If there were no metals, men would pass a horrible and wretched existence in the midst of wild beasts...’

Georgius Agricola, 1556

Growth and prosperity of a nation depends on the search, development and management of its mineral resources. Minerals constitute an important raw material and a valuable natural resource in the industrial development of the country. Due to increased competition, liberalization and globalisation world-wide, the markets for minerals have been growing both in diversity and magnitude terms.

The minerals and mining industry is a key segment of the Indian economy, with India being highly endowed with vast mineral resources. The country's accelerated growth rate warrants a rapid development of the mining sector, on which most of the basic industries in the manufacturing sector depend. Extraction and development of minerals are closely interlinked with other natural resources like land, water, air and forest. Hence, the management of this precious resource and its optimal and economical use are matters of national importance. This book provides an insight into the mining industry with special reference to India.

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1. INTRODUCTION

Mining is the extraction of valuable minerals or other geological materials from the earth, from an ore body, lode, vein, (coal) seam or reef, which forms the mineralized horizon and package of economic interest to the miner.

Mining comprises extraction of any material that cannot be grown through agricultural processes, or created artificially in a laboratory or factory. It includes non-renewable resource (e.g., petroleum and natural gas,). Most of the materials recovered by mining are base metals, precious metals, iron, uranium, coal, diamonds, limestone, oil shale, rock salt and potash. The activity of mining and quarrying also covers all the supplementary activities such as dressing and beneficiation of ores, crushing, screening, washing, cleaning, grading, milling floatation, melting, palletising, topping and other preparations carried out at the mine site which are needed to render the material marketable. Both open cast mining and underground mining operations are carried out and drilling/pumping is undertaken for extracting liquid or gaseous fuels

“A mineral is an element or chemical compound that is normally crystalline and that has been formed as a result of geological processes.”

Mining is among the oldest industries on Earth, along with agriculture. Together, mining and agriculture are the only two means of obtaining all of the raw materials needed to support society and our way of life. Throughout history, mining has played a vital role in the development of society by providing the minerals and metals necessary to build, improve, and transform civilization.

There is lot of wealth buried under the earth's surface. For mankind, this wealth is extracted by the minerals and the mining sector. Minerals are the valuable natural resources being finite and non-renewable. They constitute the vital raw materials for many basic industries and are a major source of development. The history of mineral extraction in India dates back to the days of the Harappa civilization. The wide availability of the minerals in the form of abundant rich reserves made it very conducive for the growth and development of the mining sector in India.

The country is endowed with huge resources of many metallic and non-metallic minerals. Mining sector is an important segment of the Indian economy. Since independence, there has been a pronounced growth in the mineral production both in terms of quantity and value. India produces as many as 87 minerals, which include 4 fuels, 10 metallic, 47 non-metallic, 3 atomic and 23 minor minerals (including building and other materials).

Section 2(JJ) of the Mines Act of 1952 defines the term 'minerals' as meaning 'all substances which can be obtained from the earth by mining, digging, drilling, dredging, hydraulicizing, quarrying or by any other operation and includes mineral oils (which in turn include natural gas and petroleum)'. The Supreme Court of India in *Ichchapur Industrial Co-operative Society Limited v. The Competent Authority, Oil and Natural Gas Corporation and Another* (1997(1) SC.130, Judgement Today) has held that the term 'mineral' as defined in the Mines Act of 1952, includes water as well.

2. MINING INDUSTRY IN INDIA

Indian mining industry is characterized by a large number of small operational mines. The number of mines which reported mineral production [excluding minor minerals, petroleum (crude), natural gas and atomic minerals] in India was 2076 in 2011-12 as against 2355 in the previous year. Out of 2076 reporting mines, 354 were located in Andhra Pradesh followed by Gujarat (308), Rajasthan (241), Madhya Pradesh (225), Karnataka (180), Tamil Nadu (156), Odisha (119), Jharkhand (106), Chhattisgarh (99), Maharashtra (86) and Goa (70). These 11

States together accounted for 93.64% of total number of mines in the country in the year 2011-12.

2.1. Latest trends

Indian mining industry market is set to attain a size of US \$36.2 bn by 2016, according to a new report released by Research and Markets. The report titled 'India Mining Report Q2 2012' says that India ranks among the world's top five nations for its core competency commodity reserves of coal and iron ore. According to the report, India hosts a wide range of globally significant mineral resources, including four fuel minerals 11 metallic minerals, 22 minor minerals; and 52 non-metallic minerals. Iron ore reserves are estimated in the region of 23bnt and account for 6% of global reserves, while coal reserves are reported to be around 255bnt.

India is the world's third-largest producer of coal, fourth-largest producer of iron ore and the fifth-largest producer of bauxite. However, only 10% of the country's landmass has been explored due to significant regulation and bureaucratic obstacles. Growth in 2012 and beyond will continue to be curtailed by India's poor operating environment. A bright spot, however, is the increasing number of Indian companies venturing overseas to secure stable, long-term supplies of minerals such as coal and iron ore in a bid to meet fast-rising domestic demand, according to the report.

2.2. Mineral production / Trade

The total value of mineral production (excluding atomic minerals) during 2011-12 has been estimated at Rs.210334.55 crore, which shows a decrease of about 1.02% over that of the previous year. The decline in value of mineral production is due to the restriction on exports, temporary discontinuance of mining for want of environmental clearance etc. During 2011-12, estimated value for fuel minerals account for Rs.143498.21 crore or 68.22%, metallic minerals, Rs.41954.50 crore or 19.94% of the total value and non-metallic minerals including minor minerals Rs.24881.84 crore or 11.83% of the total value.

During the year 2011-12, mineral production was reported from 32 States/Union Territories (actual reporting of MCDR & Fuel minerals from 22 States and estimation of minor minerals for all 32 States/Union Territories) of which the bulk of value of mineral production of about 91.41% was confined to 11 States (including offshore areas) only. Offshore areas are in leading position, in terms of value of mineral production in the country and had the share of 25.79% in the national output. Next in order was Odisha with a share of 12.02% followed by Chhattisgarh (9.15%), Rajasthan (9.01%), Andhra Pradesh (6.99%), Gujarat (6.83%), Jharkhand (5.86%), Madhya Pradesh (4.69%), Assam (4.63%), Goa (3.30%) and Karnataka (3.13%) in the total value of mineral production. Remaining 22 States and Union Territories having individual share of less than 3% altogether accounted for 8.59% of total value during the year under review.

During the year 2010-11, the Public Sector continued to play a dominant role in mineral production accounting for 66.51% or Rs.128271 crore in the total value. Small mines which were mostly in the private sector continued to be operated manually either as proprietary or partnership ventures. The minerals which were wholly mined / recovered by the public/joint sector in 2010-11 were Copper ore and concentrate, Diamond, Dunite, Fluorite (graded) & concentrate Phosphorite/Rock Phosphate, Rock salt, Selenite and Sulphur. By and large, almost the entire production of Sand (others), Lignite, Gold (primary and secondary of indigenous origin) and Gypsum was from Public Sector. In 2010-11, the Public Sector accounted for sizeable 91% production of coal, 81.78 of Tin concentrate, 74.33% of petroleum (crude), 68.79% of Kyanite and 62.34% of Magnesite.

2.3. Mineral rich States of India

During the year 2010-11, mineral production was reported from 32 States/Union Territories of which the bulk of value of mineral production of about 90.03% was confined to 11 States (including offshore areas) only. Offshore areas continued to be in leading position, in terms of value of mineral production in the country and had the share of 25.64% in the national output. Next in order was

- 1) Odisha with a share of 10.62%
- 2) Rajasthan (8.58%),
- 3) Andhra Pradesh (7.81%),
- 4) Jharkhand (7.72%),
- 5) Chhattisgarh (6.65%),
- 6) Gujarat (6.33%),
- 7) Madhya Pradesh (5.28%),
- 8) Assam (4.64%),
- 9) Goa (3.49%) and
- 10) Karnataka (3.27%)

Remaining 21 States/Union Territories having individual share of 3% or less than 3% all together accounted for 9.97% of total value.

i. Andhra Pradesh

The value of mineral production in Andhra Pradesh was at Rs.16587.51 crore in 2010-11. Almost all important minerals are produced in Andhra Pradesh. The principal minerals produced in the State were coal, natural gas (utilised), iron ore, limestone, petroleum (crude), barytes and which together accounted for 53.32% of total value of mineral production in the State during the year 2010-11. Coal alone contributed 41.35% of the total value of mineral production in the State.

Andhra Pradesh is the leading producer of chrysotile asbestos, barytes, mica, felspar, vermiculite, quartz, laterite, silica sand, dolomite and limestone. State is endowed with the internationally known black, pink, blue and multicoloured varieties of granites.

Krishna-Godavari basin areas of the State have emerged as new promising areas for hydrocarbons-specially natural gas.

Andhra Pradesh claims the Third position among the States in the country with a contribution of 7.81% to the total value of the mineral production.

ii. Chhattisgarh

Chhattisgarh is the sole producer of tin concentrates and is one of the leading producers of coal, dolomite and iron ore. State accounts for about 36% tin ore, 4% diamond, 18% iron ore (hematite), 17% coal and 11% dolomite resources of the country.

The value of mineral production in Chhattisgarh was at Rs.14133.87 crore in 2010-11.

The State is ranked fifth in the country and accounted for 6.65% of the total value of the production. The important minerals produced in the State in the year 2010-11 were coal, iron ore, bauxite, dolomite and limestone which together accounted for about 98.13% of the entire value of mineral production in the State. Chhattisgarh was the sole producer of tin concentrate. The State was the leading producer of coal with a share of 21.30% and that of iron ore was 14.01% in the country.

iii. Goa

Goa is well known for its iron and manganese ores. Bauxite and laterite are the other minerals produced in the State. Iron and manganese ore belts extend from South-East to North-West of the State.

The value of mineral production in Goa in 2010-11 got increased by 32.67% as compared to the previous year and was at Rs.7409.82 crore. About 99.90% of the total value of mineral production in Goa was contributed by iron ore. Production of bauxite and minor minerals was also reported from the State in the year 2010-11.

iv. Gujarat

The value of mineral production in Gujarat in 2010-11 at Rs.12731.07 crore, recorded about 0.55% increase as compared to that in the previous year. The State was ranked

sixth in the country and accounted for about 6.33% of the total value of mineral production in India during the year. Gujarat was the sole producer of agate, chalk and fluorite (concentrate) and the leading producer of Kaolin, Marl, and silica sand in the country. The State was also the second largest producer of lignite and petroleum (crude) in the country during the year 2010-11.

v. Jharkhand

Jharkhand carved out of Bihar in November, 2000 is one of the leading mineral producing States. It is one of the leading producers of coal, kyanite, gold, silver, bauxite and felspar. Uranium ore is being mined and processed by Uranium Corporation of India Ltd. (UCIL) for use as fuel in the country's nuclear power reactors through four underground mines, an opencast mine, two processing plants and a by-product recovery plant, all in East Singhbhum district. Jharkhand accounts for about 36% rock phosphate, 29% coal, 29% iron ore (hematite), 30% apatite, 22% andalusite, 18% copper ore and 5% silver ore resources of the country.

The value of mineral production in Jharkhand during the year 2010-11 was at Rs.16402.08 crore. The State claiming fourth position in the country accounted for 7.72% of the total value of mineral production during 2010-11. Jharkhand was the leading producer of kyanite and second leading producer of graphite in the country. The state was third leading producer of felspar during the year. Coal, the principal mineral produced in the State contributed 88.58% of the total value of mineral production in the State. The other principal minerals produced in the State were iron ore, bauxite, pyroxenite, quartzite and copper concentrate.

vi. Karnataka

Karnataka has the distinction of being the main gold producing State in the country. The State is the sole producer of feldspar and leading producer of iron ore, chromite and dunite.

The value of mineral production in Karnataka during the year 2010-11 was at Rs.6941.71 crore. Iron ore, gold, manganese ore and limestone being the important minerals

produced in the State together accounted for about 99.42% of the total value of mineral production during the year.

vii. Madhya Pradesh

Madhya Pradesh is the only diamond producing State and is the leading producer of copper concentrate, pyrophyllite and diaspore.

The value of mineral production in Madhya Pradesh was at Rs.11225.04 crore in the year 2010-11. Madhya Pradesh contributed 5.28% to the total value of mineral production and was Seventh among States in the country.

viii. Maharashtra

Maharashtra is the sole producer of corundum and is the second largest producer of manganese ore after Odisha. The principal mineral bearing belts in Maharashtra are Vidarbha area in the East and Konkan area in the West.

The value of mineral production in Maharashtra during the year 2010-11 was at Rs.5917.29 crore. Maharashtra accounted for about 2.78% of the total value of mineral production in the country during the year under review. It was the major producer of fluorite (graded) in the country during the year 2010-11. The State was the major producer of manganese ore and kyanite accounting for 21.63% and 36.31% respectively of total production of the mineral in the country.

ix. Odisha

Odisha is the leading producer of chromite, graphite, bauxite, manganese ore, iron ore, sillimanite, quartzite, pyroxenite and dolomite. The State hosts country's sole resources of ruby and platinum group of metals 86%. It accounts for country's 93% chromite, 92% nickel ore, 69% cobalt ore, 52% bauxite, 51% titaniferous magnetite, 44% manganese ore, 40% limestone, 22% pyrophyllite, 33% iron ore (hematite), 20% each mica & sillimanite, 25% each fireclay and garnet, 24% coal, 5% zircon and 20% vanadium ore resources.

The value of mineral production in Odisha was at Rs.22567.67crore. The State contributed 10.62% of the total value of mineral production and claims first position among the States in the country during the year under review. The important minerals produced in Odisha were coal, bauxite, chromite, iron ore, manganese ore and limestone which together accounted for about 99% of the total value of mineral production in the year 2010-11.

x. Rajasthan

Rajasthan is the sole producer of jasper, lead & zinc concentrate and wollastonite. Rajasthan was the sole producer of garnet (gem) till 2004-05. Almost entire production of calcite and natural gypsum in the country comes from Rajasthan. State is a major producer of asbestos, copper concentrate, ochre, phosphorite/rock phosphate, silver, steatite, ball clay, fluorite and felspar. The State is also an important producer of marble having various shades. Makrana area is world famous centre for marble mining.

The value of mineral production in Rajasthan during the year 2010-11 was at Rs.18241.38 crore. Its share to the total value of mineral production in the country in the year 2010-11 was about 8.58%. The State produces almost all varieties of minerals in the country. Rajasthan was the sole producer of lead concentrate, zinc concentrate, calcite, selenite and wollastonite. Almost the entire production of silver, Ochre, steatite and gypsum, in the country was reported from the State.

xi. Tamil Nadu

Tamil Nadu is leading producer of garnet (abrasive), graphite, lignite, magnesite, lime kankar and dunite. State accounts for country's 80% lignite, 74% vermiculite, 63% dunite, 65% rutile, 52% molybdenum, 49% garnet, 32% ilmentie and 27% sillimanite resources.

The value of mineral production in Tamil Nadu was at Rs.4522.49 crore in the year 2010-11. The principal minerals produced in the State were lignite, petroleum (crude), natural

gas (utilised), garnet and limestone which together accounted for 97.76%, of the value of the minerals produced in the State in the year 2010-11.

3. MINING INDUSTRY AROUND THE WORLD

The Top 40 mining companies posted record profits of \$133 billion, generated record operating cash flows, and yet market capitalisation fell by 25%. The European debt crisis and fears of a slowdown in global growth dominated the markets during the second half of the year. The broader markets fell and mining company share prices were hit particularly hard. The Top 40 companies invested \$98 billion in capital projects in 2011 and plan for a further \$140 billion for 2012.

2011 was a year of a growing disconnect for the mining industry. Mining company stocks significantly underperformed the broader markets and lost value despite record profits and the disconnect between share values and many commodity prices widened.

The mining industry is at the forefront of global economic growth. Generally, mining company stocks are more volatile than the general market. Current sentiment has exacerbated this making 2011 particularly volatile for mining stocks given the volatility of the broader markets in 2011. Fears of an economic meltdown stemming from the European sovereign debt crisis and a projected reduction in growth rates for China's economy hit the mining industry particularly hard.

While the future of Europe grabbed headlines in 2011, the global economy of the future will be dominated by China and India, not to mention other emerging markets in South East Asia, Africa and Latin America. Over the past 20 years these economies have grown quickly and are expected to continue to outpace developed nations in the years to come. According to the International Monetary Fund, in 2010 China accounted for approximately 40% of the world's base metals consumption. Even moderate percentage increases in consumption have a huge impact on global demand. While China is significant, it is part of a bigger picture of rapidly emerging nations with vast populations such as India, Indonesia, Brazil, and Nigeria. China is today's story but other emerging market nations will help to sustain a demand-led boom over the longer term.

Ownership of resources and mining industry fiscal regimes remain high on the agenda for many governments around the world. Nations are looking to take an increasing share of profits and resources through a range of measures. Ongoing discussions and debates, formal reviews of fiscal regimes, or recently enacted changes have been seen in countries such as Australia, Chile, Ghana, Peru, and South Africa. Increases in export duties and export restrictions designed to encourage value added downstream industries or protect security of domestic supply are being put into place in countries such as India and Indonesia. For example, India's increase in iron ore export duties in December 2011 resulted in Indian iron ore exports being 60% lower in February 2012 compared to February 2011. By market capitalisation, emerging market companies constitute 38% of the Top 40 in 2011, up from 35% in the prior year – the highest level seen during the period of 2002 to 2011.

It was a particularly poor year for the Top 40 with just six of the Top 40 posting positive market capitalisation movements: China Shenhua, Industrias Penoles, Goldcorp, Randgold, Yamana Gold, and Ivanhoe Mines. Of the six that gained, three were gold companies and the other three were either located in emerging markets or almost exclusively focused on emerging markets. The Top 4 companies by market capitalisation, BHP Billiton, Rio Tinto, Vale, and China Shenhua, constitute 38% of the Top 40 by market capitalisation, which is down from 44% in 2009. China Shenhua managed 7% growth in a year where most companies went backwards, closing the gap with the three larger companies.

Since 2007, iron ore has become an increasingly significant part of the Top 5 diversified miners' portfolios. Miners have recognised the demand for iron ore from emerging markets and have made the investments necessary to take advantage of price increases in recent years.

Labour shortages continued to challenge the Top 40. With mining conditions becoming increasingly difficult, shortages in skilled labour, especially in remotes locations, have often resulted in above average salaries in order to attract and retain talent. Looking in detail at the Top 4, the four largest companies by market capitalisation, namely BHP Billiton, Rio Tinto, Vale, and China Shenhua, labour costs were up at least 8% in 2011—an effect of slight increases in production and incremental increases in wages and benefits.

Coal is the world's most abundant and widely distributed fossil fuel. It's been used by civilization in some form since the Bronze Age. While some of the most significant changes to the ways it is used, how it is traded and what it means to the civilization have yet to come, one thing is for sure, coal is here to stay. As a heavy, low value per tonne, and relatively well distributed commodity, the market for coal is much more local than other mining products.

(Source – Review of global trends in the mining industry – 2012 – PWC)

4. **HISTORY OF MINING**

Since the beginning of civilization, people have used stone, ceramics and, later, metals found on or close to the Earth's surface. These were used to manufacture early tools and weapons, for example, high quality flint found in northern France and southern England was used to create flint tools. Flint mines have been found in chalk areas where seams of the stone were followed underground by shafts and galleries. The mines at Grimes Graves are especially famous, and like most other flint mines, are Neolithic in origin (ca 4000 BC-ca 3000 BC). Other hard rocks mined or collected for axes included the greenstone of the Langdale axe industry based in the English Lake District.

The oldest known mine on archaeological record is the "Lion Cave" in Swaziland, which radiocarbon dating shows to be about 43,000 years old. At this site paleolithic humans mined hematite to make the red pigment ochre. Mines of a similar age in Hungary are believed to be sites where Neanderthals may have mined flint for weapons and tools.

Mining in Europe has a very long history, examples including the silver mines of Laurium, which helped support the Greek city state of Athens. However, it is the Romans who developed large scale mining methods, especially the use of large volumes of water brought to the mine head by numerous aqueducts. The water was used for a variety of purposes, including using it to remove overburden and rock debris, called hydraulic mining, as well as washing comminuted or crushed ores, and driving simple machinery.

Mining as an industry underwent dramatic changes in medieval Europe. The mining industry in the early Middle Ages was mainly focused on the extraction of copper and iron. Other precious metals were also used mainly for gilding or coinage. Initially, many metals were obtained through open-pit mining, and ore was primarily extracted from shallow depths, rather than through the digging of deep mine shafts. Around the 14th century, the demand for weapons, armour, stirrups, and horseshoes greatly increased the demand for iron. The overwhelming dependency on iron for military purposes helped to spur increased iron production and extraction processes.

5. MINING METHODS

The process of mining from discovery of an ore body through extraction of minerals and finally to returning the land to its natural state consists of several distinct steps.

- 1) Exploration – Information about the location and value of the mineral ore deposit is obtained during the exploration phase. This phase includes surveys, field studies, and drilling test boreholes and other exploratory excavations.

This is when the mining company makes the decision to develop the mine or to walk away from the project. This includes mine planning to evaluate the economically recoverable portion of the deposit, the metallurgy and ore recoverability, marketability

and payability of the ore concentrates, engineering concerns, milling and infrastructure costs, finance and equity requirements and an analysis of the proposed mine from the initial excavation all the way through to reclamation. The proportion of a deposit that is economically recoverable is dependent on the enrichment factor of the ore in the area.

- 2) Development - If the mineral ore exploration phase proves that there is a large enough mineral ore deposit, of sufficient grade, then the project proponent may begin to plan for the development of the mine.
- 3) Active mining - Once a mining company has constructed access roads and prepared staging areas that would house project personnel and equipment, mining may commence. All types of active mining share a common aspect: the extraction and concentration (or beneficiation) of a metal from the earth. Proposed mining projects differ considerably in the proposed method for extracting and concentrating the metallic ore.
- 4) Disposal of overburden and waste rock - In almost every project, metallic ores are buried under a layer of ordinary soil or rock (called 'overburden' or 'waste rock') that must be moved or excavated to allow access to the metallic ore deposit. For most mining projects, the quantity of overburden generated by mining is enormous.
- 5) Ore extraction – After a mining company has removed overburden, extraction of the mineral ore begins using specialized heavy equipment and machinery, such as loaders, haulers, and dump trucks, which transport the ore to processing facilities using haul roads.
- 6) Beneficiation - The next step in mining is grinding (or milling) the ore and separating the relatively small quantities of metal from the nonmetallic material of the ore in a process called beneficiation. Beneficiation includes physical and/or chemical separation techniques such as gravity concentration, magnetic separation, electrostatic separation, flotation, solvent extraction, electro winning, leaching, precipitation, and amalgamation (often involving the use of mercury).
- 7) Tailings disposal - The beneficiation process generates high-volume waste called 'tailings,' the residue of an ore that remains after it has been milled and the desired metals have been extracted (e.g., with cyanide (gold) or sulfuric acid (copper)). If a

mining project involves the extraction of a few hundred million metric tons of mineral ore, then the mine project will generate a similar quantity of tailings. How a mining company disposes of this high-volume toxic waste material is one of the central questions that will determine whether a proposed mining project is environmentally acceptable.

- 8) Site reclamation and closure - When active mining ceases, mine facilities and the site are reclaimed and closed. The goal of mine site reclamation and closure should always be to return the site to a condition that most resembles the pre-mining condition.

Mining Techniques

Mining techniques can be divided into two common excavation types: surface mining and sub-surface (underground) mining. Surface mining is much more common. Some mining, including much of the rare earth elements and uranium mining, is done by less-common methods, such as in-situ leaching: this technique involves digging neither at the surface nor underground.

Surface mining is done by removing (stripping) surface vegetation, dirt, and if necessary, layers of bedrock in order to reach buried ore deposits. Techniques of surface mining include; Open-pit mining which consists of recovery of materials from an open pit in the ground, quarrying or gathering building materials from an open pit mine, strip mining which consists of stripping surface layers off to reveal ore/seams underneath, and mountaintop removal, commonly associated with coal mining, which involves taking the top of a mountain off to reach ore deposits at depth. Most (but not all) placer deposits, because of their shallowly buried nature, are mined by surface methods. Landfill mining, finally, involves sites where landfills are excavated and processed.

Sub-surface mining consists of digging tunnels or shafts into the earth to reach buried ore deposits. Ore, for processing, and waste rock, for disposal, are brought to the surface through the tunnels and shafts. Sub-surface mining can be classified by the type of access shafts used, the extraction method or the technique used to reach the mineral deposit. Drift mining utilizes horizontal access tunnels, slope mining uses diagonally sloping access shafts and shaft

mining consists of vertical access shafts. Mining in hard and soft rock formations require different techniques.

Other methods include shrinkage stope mining which is mining upward creating a sloping underground room, long wall mining which is grinding a long ore surface underground and room and pillar which is removing ore from rooms while leaving pillars in place to support the roof of the room. Room and pillar mining often leads to retreat mining which is removing the pillars which support rooms, allowing the room to cave in, loosening more ore. Additional sub-surface mining methods include hard rock mining which is mining of hard materials, bore hole mining, drift and fill mining, long hole slope mining, sub level caving and block caving.

Machinery for mining

Heavy machinery is needed in mining for exploration and development, to remove and stockpile overburden, to break and remove rocks of various hardness and toughness, to process the ore and for reclamation efforts after the mine is closed. Bulldozers, drills, explosives and trucks are all necessary for excavating the land. In the case of placer mining, unconsolidated gravel, or alluvium, is fed into machinery consisting of a hopper and a shaking screen or trommel which frees the desired minerals from the waste gravel. The minerals are then concentrated using sluices or jigs.

Large drills are used to sink shafts, excavate stopes and obtain samples for analysis. Trams are used to transport miners, minerals and waste. Lifts carry miners into and out of mines, as well as moving rock and ore out, and machinery in and out of underground mines. Huge trucks, shovels and cranes are employed in surface mining to move large quantities of overburden and ore. Processing plants can utilize large crushers, mills, reactors, roasters and other equipment to consolidate the mineral-rich material and extract the desired compounds and metals from the ore.

The mining process in a nutshell –

- ✓ Drilling
- ✓ Blasting

- ✓ Loading
- ✓ Hauling
- ✓ Transporting
- ✓ Processing / Washing

6. HISTORY OF MINING IN INDIA

Many evidences show that exploitation of minerals like coal, iron ore, copper, lead zinc has been going on in the country from time immemorial. The earliest and most authentic record of information relating to minerals in India is found in 'Arthasastra', a treatise composed by Kautilya famously known as Chanakya, between 321 and 296 B.C. This treatise gives a comprehensive account of the properties of ores of minerals and metals with the methods of their large scale production and treatment as well as the manufactures of alloys like brass, bronze and also gold and silver alloys with base metals. The records available in Kautilya's 'Arthasashtra' give the earliest stipulations in regulating mining industry as prescribed in the qualifications and responsibilities of the Superintendent of Mines who possesses the knowledge of the science dealing with copper and other minerals, expertise in mineralogy and equipped with mining labourers and necessary instruments. The Arthasashtra also provides for stringent punishment to those persons who carries on mining operations without license or who steals the mineral products. It also provides that the Superintendent of Ocean Mines (Khanyadhyakshah) shall attend to the collection of conch-shells, diamonds, precious stones, pearls, corals and salt and also regulate the commerce in the above commodities. Arthasashtra also provided that both mining and commerce in minerals shall be State monopoly.

In the medieval ages, India had a fairly well developed metallurgical industry. Between 1400-1800, individual kingdoms prescribed the controls for mining activity until Mughals established

more strict regulatory controls. In Rajasthan, mining of lead and zinc was underway since 1260 BC and right up to 18th century wherein methods of revenue collection were stipulated. Some of the Indian Princely States, notably Mysore, had their own safety regulations.

The first recorded history of mining in India dates back to 1774 when Mr. John Summer, Mr. S.G. Heatly and Mr. Redfarne were granted permission by Mr. Warren Hastings, the then Governor General of Bengal for mining coal in Pachete and Birbhum. M/s John Taylor & Sons Ltd. Started gold mining in Kolar Gold Fields in the year 1880. The first oil well was drilled in Digboi in the year 1866-just seven years after the first ever oil well was drilled in the world viz. in Pennsylvania State, USA in 1859.

The first concrete proposal for the inspection and regulation of mining operations in India came in 1890 from the Secretary of State Lord Cross. Mr. James Grundy was the first Inspector of Mines appointed by the Government of India. He worked with the organization of GSI and his duty was to inspect mines and to make recommendations on the type of regulations needed. In the first report Mr. Grundy submitted to the then Director of GSI he stressed on the need for passing mines regulations act which amongst other things would provide for special rules with legal standing as the Act itself. Briefly the act was to provide for notices of opening etc. of mines and of accidents, minimum age for boys and girls employed underground, first aid, management and supervision and safety matters, special rules for coal and other minerals were to provide for additional safety matters including report of inspection of all parts of mines and machinery.

In 1895 Government of India appointed a Committee to frame general rules applicable to mines or groups of mines and to clarify the heads under which legislation was desirable and the provisions which need to be made under each head. The Committee submitted its report in 1896. In 1897 a big disaster occurred in the Kolar Gold fields in which 52 persons were killed. In 1899 in Khost Coal Mine in Baluchistan (now in Pakistan) a mine fire occurred which caused the death of 47 persons. The finalization of mining legislation was therefore, expedited and the Mines Act was enacted in 1901 and brought in force in the same year. The Mines Act which came in force in 1901 covered all minerals worked up to a depth of over 6 meters and provided for appointment of inspectors, appointment of persons possessing the prescribed qualifications as managers of mines, empowered the Chief Inspector to enter and inspect mines, and to enquire into accidents and prohibit the employment of children.

Significance of mineral development was duly acknowledged in Government of India Act 1919 which incorporated a dual form of government referred to as dyarchy, for major provinces. As per Schedule 'L' of the said Act, entry at Sl. No. 24 & 25 Geological Survey and Control of mineral development in so far as such control was reserved for the Governor General in Council under rule made or sanctioned by the Secretary of State, and regulation of mines respectively were in domain of the Part-I viz. Central Subjects. The Mining industry was recognized as an important profession by then. Persons nominated to represent Indian Mining Association, Indian Mining Federation from Mining Constituency (referred to as special constituency) featured in the Legislative Council of the Governor like Bihar and Orissa.

6.1. History of Indian Mining Laws

With enactment of the Government of India Act, 1935 came a Federation of India, comprising both provinces and states. As per Section 100 of the Government of India Act 1935, the Federal Legislature had powers to make laws with respect to any matter enumerated in List-I in the Seventh Schedule to the Act, called "Federal Legislative List". Entry at Sl. No. 36 in the Federal Legislative List related to "regulation of mines and oilfields and mineral development to the extent to which such regulation and development under Federal control is declared by Federal law to be expedient in the public interest".

The Mineral Policy Conference held in January 1947 resulted in enactment of the Mines and Minerals (Regulation and Development) Act, 1948, the first legal framework in independent India for the regulation and development of mines. The Mines and Mineral (Regulation and Development) Act 1948 received the assent of the Governor General on 8th September 1948. The Act empowers the Central Government to regulate mines and oilfields and mineral development on the lines contemplated in the Industrial Policy Resolution of the 6th April 1948. The deliberations of the conference led to the establishment of the Indian Bureau of Mines (IBM) in March 1948 as the main regulatory agency for monitoring and supervising mining activity in the country.

With the adoption of the Constitution of India on 26th January 1950, the legislative powers of the Central government and the State governments were clearly defined. Entry 54 of List I in the Seventh Schedule of the Constitution empowered the Central government to regulate mining activities and the development of minerals. Entry 23 of List II in the Seventh Schedule

empowered the state governments to frame rules and regulations in respect of mining activities and mineral development, subject to the provisions of List I.

7. OVERVIEW OF MINING LAWS IN INDIA

Under the Constitution of India, management of mineral resources is the responsibility of the Central Government and the State Governments in terms of the Union List and State List respectively. The Central Government is the owner of the minerals underlying the ocean within the territorial waters or the Exclusive Economic Zone of India, while the State Governments are the owners of minerals located within the boundary of the State concerned. The Central Government, in consultation with the State Governments, formulates the legal measures for regulation of mines and minerals in order to ensure basic uniformity in mineral administration as well as to maintain the pace of development of mineral resources, in consonance with the national policy goals.

The Mines and Minerals (Development and Regulation Act, 1957, ('MMDR') and the Mines Act, 1952, together with the rules and regulations framed under them, constitute the basic laws governing the mining sector in India.

The health and safety of the workers is governed by the Mines Rules, 1955 created under the jurisdiction of the Mines Act, 1952.

The Mineral Concession Rules, 1960 outline the procedures and conditions for obtaining a Prospecting Licence or Mining Lease.

The Mineral Conservation and Development Rules, 1988 lays down guidelines for ensuring mining on a scientific basis, while at the same time, conserving the environment. The provisions of Mineral Concession Rules and Mineral Conservation and Development Rules are, however, not applicable to coal, atomic minerals and minor minerals. The minor minerals are separately notified and come under the purview of the State Governments. The State Governments have for this purpose formulated the Minor Mineral Concession Rules.

List of Laws applicable to the Mining Sector in India

1. The Mines and Minerals (Regulation and Development) Act, 1957
2. The Mines Act, 1952
3. The Mines Rules, 1955
4. The Mineral Concession Rules, 1960
5. The Mineral Conservation and Development Rules, 1988
6. Metalliferous Mines Regulations, 1961
7. Maternity Benefit (Mines) Rules, 1963
8. Mines Crèche Rules, 1966
9. Mines Rescue Rules, 1985
10. Granite Conservation and Development Rules, 1999
11. Marble Development and Conservation Rules, 2002
12. Mining Leases (Modification of Terms) Rules, 1956
13. The Coal Mines Regulations, 1957
14. Goa, Daman And Diu Mining Concessions (Abolition And Declaration As Mining Leases) Act, 1987
15. Cess and other Taxes on Minerals (Validation) Act, 1992
16. Offshore Areas Mineral (Development and Regulation) Act, 2002
17. Offshore Areas Mineral Concession Rules, 2006
18. National Mineral Policy, 2008
19. The Forest (Conservation) Act, 1980

20. The Forest (Conservation) Rules, 1981
21. Bihar Minor Mineral Concession rules, 1972
22. The Goa, Daman and Diu Minor Mineral Concession Rules, 1985
23. Himachal Pradesh Minor Minerals (Concession) Revised Rules, 1971
24. Karnataka Minor Mineral Concession Rules, 1994
25. The Pondicherry Minor Minerals (Concession) Rules, 1977
26. Punjab Minor Mineral Concession Rules, 1964
27. The Rajasthan Minor Mineral Concession Rules, 1986
28. The Tamil Nadu Minor Mineral Concession Rules, 1956
29. The Kerala Minor Mineral Concession Rules, 1967
30. The Uttar Pradesh Minor Minerals (Concession) Rules, 1963

7.1. The Mines and Minerals (Development and Regulation) Act, 1957

This Act regulates the working of mines and provides for the development of minerals. The Act extends to the whole of India. There are 33 sections with 3 schedules in the Act. The First Schedule deals with specified minerals, second schedule with rates of royalty and third schedule with rates of dead rent.

The following rules have been notified under the Mines and Minerals (Development and Regulation) Act, 1957 -

- 1) Mineral Concession Rules, 1960
- 2) Mineral Conservation and Development Rules, 1988
- 3) State Minor Mineral Concession Rules

Section 2 of the Act contains a declaration, which has brought the entire field of mines and minerals within the jurisdiction of the Central Government. The State Government has no authority to legislate in this area on its own. The State Government may choose to frame rules but it cannot enact laws on the subject (*Chandeshwar Prasad v. Sub Divisional L.R. Officer*, AIR 1986 CAL. 1(15)).

Important definitions under the Act

"Minerals" includes all minerals except minerals oils. (Sec.3 (a) of MMDR Act, 1957)

"Minerals oils" includes natural gas and petroleum. (Sec.3 (b) of MMDR Act, 1957)

"Mining lease" means a lease granted for the purpose of undertaking mining operations, and includes a sub-lease granted for such purpose. (Sec.3(c) of MMDR Act, 1957)

"Mining operations" means any operations undertaken for the purpose of winning any mineral. (Sec.3 (d) of MMDR Act, 1957)

"Minor minerals" means building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes and any other mineral which the Central Government may, by notification in the Official Gazette, declare to be a minor mineral. (Sec.3 (e) of MMDR Act, 1957)

"Prospecting licence" means a licence granted for the purpose of undertaking prospecting operations. (Sec.3 (g) of MMDR Act, 1957)

"Prospecting operations" means any operations undertaken for the purpose of exploring, locating or proving mineral deposits (Sec.3 (h) of MMDR Act, 1957)

"Reconnaissance operations" means any operations undertaken for preliminary prospecting of a mineral through regional, aerial, geophysical or geochemical surveys and geological mapping, but does not include pitting, trenching, drilling (except drilling of boreholes on a grid specified from time to time by the Central Government) or sub-surface excavation. (Sec.3 (ha) of MMDR Act, 1957)

"Reconnaissance permit" means a permit granted for the purpose of undertaking Reconnaissance operations. (Sec.3 (hob) of MMDR Act, 1957)

Reconnaissance, Prospecting and mining operations (Sec.4 to Sec.9A)

Reconnaissance or Prospecting or mining operations should be done only under a valid permit, licence or lease as the case may be. "Prospecting operations" means any operations undertaken for the purpose of exploring, locating or proving mineral deposits. "Reconnaissance operations" means any operations undertaken for preliminary prospecting of a mineral through regional, aerial, geophysical or geochemical surveys and geological mapping, but does not include pitting, trenching, drilling (except drilling of boreholes on a grid specified from time to time by the Central Government) or sub-surface excavation. "Mining lease" means a lease granted for the purpose of undertaking mining operations, and includes a sub-lease granted for such purpose.

There are three kinds of mineral concessions, viz. Reconnaissance Permit (RP), Prospecting License (PL) and Mining Lease (ML).

The State Government should not grant a [reconnaissance permit, prospecting licence or mining lease to any person unless such person is and Indian national or a company as defined in Sec.3(1) of the Companies Act, 1956 and satisfies such conditions as may be prescribed. For any mineral specified in the First Schedule, no prospecting licence or mining lease should be granted except with the previous approvals of the Central Government. A person will be deemed to be an Indian national –

- in the case of a firm or other association of individuals, only if all the members of the firm or members of the association are citizens of India; and
- In the case of an individual, only if he is a citizen of India.

Mining lease should not be granted by the State Government unless it is satisfied that –

- there is evidence to show that the area for which the lease is applied for has been prospected earlier or the existence of mineral contents therein has been established otherwise than by means of prospecting such area; and
- There is a mining plan duly approved by the Central Government, or by the State Government, in respect of such category of mines as may be specified by the Central Government, for the development of mineral deposits in the area concerned.

The mining plan and the scheme of mining thus becomes an extremely vital document for the scientific and systematic development of mineral deposits. The mining plan and the scheme of mining are to be prepared in accordance with specified formats for different category of mines (available at all regional offices of IBM).

Reconnaissance Permit

An application for grant of reconnaissance permit in respect of any land in which the minerals vest in the Government should be made to the Director, Mines and Geology, of the State Government concerned along with fees as prescribed. The State Government shall acknowledge receipt of the application and grant the reconnaissance permit to every applicant who is eligible in terms of the MMDR Act, 1957. Reconnaissance Permit is granted for preliminary prospecting of a mineral through regional, aerial, geophysical or geochemical surveys and geological mapping. The Reconnaissance Permit for any mineral or prescribed group of associated minerals is granted for 3 years and for a maximum area of 5,000 sq. kms, to be relinquished progressively. After 2 years, the area should be reduced to 1,000 sq. kms or 50% of the area granted, whichever is less. At the end of 3 years, area held under a Reconnaissance Permit should be reduced to 25 sq kms. In a State, a person can be granted a maximum area of 10,000 sq. kms under Reconnaissance Permit subject to the condition that area in a single Reconnaissance Permit does not exceed 5000 sq. kms. The holder of a Reconnaissance Permit has a preferential right to obtain a Prospecting Licence in respect of the land remaining under the permit subject to certain conditions including those relating to minimum expenditure commitment and specific physical targets.

Prospecting Licence

An application for grant of a Prospecting Licence should be made to the District Collector of the State Government concerned along with prescribed fees. The State Government shall acknowledge the receipt of the application and consider only such applications as are eligible in terms of MMDR Act, 1957.

Prospecting Licence is granted for undertaking operations for the purpose of exploring, locating or proving mineral deposit. A Prospecting License for any mineral or prescribed group of associated minerals is granted for a maximum period of 3 years. A Prospecting Licence can be

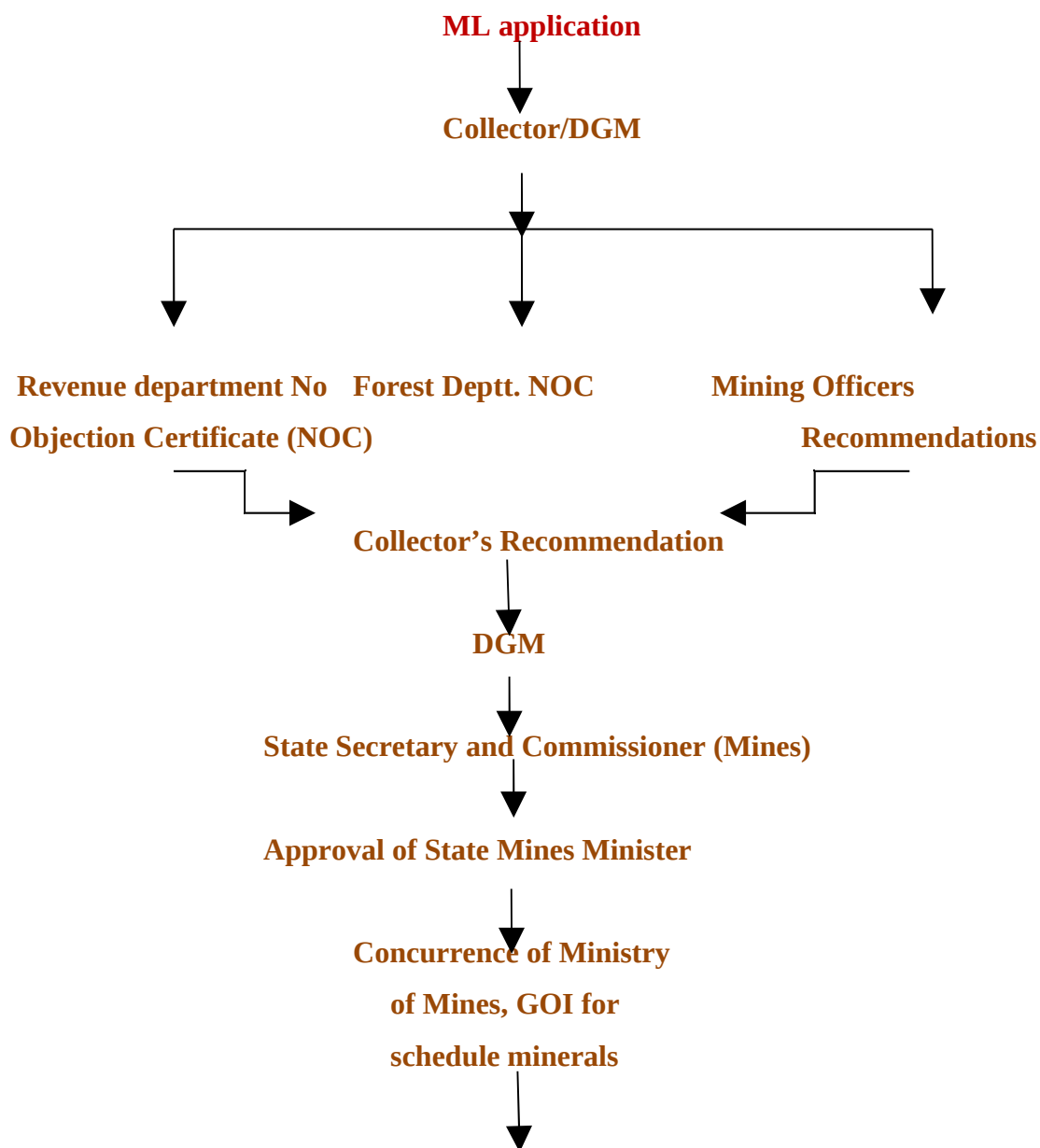
renewed in such a manner that the total period for which a PL is granted does not exceed 5 years. In a State, a person can be granted a maximum area of 25 sq. kms in one or more Prospecting Licenses, but if the Central Government is of the opinion that in the interest of development of any mineral it is necessary to do so, the maximum area limit can be relaxed. The prospecting licence holder has a preferential right for obtaining a mining lease in respect of the minerals explored in a particular area. A Prospecting Licence may contain other conditions relating to compensation for damage to land, restriction regarding felling of trees, entry on occupied land, etc.

Mining lease

An application for grant of mining lease in respect of any land in which minerals vest in the Government should be made to the District Collector of the State Government concerned along with prescribed fee. Every such application should also include with it the consent of the land owner and any person having occupation rights over the land.

Mining Lease is granted for undertaking operations for winning any mineral. It allows for the development and production of minerals from ore bodies discovered by prospecting or exploration operations. A Mining Lease for any mineral or prescribed group of associated minerals is granted for a minimum period of 20 years and a maximum period of 30 years. A Mining Lease can be renewed for periods not exceeding 20 years each. In a State, a person can be granted a maximum area of 10 sq. kms in one or more Mining Leases, but if the Central Government is of the opinion that in the interest of development of any mineral it is necessary to do so, the maximum area limit can be relaxed.

The procedure for grant of mineral concessions for a mining lease is depicted in the chart below -





Renewal of mining lease

A person is required to apply for renewal of the mining lease twelve months prior to the date of expiry of the subsisting mining lease. Any delay in such filing can be condoned by the State Government on merits provided the application for renewal is made prior to the date of expiry of the subsisting mining lease. The documentation required and the procedure involved for renewal of a mining lease is the same as that for a new mining lease, and an application for renewal can be granted or rejected by the State Government.

However, if a person applies for renewal of the mining lease in time, he can continue mining operations even beyond the date of expiry of the subsisting mining lease till the State Government passes a decision on his application for renewal. Further, every person seeking renewal of the mining lease for mineral which is used in his own industry is entitled for renewal of the lease for a period not exceeding twenty years.

Termination of mining lease

A mining lease lapses, if after execution of the mining lease, mining operation does not commence in two years time. If for genuine reasons more time is required to commence mining operations, the entrepreneur should inform the State Government well in advance and take permission.

After commencement of mining operation, if the area is kept idle/not worked for a continuous period of two years, the mining lease also lapses. In such cases also the entrepreneur should inform the State Government and take permission in order to avoid lapsing of the mining lease.

If the mining leaseholder violates any of the terms and conditions of the mining lease, including default in payment of mining dues, the mining lease can be terminated.

For all minerals other than minor minerals, the Central Government reserves the right to direct premature termination of a mining lease for grounds specified in section 4A(1) of the MMDR Act, 1957, which include preservation of natural environment, prevention of pollution, preservation of monuments etc.

Royalties and Dead Rent

The holder of a mining lease should pay royalty in respect of any mineral removed or consumed by him or by his agent, manager, employee, contractor or sub-lessee from the leased area at the rate for the time being specified in the Second Schedule in respect of that mineral. The Central Government may, by notification in the Official Gazette amend the Second Schedule so as to enhance or reduce the rate at which royalty will be payable in respect of any mineral with effect from such date as may be specified in the notification.

The holder of a mining lease, whether granted before or after the commencement of the Mines and Minerals (Regulation and Development) Amendment Act, 1972, should notwithstanding anything contained in the instrument of lease or in any other law for the time being in force, pay to the State Government, every year, dead rent at such rate as may be specified, for the time being, in the Third Schedule, for all the areas included in the instrument of lease. Provided that where the holder of such mining lease becomes liable, under section 9, to pay royalty for any mineral removed or consumed by him or by his agent, manager, employee, contractor or sub-lessee from the leased area, he will be liable to pay either such royalty, or the dead rent in respect of that area, whichever is greater.

The Central Government may, by notification in the Official Gazette, amend the Third Schedule so as to enhance or reduce the rate at which the dead rent shall be payable in respect of any area covered by a mining lease and such enhancement or reduction shall take effect from such date as may be specified in the notification.

Once fixed, the rates of royalties and dead rent should not be enhance before three years.

Power of Central Government

The Central Government is bound to take steps for the conservation and systematic development of minerals in India and for the protection of the environment by preventing and controlling pollution, which may be caused by prospecting or mining operations. For this purpose, the

Central Government makes rules such that conservation and development of minerals are ensured without unduly affecting the environment (Section 18).

The Government has the power of search, entry and inspection of mines and recovery of amounts due as arrears of land revenue (Sections 23B, 24 and 25).

Penalties (Sec.21)

Whoever contravenes the provisions of sub-section (1) or sub-section (1A) of section 4 shall be punished with imprisonment for a term which may extend to two years, or with fine which may extend to twenty-five thousand rupees, or with both.

Any rule made under any provision of this Act may provide that any contravention thereof shall be punishable with imprisonment for a term which may extend to one year or with fine which may extend to five thousand rupees, or with both, and in the case of continuing contravention, with an additional fine which may extend to five hundred rupees for every day during which such contravention continues after conviction for the first such contravention.

If the person committing an offence under this Act or any rules made thereunder is a company, every person who at the time the offence was committed was in charge of, and was responsible to the company for the conduct of the business of the company, shall be deemed to be guilty of the offence and shall be liable to be proceeded against and punished accordingly: Provided that nothing contained in this sub-section shall render any such person liable to any punishment, if he proves that the offence was committed without his knowledge or that he exercised all due diligence to prevent the commission of such offence. Where an offence under this Act has been committed with the consent or connivance of any director, manager, secretary or other officer of the company, such director, manager, secretary or other officer shall be deemed to be guilty of that offence and shall be liable to be proceeded against and punished accordingly.

7.1.1. Mineral Concession Rules, 1960

The Central Government made these rules in exercise of power conferred by Section 13 of the Mines and Minerals (Regulation and Development) Act, 1957. This rule is applicable to all

minerals including Coal, lignite, atomic minerals etc. and deals with procedure for grant of Prospecting Licence (PL) and Mining Lease (ML) of major minerals only. It does not apply to oil fields or minor minerals. Minor minerals are notified by Central Government from time to time, for which the State Governments, frame rules for issuing permits, licences etc. The salient features of these rules are -

- Chapters II, III and IV contain rules for the grant of reconnaissance permits as well as grant and renewal of Prospecting Licence and Mining Lease only in respect of the land in which the minerals vest with the Government of India.
- Rule 4 to Rule 7 of Chapter II lay down the procedure for the grant of reconnaissance permit by the State Governments along with the conditions of reconnaissance permit, which include that the permit holder has to obtain permission to enter 'forest land' for reconnaissance purpose, under the Forest (Conservation) Act, 1980.
- Rules 8 to 21 in Chapter III lay down the procedure for the grant/renewal of prospecting license, conditions of prospecting license, security deposit, etc. The conditions relating to environmental mitigation measures are laid down in Sub-rule 1(x) of Rule 14. These are as given below-

The licensee shall -

- (a) take immediate measures for planting in the same area or any other area selected by the Central or State Government not less than twice the number of trees destroyed by reasons of any prospecting;
- (b) look after them during subsistence of the license after which these shall be handed over to the State Forest Department or any other authority as may be nominated by the Central or State Government; and
- (c) restore to the extent possible, other flora destroyed by prospecting operations.

- Sub Rule 2(A) (iii) of Rule 14 imposes restrictions on felling of the trees on unoccupied and unreserved Government land.
- Sub Rule 2(A) (v) of Rule 14 imposes restrictions on operations in reserved or protected forests.
- Rules 22 to Rule 46 relate to the grant/renewal of mining lease and related issues. Sub Rule 5 of Rule 22 outlines that the following details are to be shown on the mine plans-
 - o Extent of mining operations
 - o Geological details, mineral reserves
 - o Area under manual mining and under mechanized mining separately
 - o Natural water courses, forest areas with diversity of trees, assessment of impact on forest land surface and other environmental parameters including air and water pollution.
- Rule 27, Sub Rule (1) (s) lays down the conditions that relate to environmental protection in the mining operations. These are outlined below-

The lessee shall

* Take immediate measures for planting in the same area or any other area selected by the Central or State Government not less than twice the number of trees destroyed by reasons of any mining operations;

* Look after them during the subsistence of the lease after which these trees shall be handed over to the state Forest Department or any other authority nominated by the Central or state Government; and

* Restore, to the extent possible other flora destroyed by the mining operations.

- Rule 22, Sub Rule (2) states that a mining lease may contain such other conditions as the State Government may deem necessary in regard of the following, namely –

* The compensation for damage to the land covered by the lease

* The felling of trees

* The entering or working in a reserved or protected forest.

7.1.2. The Mineral Conservation and Development Rules, 1988

The Central Government made these rules in exercise of power conferred by Section 18 of the Mines and Minerals (Regulation and Development) Act, 1957 for conservation and development of minerals. These rules will apply to all minerals except petroleum and natural gas, coal, lignite and sand for stowing, any mineral declared as prescribed substances for the purpose of the Atomic Energy Act, 1962 and minor minerals.

Some of the important provisions of these Rules are: –

- Every holder of a reconnaissance permit should submit to the Controller General and the Regional Controller or the authorised officer within a period of sixty days from the date of execution of the reconnaissance permit, a scheme of reconnaissance operations indicating the manner in which he proposes to carry out reconnaissance operations in the area covered by the permit. Reconnaissance operations should be carried out only in accordance with the scheme of reconnaissance. Every holder of a reconnaissance permit shall send to the Controller General, Controller of Mines and the Regional Controller an yearly report in Form-BB along with all the aerial, photo-geological, geophysical, geochemical and such other data collected by him as per the conditions stipulated in the reconnaissance permit so as to reach them within thirty days after expiry of every year from the date of execution of the reconnaissance permit or the expiry of the reconnaissance permit or the abandonment of the reconnaissance permit or termination of reconnaissance permit, whichever is earlier.
- Every holder of a prospecting licence should submit to the Controller General and the Regional Controller or the authorised officer within a period of 60 days from the date of execution of the prospecting licence, a scheme of prospecting indicating the manner in which he proposes to carry out the prospecting operations, in the area covered by the

licence. Prospecting operation should be carried out only in accordance with the scheme of prospecting. Every holder of a prospecting licence should submit to the Controller General, Controller of Mines and the Regional Controller and yearly report in Form-B so as to reach them within thirty days after the expiry of twelve months from the date of execution of the prospecting licence or the expiry of the prospecting licence whichever is earlier.

- No person should commence mining operations in any area except in accordance with an approved mining plan. The owner, agent, mining engineer or manager of every mine should send to the Controller General, Controller of Mines and the Regional Controller intimation in Form-C of the opening of a mine so as to reach them within fifteen days of such opening. The scheme of mining should be submitted to the Regional Controller or the officer authorised in this behalf by the State Government, as the case may be, at least one hundred twenty days before the expiry of the five years period, for which it was approved on the last occasion.
- The prospecting and mining operations shall be carried out in such a manner so as to ensure systematic development of mineral deposits, conservation of minerals and protection of environment.
- The owner, agent, mining engineer, or manager of every mine should not abandon a mine or a part of mine during the subsistence of the lease except with prior permission in writing of the Controller General or the authorised officer. Every mine shall have Mine Closure Plan, which shall be of two types namely - progressive mine closure plan and final mine closure plan.
- Provisions with regard to open cast working, underground mining operations, working of machinery and plant, financial assurance, general requirements about plans and sections, protection of environment, employment of qualified persons etc.
- Monthly returns, quarterly returns and annual returns need to be filed by the owner, agent, mining engineer or manager of every mine.

7.2. Mines Act, 1952

The mining legislation was initially passed in 1923. The present Act was brought into force in 1952 for the regulation of labour and safety in mines.

The Central Government, by notification in the official gazette, may exempt any local area or any mine or class of mine or any part of a mine or any class of persons from the operation of all or any of the provisions of this Act or the regulations, rules or by laws.

The implementation of the Mines Act, 1952 is ensured through the provisions of the Mines Rules, 1955, Metalliferous Mines Regulations, 1961, and the Maternity Benefit (Mines) Rules, 1963, etc.

The Act is administered by the Ministry of Labour and Employment through the Directorate General of Mines Safety (DGMS).

It extends to the whole of India.

The provisions of the Act except those contained in Sections 7, 8, 9, 40, 45 and 46 will not be applicable to any mine or part thereof in which excavation is being made for prospecting purposes only and not for the purpose of obtaining minerals for use or sale, provided that –

(i) Not more than twenty persons are employed on any one day in connection with any such excavation.

(ii) the depth of the excavation measured from its highest to its lowest point nowhere exceeds six, metres or, in the case of an excavation for coal fifteen metres: and

(iii) no part of such excavation extends below superjacent ground; or

any mine engaged in the extraction of kankar, murrum laterite, boulder, gravel, shingle, ordinary sand (excluding moulding sand, glass sand and other mineral sands), ordinary clay (excluding kaolin, china clay, white clay or fire clay), building stone, slate, road metal, earthy fullers earth, marl chalk and lime stone.

Provided that –

- (i) the working does not extend below superjacent ground: or
- (ii) where it is an open cast working –
 - (a) the depth of the excavation measured from its highest to its lowest point nowhere exceeds six meters;
 - (b) the number of persons employed on any one day does not exceed fifty; and
 - (c) explosives are not used in connection with the excavation.

{ Sections 7 – powers of Inspectors of Mines

Sec.8 - powers of special officers to enter, measure etc.

Sec.9 – facilities to be afforded to Inspectors

Sec.40 - employment of persons below 18 years of age

Sec.45 – prohibition of presence of persons below 18 years of age in a mine

Sec.46 – employment of women }

The Act consists of 88 sections in 10 chapters.

Meaning of term ‘Mine’

According to the Act, the term 'mine' means "any excavation where any operation for the purpose of searching for or obtaining minerals has been or is being carried on and includes –

- (i) all borings, bore holes, oil wells and accessory crude conditioning plants, including the pipe conveying mineral oil within the oilfields;
- (ii) all shafts, in or adjacent to and belonging to a mine, where in the course of being sunk or not:
- (iii) all levels and inclined planes in the course of being driven;
- (iv) all opencast workings;
- (v) all conveyors or aerial ropeways provided for the bringing into or removal from a mine of minerals or other articles or for the removal of refuse there from;
- (vi) all adits, levels, planes, machinery works, railways, tramways and sidings in or adjacent to and belonging to a mine;
- (vii) all protective works being carried out in or adjacent to a mine;

- (viii) all workshop and store situated within the precincts of a mine and the same management and used primarily for the purposes connected with that mine or a number of mines under the same management;
- (ix) all power stations, transformer sub-stations converter stations : rectifier stations and accumulator storage stations for supplying electricity solely or mainly for the purpose of working the mine or a number of mines under the same management;
- (x) any premises for the time being used for depositing sand or other material for use in a mine or for depositing refuse from a mine or in which any operations in connection with such and refuse or other material is being carried on, being premises exclusively occupied by the owner of the mine:
- (xi) any premises in or adjacent to and belonging to a mine or which any process ancillary to the getting, dressing or operation for sale of minerals or of coke is being carried on."

Inspectors and Certifying Surgeons

The Act provides for appointment of the Chief Inspector, Inspectors of Mines and Certifying Surgeons. For the formulation of proposals, making rules and regulations and to inquire into accidents, committees may be formed (Chapter II).

Mining operations

The owner, agent or manager of a mine should, before the commencement of any mining operation, give to the Chief Inspector, the Controller, Indian Bureau of Mines and the District Magistrate of the district in which the mine is situated a notice of commencement in Form-A. It should reach the persons concerned at least one month before the commencement of any mining operation.

Every mine should be under a sole manager who should have the prescribed qualifications and the owner or agent of every mine should appoint a person having such qualifications to be the manager: provided that the owner or agent may appoint him as manager if he possesses the prescribed qualifications.

The duties and responsibilities of the owner (proprietor, lessee or an agent) to manage mines and mining operations have been specified under the Act. The owners, agent and manager of every mine will be responsible to see that all operations carried on in connection with the mine are

conducted in accordance with the provisions of the Act and of the regulations, rules, bye-laws and orders made thereunder.

Health and Safety

For every mine wherein more than 100 persons are ordinarily employed, a safety committee is required to be constituted.

In every mine effective arrangement should be made to provide and maintain at suitable points conveniently situated a sufficient supply of cold and wholesome drinking water for all persons employed therein.

Sufficient number of latrines and urinals should be provided separately for males and females in every mine and maintained in a clean and sanitary condition.

In every mine there should be provided and maintained so as to be readily accessible during all working hours prescribed number of first-aid boxes or cupboards equipped with the requisite contents.

It is the duty of the owner, agent or manager of a mine to see that adequate and suitable arrangements are made for the training of persons in first-aid and the provision of such equipment.

In every mine where more than one hundred and fifty persons are employed there should be provided and maintained a first-aid room with such equipment and in the charge of such medical and nursing staff as may be prescribed. The first-aid room should be in charge by a qualified medical practitioner and where the number of persons ordinarily employed in a mine is more than 1000; such medical practitioner should be a whole time employee at the mine.

Any accident in the mines should be immediately reported to the authorities and the information should be entered in the Register of Accidents maintained for this purpose.

Hours of work

No person shall be allowed to work in a mine for more than six days in any one week.

No adult employed above ground in a mine should be required or allowed to work for more than forty-eight hours in any week or for more than nine hours in any day.

No person employed below ground in a mine should be allowed to work for more than forty-eight hours in any week or for more than eight hours in any day. No work should be carried on

below ground in any mine except by a system of shifts so arranged that the period of work for each shifts is not spread-over more than the daily maximum hours stipulated.

Whether above ground or below ground, every worker doing overtime work should be entitled to wages at the rate of twice his ordinary rate of wages the period of overtime work being calculated on a daily basis or weekly basis whichever is more favourable to him.

No person employed in a mine should be required or allowed to work in the mine for more than ten hours in any day inclusive of overtime.

No person should be required or allowed to work in a mine if he has already been working in any other mine within the preceding twelve hours.

Persons below the age of eighteen

No person below eighteen years of age should be allowed to work in any mine or part thereof. But apprentices and other trainees, not below sixteen years of age, may be allowed to work, under proper supervision, in a mine or part thereof by the manager:

No person below eighteen years of age should be allowed to be present in any part of a mine above ground where any operation connected with or incidental to any mining operation is being carried on.

No woman should be employed in any part of a mine which is below-ground and in any mine above ground except between 6am and 7pm. Every woman employed in a mine above ground should be allowed an interval of not less than eleven hours between the termination of employment on any one day and the commencement of the next period of employment.

Leave with wages and overtime

Every person employed in a mine who has completed a calendar year's service should be allowed, during the subsequent calendar year leave with wages, calculated – in the case of a person employed below ground, at the rate of one day for every fifteen days of work performed by him, and in any other case, at the rate of one day for every twenty days of work performed by him. Any leave not taken by a person to which he is entitled in any one calendar year, shall be added to the leave to be allowed to him during the succeeding calendar year, but the total number of days of leave which may be accumulated should not at any time exceed thirty days in all.

Overtime should be paid at the end of each wage period. While calculating overtime on any day, a fraction of an hour less than 30 minutes should be ignored and a fraction of 30 minutes or more should be counted as one hour.

Welfare amenities

At every mine where more than 50 persons are ordinarily employed, there should be provided adequate and suitable shelters at or near loading wharves, opencast workings, workshops and mine entrances where 25 or more persons are ordinarily employed, for taking food and rest.

At every mine where in more than 250 persons are ordinarily employed, if the Chief Inspector or an Inspector or an Inspector so requires, there should be provided and maintained in or adjacent to the precincts of the mine, a canteen for the use of all persons employed. Food drink and other items served in a canteen should be sold on a non-profit basis and the prices charged will be subject to the approval of the Canteen Managing Committee. A list of approved prices should be conspicuously displayed in the canteen in English, Hindi, and in the language of the district in which the mine is situated.

For every mine where 500 or more persons are ordinarily employed, the owner agent or manager should appoint a suitably qualified person as Welfare Officer, and where the number of persons so employed in a mine exceeds 2500 such Welfare Officer should be assisted by one suitably qualified additional Welfare Officer for every additional 2000 persons or part thereof employed.

No intoxicating drink or drug should be carried or permitted to be carried below ground into the workings of a mine or part.

Punishment

Whoever contravenes the provisions of the Act or of any regulation rule, bye-law or of any order made thereunder prohibiting restricting or regulating the employment or presence of persons in or about a mine will be punishable with imprisonment for a term which may extend to three months, or with fine which may extend to one thousand rupees, or with both.

If a person below eighteen years of age is employed in a mine, the owner, agent or manager of such mine will be punishable with fine which may extend to five hundred rupees.

Whoever fails to appoint a manager will be punishable with imprisonment for a term which may extend to three months or with fine which may extend to two thousand and five hundred rupees, or both.

Whoever makes, give or delivers any plan return, notice record or report containing a statement, entry or detail which is not to the best of his knowledge or belief true may be punished with imprisonment up to three months or a fine up to Rs.1, 000 or both.

Whoever contravenes any provision of this Act or of any regulation rule or bye-law or of any order made there under, for which no penalty is expressly provided may be punished with imprisonment up to three months, or a fine up to Rs. 1,000 or both.

The Mines Rules, 1955 have been framed under Section 58 of the Mines Act of 1952. These Rules prescribe powers and duties of certifying surgeons. The Rules require the maintenance and production of reports and registers and other records at an office located within the precincts of the mine. The registers to be maintained under the Rules are –

Form	Register / Notice
Form A	Notice of commencement and end of work
Form B	Register of employees
Form C	Register of persons employed below ground during the week
Form E	Register of persons employed above ground otherwise than in opencast working during the week
Form F	Register of Compensatory Days of Rest
Form G	Register of Leave Account during the Calendar Year
Form H	Register of Leave Account during the Calendar Year
Form I	Register of Overtime Wages
Form J	Return of Reportable accident
Form K	Return of Minor Accidents
Form L	Information regarding leave with Wages
Form M	Notice of initial/ periodical medical examination
Form N	Second and final notice of initial/periodical medical examination
Form O	Report of medical examination

Form Q	Notice of medical re-examination by Appellate Medical Board
Form R	Second and final notice of medical re-examination by Appellate Medical Board
Form S	Report of medical re-examination by Appellate Medical Board
Form T	Annual Return for the year ending on the 31st December
Form U	Inspection register

The Metalliferous Mines Regulations, 1961 provide for the certification of the competency and fitness for the managers of mines, mine engineers, supervisory staff, foreman, and surveyors. The regulation also prescribes the types of mining plans, the types of surveys of mining plans, the types of survey and mining instruments to be used, the equipment used for access and egress of workers to the mines, transportation of men, minerals, and other related matters.

The Mines Rescue Rules, 1985 came into force with effect from 2nd April-1985, replacing the previous Coal Mines Rescue Rules-1959. The most important change made is that these rules are applicable to both Coal and Metalliferous mines having workings belowground. The rules have far reaching implications and as it were considered not possible and expedient to enforce all the provisions immediately, a period of 3 years was provided for the changeover. In the meanwhile the mine owners were to arrange for the new Rescue Stations and Rescue Rooms, and equip them with the stipulated apparatus and the rescue trained persons.

In order to provide for rescue of work persons in the event of explosion, fire etc. the Mines Rescue Rules, 1985, have been framed. These apply to coal and metalliferous underground mines. The Rescue Rules provide for the establishment of rescue stations and conduct of rescue work in Mines affected by an explosion or fire, an inrush of water or influx of gases. To operate under these conditions, services of specially trained men with special rescue apparatuses are required.

The Mines (Amendment) Bill, 2011

The Mines (Amendment) Bill, 2011 was introduced in the Rajya Sabha on March 23rd, 2011. The Bill was referred to the Standing Committee on Labour on April 01st, 2011 and the Report was submitted by the Committee on December 20th, 2011.

Since the last amendment was made in 1983 there have been several developments in the area of technology, scale of operation, working environment and work practices in coal, non-coal and oil sector. Operations are getting more and more mechanised with introduction of heavy machines, shallow deposits are getting depleted and mines are becoming deeper and complicated and operators from other parts of the world have started acquiring mining rights and managing mining operations within our country. This has created a new safety and health risk scenario at the work places in these sectors. In view of such developments the amendments have been proposed to the Bill mainly to keep pace with the changes at work places in the mining sector and thereby attempting to effectively manage the safety and health risk to the work persons employed in these sectors.

The following amendments have been proposed in the Bill –

- (a) Amend the “long title” of the Act so as to reflect therein the regulation of conditions of work and welfare of persons employed in mines;
- (b) clarify that the applicability of the Act to whole of India includes up to the Exclusive Economic Zone and Maritime Zones of India as defined under the Territorial Waters, Continental Shelf, Exclusive Economic Zone and Other Maritime Zones Act, 1976;
- (c) substitute the definition of “owner” so as to provide that a person or authority having ultimate control over the affairs of the mine be the owner and specifically provide for the person who would be the owner in the case of (i) company incorporated in India; (ii) foreign company; (iii) firm and other association of persons;
- (d) define “foreign company” with reference to the Companies Act, 1956;

- (e) make provisions for appointment of sufficient number of “officials” having prescribed qualifications for the effective supervision of all operations, equipment, installation and sets to ensure compliance of the provisions of the Act and rules;
- (f) increase the penalties,—
- (i) in case of obstruction of Chief Inspector or an Inspector in the discharge of his duties under section 63, from “five hundred rupees” to “fifty thousand rupees”;
 - (ii) in case of falsification of records under section 64, from “one thousand rupees” to “one lakh rupees”;
 - (iii) in case of using false certificate of fitness under section 65, from “two hundred rupees” to “twenty thousand rupees”;
 - (iv) in case of omission to furnish plans, etc., under section 66, from “one thousand rupees” to “one lakh rupees”;
 - (v) in case of contravention of provisions regarding employment of labour under section 67, from “one thousand rupees” to “one lakh rupees”;
 - (vi) in case of employment of persons below eighteen years of age under section 68, from “five hundred rupees” to “fifty thousand rupees”;
 - (vii) in case of failure to appoint a manager of mines, in contravention of the provisions of section 17, under section 69, from “three months, or with fine which may extend to two thousand and five hundred rupees” to “one year, or with fine which may extend to two lakh and fifty thousand rupees”;

- (viii) in case of failure to give notice of accident, in contravention of the provisions of sub-section (1) of section 23, under section 70, from “five hundred rupees” to “fifty thousand rupees”;
 - (ix) in case of contravention of certain regulations under section 72A, from, “six months, or with fine which may extend to two thousand rupees” to “one year, or with fine which may extend to two lakh rupees”;
 - (x) in case of contravention of the any order issued under section 22 relating to powers of inspectors when causes of danger not expressly provided against exist or when employment of persons is dangerous, under section 72B, from “two years imprisonment and fine which may extend to five thousand rupees” to “five years imprisonment and fine which may extend to five lakh rupees”;
 - (xi) provided in section 72C of the Act for contravention of law with dangerous results;
 - (xii) provided in section 73 of the Act for contravention of any provision of the Act or of any rule or regulation or bye-law or of any order made thereunder of which no penalty is specified in the Act;
- (g) insert a new section 74A so as to shift the burden of proof upon the person who is being prosecuted or proceeded against to prove that it was not reasonably practicable, or, all practicable measures to satisfy the safety requirements were taken;
- (h) amend section 76 so as to enlarge the scope to cover the foreign companies and to take away the “manager” out of the scope of the said section; and

- (i) To insert a new section 76A to provide that the person who has actual ultimate control over the affairs of the mines would continue to be liable for the contravention of the provisions of the Act or of any rule or regulation or bye-law or order made thereunder.

7.3. National Mineral Policy

In pursuance of the reforms initiated by the Government of India in July, 1991 in fiscal, industrial and trade regimes, the National Mineral Policy was announced in March, 1993. The National Mineral Policy recognized the need for encouraging private investment including Foreign Direct Investment (FDI), and for attracting state-of-art technology in the mineral sector.

During the Mid-term Appraisal of the 10th Plan in the Planning Commission, it was observed that the 1993 Policy had not been able to achieve the aim of encouraging the flow of private investment and introduction of high end technology for exploration and mining because of procedural delays, etc. A High Level Committee under the Chairmanship of Shri Anwarul Hoda was therefore constituted on 14th September, 2005 by the Planning Commission to review the existing policy and make recommendations for possible amendments to the Mines and Minerals (Development and Regulation) Act, 1957 to give a fillip to private investment in the mining sector. Based on recommendations of Hoda Committee, the National Mineral Policy, 2008 was announced by the Government of India in March, 2008. The National Mineral Policy, 2008 (NMP) endeavours to attract technology and fresh investment through specific measures.

The National Mineral Policy of 2008 enunciates measures like assured right to next stage mineral concession, transferability of mineral concessions and transparency in allotment of concessions, in order to reduce delays which are seen as impediments to investment and technology flows in the mining sector in India. The Mining Policy also seeks to develop a Sustainable Development Framework for optimum utilisation of the country's natural mineral resources for the industrial growth in the country and at the same time improving the life of people living in the mining areas, which are generally located in the backward and tribal regions of the country. Other features of the National Mineral Policy, 2008 are –

- The Policy recognizes that minerals are valuable natural resources being the vital raw material for infrastructure, capital goods and basic industries and development of the extraction and management of minerals has to be integrated into the overall strategy of the country's economic development.
- The exploitation of minerals has to be guided by long-term national goals and perspectives which are dynamic and responsive to the changing global economic scenario.
- It also, recognizes that the country is blessed with ample resources of a number of minerals and has the geological environment for many others being a part of the ancient Gondwanaland, which includes parts of Australia, South Africa, and Latin America.
- The Policy lays out that the guiding strategy for development of any mineral should naturally keep in view its ultimate end uses in terms of demand and supply in the short, medium and long terms and this would be market oriented. However, a disaggregated approach in respect of each mineral will be adopted and a mineral specific strategy will be developed to maximise gains from the comparative advantage which the country enjoys and mineral development will be prioritized in terms of import substitution, value addition and export, in that order.
- Conservation of minerals shall be construed not in the restrictive sense of abstinence from consumption or preservation for use in the distant future but as a positive concept leading to augmentation of reserve base through improvement in mining methods, beneficiation and utilisation of low grade ore and rejects and recovery of associated minerals.

7.4. Forest Conservation Act, 1980

For exploring and mining on forest land, prior permission of the government is required, under the provisions of the Forest (Conservation) Act, 1980. Rule 6 of the Forest (Conservation) Rules,

2003 prescribes the procedure for submission of proposals for seeking prior approval of the Central Government under Section 2 of the Act. All proposals relating to diversion of forest land up to 40 hectares and proposals for clearing of naturally grown trees for reforestation shall be sent directly to the concerned Regional Office of the Ministry Of Environment and Forest by the State/UT government or other authority.

Compensatory afforestation and payment of net present value of forest land are the most important conditions stipulated by the Central Government while approving proposals for de-reservation or diversion of forest land for non-forest uses. Compensatory afforestation is required to be done over equivalent area of non-forest land. The other standard conditions for mining projects include:

- (a) phased reclamation of mined area,
- (b) safety zone area, its afforestation and fencing,
- (c) afforestation on one and half times degraded forest land in lieu of the area used for safety zone and
- (d) In case of underground mines, areas on surface to be fenced and afforested.
- (e) Lands identified for compensatory afforestation to be transferred to the Forest Department.
- (f) Two stage clearance of proposals. In first stage, the proposal shall be agreed to in principle whereas in the second stage, the final approval will be accorded.

7.5. Environment (Protection) Act, 1986

The Environment (Protection) Act, 1986 and the Environment (Protection) Rules, 1986 provide for prospecting and exploration of major minerals in areas above 500 hectares only with prior permission from the Ministry of Environment and Forests. In this respect an application in the prescribed form is required to be made to the Ministry of Environment and Forests. The application must be accompanied by the Environment Impact Assessment Report and the Environment Management Plan, in accordance with the guidelines issued by the Government.

The Environment Impact Assessment (EIA) Report submitted with the application shall be evaluated and assessed by the Ministry of Environment and Forests. The assessment shall be completed within a period of ninety days from the receipt of the requisite documents or data. If

no comments are received within this time period, the project would be deemed to have been approved.

A half yearly report is required to be submitted to the Ministry of Environment and Forest, to monitor efficiency of the implementation of the recommendations and conditions, subject to which environmental clearance has been given.

7.6. Wildlife (Protection) Act, 1972

The provisions of the Wildlife (Protection) Act 1972 are applicable to all the mining lease areas. There is ban on diversion of notified sanctuary area for non-forest purposes. Any forest area notified under Section 26-A of this Act cannot be diverted for non-forest purposes without obtaining sanction from the Ministry of Environment and Forests, Government of India, under Section-2 of the Forest (Conservation) Act, 1980. Acquisition of mining rights in non-forest area of sanctuary violates provisions of the Section-20 of the Wildlife (Protection) Act, 1972 which imposes restrictions on the accrual of rights. In the sanctuaries or national parks declared by the Central Government, there is ban on the de-notification of forests/sanctuaries/national parks. A mining lease area has to be 10 km away from the boundary of national parks/sanctuaries.

7.7. Mines and Minerals Development and Regulation (MMDR) Bill, 2011

The Mines and Minerals (Development and Regulation) Bill, 2011, prepared by the Ministry to replace the existing Mines and Minerals (Development and Regulation) Act, 1957 approved by the Cabinet and the Bill has been introduced in Lok Sabha on 12th December, 2011. The Bill has been prepared after several rounds of consultation and workshop with all Stakeholders. The Bill seeks a complete and holistic reform in the mining sector with provisions to address issues relating to sustainable mining and local area development, benefit sharing mechanism to the people affected by mining operations. The Bill, also, aims to ensure transparency, equity, elimination of discretions, effective redressal and regulatory mechanisms along with incentives encouraging good mining practices, which will also lead to technology absorption and exploitation of deep seated minerals. The Bill has been referred to Standing Committee on Coal

& Steel on 5th January, 2012 and the recommendations of the Standing Committee on Coal and Steel are awaited.

The salient features of the Bill are –

- (a) it provides for a simple and transparent mechanism for grant of mining lease or prospecting licence through competitive bidding in areas of known mineralization, and on the basis of first-in-time in areas where mineralization is not known;
- (b) it enables the mining holders to adopt the advanced and sophisticated technologies for exploration of deep-seated and concealed mineral deposits, especially of metals in short supply through a new mineral concession;
- (c) it enables the Central Government to promote scientific mineral development, through Mining Plans and Mine Closure Plans enforced by a central technical agency namely the Indian Bureau of Mines, as well as the Regulatory Authorities and Tribunals;
- (d) it empowers the State Governments to cancel the existing concessions or debar a person from obtaining concession in future for preventing the illegal and irregular mining;
- (e) it empowers the Central Government and State Governments to levy and collect cess;
- (f) establishment of the Mineral Funds at National and State level for funding the activities pertaining to capacity building of regulatory bodies like Indian Bureau of Mines and for research and development issues in the mining areas;
- (g) it provides for reservation of an area for the purpose of conservation of minerals;
- (h) it enables the registered co-operatives for obtaining mineral concessions on small deposits in order to encourage tribals and small miners to enter into mining activities;
- (i) it empowers the Central Government to institutionalise a statutory mechanism for ensuring sustainable mining with adequate concerns for environment and socioeconomic issues in the mining areas, through a National Sustainable Development Framework;

- (j) it provides for establishment of the National Mining Regulatory Authority which consists of a Chairperson and not more than nine members to advise the Government on rates of royalty, dead rent, benefit sharing with District Mineral Foundation, quality standards, and also conduct investigation and launch prosecution in cases of large scale illegal mining;
- (k) it provides for establishment of the State Mining Regulatory Authority consisting of such persons as may be prescribed by the State Government to exercise the powers and functions in respect of minor minerals;
- (l) it provides for establishment of a National Mining Tribunal and State Mining Tribunals to exercise jurisdiction, powers and authority conferred on it under the proposed legislation;
- (m) it empowers the State Governments to constitute Special Courts for the purpose of providing speedy trial of the offences relating to illegal mining;
- (n) it empowers the Central Government to intervene in the cases of illegal mining where the concerned State Government fails to take action against illegal mining;
- (o) it provides for stringent punishments for contravention of certain provisions of the proposed legislation; and
- (p) to repeal the Mines and Minerals (Development and Regulation) Act, 1957.

8. ROYALTY

Royalty means payment made to the owner of certain types of rights by those who are permitted by the owners to exercise such rights. Levy of Royalty on minerals is an universal concept based on the premise that mineral resources are “wasting assets”. A royalty levied on mineral production has been widely advocated for a number of reasons. The rationale for royalty is that it is a payment to mineral rights holder from mineral producer in consideration for the extraction of valuable and non-renewable natural resource. Royalty forms a vital part of a fiscal regime of mining and when properly designed, it is an important means of revenue realisation for the Government.

The Supreme Court, in *India Cement Ltd. v. State of Tamil Nadu and others* (AIR 1990 SC 85) had opined that royalty is a tax and its payment is for the user of land. The judgement had relied on a concept that royalty in as much as some intrinsic economic value was attributed to the extracted mineral created due to interaction among land, capital and labour each of which possesses some definite intrinsic economic value. In this sense royalty was viewed as a kind of tax linked either directly or indirectly to the intrinsic economic value of a mineral realised through sale by the lessee. In the aforesaid judgement, the Supreme Court held that royalty is charged on the basis of per unit mineral extracted, and the minerals could only be extracted, if there are three things i.e. (i) land from which mineral could be extracted, (ii) capital for providing machinery, equipment and other requirements, and (iii) labour. In other words, the unit of charge of royalty is land + labour + capital.

However, in the case of *State of West Bengal v. Kesoram Ltd and others*, SC, CA. No. 1532-1533 of 1993, Judgement dated 15th January, 2004 the Supreme Court had pronounced that Royalty is not a tax. The royalty is levied with reference to the quantity of the minerals produced in the rent of the land on which the mine is situated or the price of the privilege of winning the minerals from the land parted by the government in favour of the lessee.

There are various types of royalties, such as, unit based royalty, ad valorem based royalty, and royalty as a share of profit. Today country’s royalty structure has been rationalized to make it more market oriented. From 13th August 2009, only 9 minerals are charged royalty on ‘units of production’ basis. Royalty on all the remaining minerals is on ad valorem basis. Therefore royalty constitutes an important aspect of mining industry and is of great importance to the State Governments and mining industry alike.

Concept of royalty

A lessee is a person who is granted mineral concessions. The lessee is required to pay a certain amount in respect of the mineral extracted in proportion to the quantity extracted. Such payment is called royalty. Royalty is calculated on the quantity of minerals extracted or removed. The owner of the land is called lessor. The lessor has a right to receive a royalty based on the production of minerals. The lessor i.e. State Governments are collected royalty irrespective of whether mineral is marketed or not marketed. When a mineral has been mined it acquires a definite market value depending on grade, market conditions and so on.

The royalties in respect of mining leases is specified in Section 9 of the Mines and Minerals Development and Regulation Act, 1957.

The rationale for royalty is that it is a payment to mineral-rights holder from mineral producer in consideration for the extraction of valuable and nonrenewable natural resources. Mineral resources form the basic building blocks of civilised life and are essential segment of economics of a country.

Royalty rates in India

Prior to 1990, some of the State Governments were separately levying cess on mineral production under various State Acts usually linked to royalty. However, these levies were struck down by the Supreme Court in December, 1989, being ultra vires of the Indian Constitution, and consequently there was pressure on Central Government from the States to compensate them for loss of cess/revenue from tax on mineral rights. Under the circumstances, the Central Government took into account the revenue losses sustained by the States and fixed the royalty rates in February, 1992.

Consistent with its past practice, the Department of Mines, Ministry of Mines constitutes a study group on regular intervals to revise the rates of royalty on major minerals other than coal, lignite and sand for stowing. The latest revised rates of royalty and dead rent have been notified vide Gazette of India notification Nos. GSR 574(E) and GSR 575(E) dated 13.8.2009. The major revisions in the royalty rates were carried out in 1949, 1962, 1968, 1975, 1981, 1987, 1992, 1997, 2000, 2004 and 2009.

The highlights of the revised rates are as follows:

(i) Royalty rates for minerals viz. amphibole asbestos, china clay/kaolin (including ball clay, white shale and white clay), graphite, iron ore, quartz, silica sand, moulding sand and quartzite to be shifted from tonnage basis system of royalty to ad valorem basis. The Hoda Committee had recommended that the rates of royalty should move forward decisively on ad valorem basis. The basic principle of fixing ad valorem of royalty ensures that the market forces themselves take care of the increase and decrease of royalty accruals and further intervention from the Government is not required except in exceptional cases.

(ii) Royalty rates for 9 minerals, chrysotile asbestos, dolomite, limestone, lime kankar, lime shell, monazite, ochre, slate and tungsten has been continued to attract unit of production based royalty because it was held that shifting over to ad valorem rates for these minerals is not administratively feasible.

(iii) For base metals (copper, zinc, lead, etc.), bauxite and laterite dispatched for extraction of alumina and aluminium, the rates of royalty has been continued to be linked to the international benchmark metal prices to ensure higher royalty payment for high grade ore and lower royalty payment for low grade ore. However, in case of bauxite and laterite dispatched for non metallurgical uses, royalty has been levied on ad valorem basis as per the national benchmark price published by Indian Bureau of Mines (IBM).

(iv) There is a steep increase in the rates of dead rents from second year of mining lease in order to discourage dormant holdings.

The rates of royalty for coal and lignite has been continued to be levied as per the Official Gazette Notification Number GSR 522(E) dated 1st August, 2007.

The rates of royalty for uranium has been continued to be levied as per the Official Gazette notification number GSR 96(E) dated 13th February, 2009.

Royalty for minor minerals

The minerals mined are of two types, i.e. minor minerals and major minerals. Minor minerals are mostly used in local areas, required locally and for local purposes, especially for construction activity.

The term 'minor mineral' has been defined in clause (e) of Section 3 of the Mines and Minerals (Development and Regulation) Act, 1957 as - 'minor minerals' means building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes, and any other mineral which the Central Government may, by notification in the Official Gazette, declare to be a minor mineral".

Apart from the minerals already listed as minor minerals in the above clause, the Central Government has declared the following minerals as minor minerals : (1) boulder, (2) shingle, (3) chalcedony pebbles used for ball mill purposes only, (4) limeshell, kankar and limestone used in kilns for manufacture of lime used as building material, (5) murrum, (6) brick-earth, (7) fuller's earth, (8) bentonite, (9) road metal, (10) reh-matti, (11) slate and shale when used for building material, (12) marble, (13) stone used for making household utensils, (14) quartzite and sandstone when used for purposes of building or for making road metal and household utensils, (15) saltpetre and (16) ordinary earth (used or filling or levelling purposes in construction or embankments, roads, railways and buildings).

Section 15 of the Mines and Minerals (Development and Regulation) Act, 1957, empowers the respective State Governments to make rules in respect of minor minerals. Section 15(3) of the above said Act is regarding payment of royalty by the holder of mining lease, at the rate prescribed in the Minor Minerals Concession Rules of the respective State Governments. Thus, the realisation of royalty is a statutory right of the State Government, and provisions are made in the Rules of the respective State Government regarding payment of royalty. The Minor Mineral Concession Rules are not uniform and differ from State to State. Royalty rates for the same minerals also vary from State to State. The period after which the rates of royalty can be enhanced or reduced also vary from State to State.

Dead rent

Dead Rent is a deterrent against the tendency of leaseholders in cornering the mining lease and keeping the mineral resources idle. In the mining sector, there is a possibility that a lessee may deliberately prevent his competitor from accessing the mineral bearing land, thereby preventing production of minerals leading to artificial scarcity for the mineral, and also depriving the State

Governments from the royalty revenue which may accrue normally. Therefore, ideally, the 'dead rent' should have some relationship with economic values of mineral resources which are kept idle by the lessees and not merely with surface area of the idle leases. This was the view taken by the earlier Study Group and the rates of dead rent, which came into effect from 14th October 2004, were determined on the basis that higher dead rent would be levied on high value minerals. At present, the rate of dead rent varies according to grouping of minerals viz. precious metals and stones (like gold, silver, diamond, ruby, sapphire and emerald); high value minerals (semi-precious stones - agate, gem garnet and corundum); copper, zinc, asbestos (chrysotile variety) and mica; medium value minerals (chromite, manganese ore, kyanite, sillimanite, vermiculite, magnesite, wollastonite, perlite, diaspore, apatite, rock phosphate, fluorite (fluorspar) and barytes; and low value minerals (other than precious metals and stones, high value minerals and medium value minerals).

Generally one year is required for mine development, and the same may be exempted from levy of dead rent. Beyond the first year of mining operations, in order to curb any tendency of the mine owners to keep the leases idle

There is no provision for the payment of dead rent in Gujarat, Marathwada region of Maharashtra and Tamil Nadu. In all other states, the holder of a lease is required to pay either dead rent or royalty, whichever is higher in amount, but not both. In Himachal Pradesh, Madhya Pradesh, Punjab and Haryana, separate dead rent is charged if the mining of one mineral does not involve the mining of the other.

Royalty for Offshore Area Minerals

Article 297 of the Constitution of India was amended in 1976. According to the amended Article, all lands, minerals and other things of value underlying the ocean within the territorial waters, or the continental shelf, or the exclusive economic zone of India shall vest in the Union and be held for the purposes of the Union.

A study carried out by Geological Survey of India (GSI) showed that there are various minerals like ilmenite, rutile, zircon, garnet, manganese ore, monazite, sillimanite, etc., reserves of around 92 million tonnes under sea, which are worth several crores.

The Ministry of Mines had approved a policy on offshore mining and open offshore mining within 200 nautical miles of the coast, an area that comes under the countries exclusive economic zone (EEZ). The private players can now mine the sea bed to give a fillip to mining industry. The areas which can be explored are of Gopalpur Coast in Orissa, Visakhapatnam in Andhra Pradesh as well as the Kerala coast and Ratnagiri in Maharashtra.

The Offshore Area Mineral (Development and Regulation) Act, 2002 provides for development and regulation of mineral resources in the territorial waters, continental shelf, exclusive economic zone and other maritime zone of India and to provide for matters connected therewith or incidental thereto was notified on 31st January, 2003. Subsequently vide Gazette of India, Ministry of Mines Notification GSR 691(E) dated 3rd November, 2006 in exercise of the powers conferred by Section 35 of the said Act read with Section 22 of the General Clause Act, 1897 made the Offshore Area Mineral Concession Rules, 2006.

As per Section 16 of the aforesaid Act a lessee shall pay royalty to the Central Government in respect of any mineral removed or consumed by him from the area covered under the production lease, at the rate specified in the First Schedule in respect of that mineral. The Central Government shall not enhance the rate of royalty in respect of any mineral more than once during any period of three years. As per Section 17 of the aforesaid Act, a lessee shall pay to Central Government, every year fixed rent in respect of the area covered under the production lease, at the rate for the time being specified in Second Schedule of the Act. Further, lessee shall be liable to pay either royalty or the fixed rent, whichever is greater. Like royalty of onshore minerals, the Central Government shall not enhance the rate of fixed rent of offshore minerals more than once during any period of three years.

Royalty rates worldwide

There are wide varieties of approaches across the globe in royalty taxation in different countries with no clear trend for global convergence. However, the royalty tax system globally can be classified as one of the three types –

- (i) Unit based.
- (ii) Ad valorem (value based).

(iii) Profit based.

Few nations apply hybrid systems that combine two or three methods.

Though the unit based and ad valorem systems of royalty are more prevalent, the profit based systems are increasingly being applied in the developed countries.

9. ENVIRONMENTAL EFFECTS OF MINING

The extraction of minerals from nature often creates imbalances which adversely affect the environment. The key environmental impacts of mining are on wildlife and fishery habitats, the water balance, local climates and the pattern of rainfall, sedimentation, the depletion of forests and the disruption of the ecology.

Air – Surface mines may produce dust from blasting operations and haul roads. Many coal mines release methane, a greenhouse gas.

Water – The mining sector uses large quantities of water, though some mines do reuse much of their water intake. Mining throws sulphide containing minerals into the air, where they oxidise and react with water to form sulphuric acid. This together with various trace elements impacts groundwater, both from the surface and underground mines.

Land – The movement of rocks due to mining activities and overburden in the case of surface mines impacts land severely.

Health and safety – Mining operations range from extremely hazardous to being as safe or as dangerous as any other large scale industrial activity. Underground mining is generally more hazardous than surface mining because of poorer ventilation and visibility and the danger of rock falls. The greatest health risks arise from dust which may lead to respiratory problems and from exposure to radiation where applicable.

One of the major environmental challenges facing the mining industry is due to the mine sites which are no longer in use.

While mining has historically affected its surrounding environment, advances in technology and changes in management techniques mean that many negative impacts are now avoidable.

Increasingly, mining companies are making efforts to reduce the environmental impact of mining and minimize the footprint of their activities throughout the mining cycle, including working to restore ecosystems post-mining.

There is a misperception that free-market policies implemented in order to attract mining investment have led developing countries to weaken their environmental regulations. This is simply not true. In fact, in the past two decades developing countries have become more aware of environmental issues, and have taken steps to regulate and to protect their environment. Many voluntary measures have also been implemented by mining companies to achieve and maintain their social licence to operate.

Since the 1990s developing countries have implemented environmental regulations and established administrative structures to enforce these laws. Legal and administrative reforms have improved environmental rights and legal protection of the environment.

Transnational mining companies use environmentally efficient technologies in all their operations. According to the World Bank, “with some exceptions international mining companies use the same technology in developing countries as they do in their home countries, and they often supersede local environmental standards.” These technologies have improved in recent decades to permit new reserves to be located with less environmental disruption, extend the life of existing mining operations, and use less energy in smelting and refining. A recent study of 419 mines observed for up to 10 years found that multinational gold mining companies are equally environmentally efficient in developing nations as they are in developed countries.

9.1. Sustainable Development Framework for the Mining Sector

The Indian mining sector has been facing severe criticism on several issues relating to its performance vis-à-vis sustainable development. A High Level Committee which was set up under the Chairmanship of Shri Anwarul Hoda, Member, Planning Commission in the year 2005, to review the National Mineral Policy recommended that apart from introducing best practices in implementation of environment management, there was also a need to take into account the global trends in sustainable developments. The High Level Committee, specifically, studied the

impact of mineral development with the need to develop principles in mining, best practices, and reporting standards which may be measured objectively. The Committee recommended development of a Sustainable Development Framework (SDF) specially tailored to Indian context taking into account the work done and being done in International Council of Mining and Metals (ICMM and International Union for the Conservation of Nature and Natural Resources (IUCN). The SDF was to comprise principles, reporting initiatives and good practice guidelines.

Definition of “Sustainable Development” in the mining sector - “Mining that is financially viable; socially responsible; environmentally, technically and scientifically sound; with a long term view of development; uses mineral resources optimally; and, ensures sustainable post-closure land uses. Also one based on creating long-term, genuine, mutually beneficial partnerships between government, communities and miners, based on integrity, cooperation and transparency”.

The following seven principles form the core of the Sustainable Development Framework for India –

- (i) Incorporating Environmental and Social Sensitivities in decisions on leases: This principle integrates sustainable development concepts at the earliest phase of the mining life cycle. The underlying philosophy of the principle is to categorise mineral bearing areas based on an environmental and social analysis taking a risk based approach. At the bidding stage the categorisation of lease areas into High and Low risk will allow the investors to take business decision with the knowledge that the cost and uncertainties of getting approvals as well as operations in high risk areas will be significantly higher than the low risk areas. It will also allow regulators to put additional commitments at an early stage for environmental and social performance. This principle allows for the government to balance environmental and social interests of the nation, with mining priorities in the longer term;
- (ii) Strategic Assessment in Key Mining regions: Understanding that mining activities occurs in clusters which have impacts at a regional level, undertake a strategic assessment of regional and cumulative impacts and develop a Regional Mineral Development Plan based on as assessment of the regional “capacity” at periodic intervals. Creating an

- institutional structure to own and implement such plans in key mining regions and taking critical decisions on mining, new leases, allocation of resources, and even possible moratorium on mining to ensure more sustainable planning and development in such regions;
- (iii) Managing impacts at the Mine level impact through sound management systems. The key elements of this principle are impact assessment of key environmental, social, health and safety issues, development of management framework and systems at the mine level and continual improvement of the same on the basis of international standards on a self driven basis. A key elements is disclosing performance on environmental and social parameters to external stakeholder at every stage of the project lifecycle;
 - (iv) Addressing Land, Resettlement and Other Social Impacts. This principle demands a comprehensive assessment of social impacts and displacement of mining projects at the household, community and mining region level, and management commitment to address those impacts through mitigation measures and management plans;
 - (v) Community engagement, benefit sharing and contribution to socio-economic development. This principle seeks commitment to regular engagement with the local community as well as sharing of project benefits with the affected families. It is rooted in the principle of sharing profits with the affected communities already provisioned for the in draft MMDR Act awaiting approval. It dovetails the social impact management of project operations with the CSR initiatives being undertaken and looks at an integrated approach to mitigate impacts and improve local livelihoods and living conditions in the neighbourhood areas/communities.
 - (vi) Mine Closure and Post Closure Mining operations must prepare, manage and progressively work on a process for eventual mine closure. This process must cover all relevant aspects and impacts of closure in an integrated and multi-disciplinary way. This must be an auditable document and include a fully scoped and accurate estimate of planned cost of closure to the company. The cost estimates must be adequately provisioned to cover national, regional and local legal and regulatory

- requirements for closure; and must also include the cost of servicing all agreements/commitments made with stakeholders towards post-closure use;
- (vii) Assurance and Reporting. This principle seeks mining sector stakeholders to assess their performance against this SDF and demonstrate continual improvement on this performance over the life of the project. It requires this performance to be reported in a structured manner in a Sustainable Development Report to be disclosed in the public domain as well as to regulatory agencies to consider during approval processes.

The SDF provides guidance for the mining companies to improve performance on environmental and social aspects, however, over time it can also become the common benchmark against which all mining operations may be evaluated in terms of their comparative performance on sustainable development terms.

The SDF will need to be used by mining companies to demonstrate commitment to sustainable development, and may be submitted to regulators at the time of seeking clearance or renewal or extension. It should also be used by regulators to evaluate the mining company's commitment to achieving environmental and social goals. Investors and financiers may use this to assess risk and could additionally use it to demand better performance of the associated mining operations.

10. AUTHORITIES AND ORGANISATIONS RELATED TO THE MINING SECTOR

1) Ministry of Mines

www.mines.nic.in

At the Central level, the 'Ministry of Mines' is the nodal agency for overall growth and expansion of minerals and mining sector. It is responsible for survey and exploration of all minerals (other than natural gases, petroleum and atomic minerals); for mining and metallurgy of non-ferrous metals like aluminium, copper, zinc, lead, gold, nickel, etc. as well as for administration of the 'Mines and Minerals (Regulation and Development) Act, 1957' in respect of all mines and minerals (other than coal, natural gas and petroleum).

At present, the Ministry is having two subordinate offices, namely:-

a) **Geological Survey of India (GSI), Kolkata**

www.portal.gsi.gov.in/

It is one of the biggest national survey organisations of the world and one of the largest scientific organizations of the country. It has been functioning as a vital arm of the Ministry, providing basic and specialized information on mineral resources as well as contributing to their development and management. It seeks to collect, synthesize and update the data about the sector on a continuous basis as well as refine the nation's geoscientific information and knowledge. Such database is the basic source of accurate and specialized geoscientific inputs to a wide spectrum of end users covering Government/semi-Government agencies, multi-national and private organisations involved in resource exploitation, research, education, etc.

The principal function of GSI relates to creation and updation of national geoscientific data and mineral resource assessment, air-borne and marine surveys and conducting multifarious geo-technical, geo-environmental and natural hazards studies, glaciology, seismotectonics, etc. and to nurture studies on fundamental research. In all the developmental facets of the country including coal, steel, cement, metals/ minerals and power industries, GSI made neat contributions and remained relevant in the national context. Outcome of work of GSI has immense societal value as well as relevant to global perspective adopting state-of-the-art technologies and using methodologies, which are

cutting-edge. Functioning and annual programmes of GSI assumes significance in the national perspective since it is directly related to delivering the public good.

With its headquarters at Kolkata, GSI has six Regional offices at Lucknow, Jaipur, Nagpur, Hyderabad, Shillong and Kolkata and offices in almost all States of the country.

The GSI is the prime provider of basic earth science data to the government, industry and the public, as well as responsive participant in international geo scientific fora. The vibrant steel, coal, metals, cement and power industries, which expanded phenomenally in the post-independence era, bear eloquent testimony to the GSI's relevance in the national context. Geo scientific work of GSI encompasses practically the entire gamut of earth sciences and thus great responsibilities are bestowed on the organisation.

b) **Indian Bureau of Mines (IBM), Nagpur –**

www.ibm.nic.in/

It is engaged in the promotion of scientific development of mineral resources of the country, conservation of minerals and protection of environment in mines, other than coal, petroleum and natural gas, atomic mineral and minor minerals. It performs regulatory functions, namely enforcement of the Mineral Conservation and Development Rules, 1988, the relevant provisions of the Mines and Minerals (Development and Regulation) Act, 1957, Mineral Concession Rules, 1960 and Environmental Protection Act, 1986 and Rules made there under.

It provides technical consultancy services to the mining industry for the geological appraisal of mineral resources, and the preparation of feasibility reports of mining projects, including beneficiation plants. It prepares mineral maps and a countrywide inventory of mineral resources of leasehold and freehold areas. It also promotes and monitors community development activities in mining areas. It functions as Data Bank of Mines and Minerals and publishes statistical periodicals. It also, undertakes scientific, techno-economic, and research oriented studies in various aspects of mining, geological

studies, ore beneficiation and environmental studies. It advises the Central and State Governments on all aspects of mineral industry, trade, legislation, etc.

IBM is organized into six functional divisions, namely:

- Mines Control and Conservation of Minerals Division.
- Ore Dressing Division.
- Technical Consultancy, Mining Research and Publication Division.
- Mineral Economics Division.
- Mining and Mineral Statistics Division.
- Planning and Co-ordination Division.

IBM has its headquarters at Nagpur, 3 Zonal Offices at Ajmer, Bangalore and Nagpur, and 12 Regional Offices at Ajmer, Bangalore, Bhubaneswar, Chennai, Dehradun, Goa, Hyderabad, Jabalpur, Kolkata, Nagpur, Ranchi and Udaipur and 2 sub-regional offices at Guwahati and Nellore. 6 IBM has well equipped Ore Dressing Laboratories and Pilot Plants at Ajmer, Bangalore and Nagpur. A Clay laboratory has also been established at Kolkata to cater to the needs of the North-Eastern Region.

There are three research institutions, which are autonomous bodies of this Ministry, such as: -

- i. **Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC), Nagpur**

<http://www.jnarddc.gov.in/>

JNARDDC an Autonomous Body of Ministry of Mines is a “Centre of Excellence” set up in 1989 as a joint venture of Ministry of Mines, and UNDP with a view to provide major R&D support system for the emerging modern aluminium industry in India. The objective of the Centre is to assimilate the technology available in the country and abroad for the production of alumina & aluminium including aluminium alloys as well as develop technical knowhow for the basic engineering process and downstream areas and to provide training to the personnel employed in the Indian aluminium industries.

The centre also provides technological support for setting up Alumina refinery in the country. In the process the Centre caters R&D needs of both Primary and Secondary Producers.

ii. **National Institute of Rock Mechanics (NIRM), Kolar Gold Fields (Karnataka)**

<http://www.nirm.in/>

The National Institute of Rock Mechanics (NIRM) is a premier centre for research in applied and basic rock mechanics. It is an ISO 9001: 2000 certified research Institute. The Institute provides research and consultancy services for improving safety and productivity in the mining and civil engineering sectors. With its rich experience, underpinned with the strength of world class software and laboratory facilities, NIRM plays a vital role in offering technical services in mining, hydroelectric and tunnelling projects, site evaluation for construction of nuclear power plants and other infrastructure development projects both in India and abroad.

The Institute has been extending its support to the industry in the following areas:

- Metalliferous mines / Hard Rock Mines
- Coal Mines
- Hydroelectric & Tunnelling Projects
- Other Civil Construction Projects

iii. **National Institute of Miners' Health (NIMH), Nagpur**

<http://www.nimh.gov.in/>

National Institute of Miners' Health, Nagpur (NIMH) is an autonomous institute established under Ministry of Mines, Govt. of India with the objective of promotion of occupational health and prevention of occupational diseases among the workers employed in mining and mineral based industries. The Institute is engaged in research and developmental activities relating to occupational health, work place monitoring etc.,

in mines and mineral based industries. The Institute also conducts training programme for development of manpower in these fields.

The Institute is providing technical support services in health surveillance, workplace airborne dust monitoring, noise exposure profile, vibration related health risk studies, ergonomic assessment of HEMMs, etc. to mines and mineral based industries.

In addition to the above, two registered Societies, namely, the Non-ferrous Materials Technology Development Centre, Hyderabad (NFTDC) and Centre for Techno Economic Policy Option New Delhi (C-Tempo) both are non-grant institutions within the administrative purview of Ministry of Mines.

2) Directorate General of Mines Safety (DGMS)

DGMS is the Indian Government regulatory agency for safety in mines and oil-fields. It conducts inspections and inquiries, issues competency tests for the purpose of appointment to various posts in the mines, and organizes seminars/conferences on various aspects of safety of workers. The mission of DGMS is to reduce the risk of occupational diseases and injury to persons employed in mines and to continually improve safety and health standards, practices and performance in the mining industry. In order to fulfill its mission, DGMS performs the following functions:-

- Periodic inspections of mines to keep vigil over the status of safety.
- Investigations into accidents, dangerous occurrence and complaints.
- Granting statutory permissions for specific mining operations and laying down precautionary measures while working.
- Developing safety legislation and standards.
- Undertaking safety promotional initiatives through safety campaigns, awareness programmes and workers' participation in safety management.

3) National Metallurgical Laboratory

<http://www.nmlindia.org/>

Research and developments at National Metallurgical Laboratory focuses on Minerals, Metals and Materials. Through an arsenal of state of the art facilities and infrastructure, and on the strength of its expertise, NML has evolved into a premier Indian organization in the stated areas. It has to its credit hundreds of mineral beneficiation protocols, numerous strategic and substitute alloy developments, several industrial solutions especially in remaining life assessment, material selection and property enhancement.

4) National Geophysical Research Institute

<http://www.ngri.org.in/>

National Geophysical Research Institute (NGRI), a constituent Laboratory of CSIR, was established in 1961 in Hyderabad, with the mission to carry out research in multidisciplinary areas of Earth Sciences. The Institute plays a pivotal role in the exploration of Hydrocarbons, Mineral and Groundwater resources in addition to studies in Engineering Geophysics, Seismology, Geo dynamics and Geo environment. The Institute has a staff strength of 550 that includes about 150 highly qualified scientists doing extensive research in Earth Sciences assisted by an equal number of highly skilled technical staff for data acquisition, data processing and field investigations.

5) Federation of Indian Mineral Industries

<http://www.fedmin.com/>

The mining and mineral production interests in India were earlier represented by regional associations of mine operators and individual lease holders. In 1966, the individual mine operators and associations established an all-India federation a non-profit corporate body under the Companies Act, 1956 to promote the interests of mining, mineral processing, metal making and other mineral-based industries and to attend to the problems faced by them in lease grants, renewals, tenures, production, taxation, trade, exports, labour, etc. The Federation of Indian Mineral Industries (FIMI), which came into existence with a small membership of about 40 federating associations and individual units, is now a 350-member body. FIMI envelopes in its fold mining, mineral processing, metal making, cement and other mineral-derived industries as well as granite,

stone, marble and slate industries — private, joint and public sectors — of the country. It represents the entire non-fuel mining and mineral processing activities of the nation.

FIMI, while pleading for the promotion of these industries, interfaces with government, trade and industry bodies, educational and R&D institutions etc. on — legal, tenurial, fiscal, regulatory, forests and environmental — all matters connected with the functioning of this sector on a continuing basis.

FIMI's main objective is to establish a vibrant, environmentally benign mineral industry (explorative, extractive and processing activities related to minerals) that meets the mineral needs of the nation from the existing resource endowment, import the mineral and metals that are scarce or absent, and export the surplus minerals and metals that have an external market without prejudice to domestic needs.

11. MAJOR COMPANIES IN THE MINING SECTOR

PSUs like National Aluminium Corporation (NALCO), Steel Authority of India Limited (SAIL), National Mineral Development Corporation (NMDC) and Coal-India contribute about 85 percent of India's total value of mineral production and are the main producers of key commodities such as coal, iron-ore, and aluminium, copper and gold.

The major players in the mining sector on the basis of minerals produced by them are –

Mining Sector	Major Players
Exploration and production of coal/lignite	<ul style="list-style-type: none"> • Coal India Ltd. • Neyveli Lignite Corporation • IISCO
Exploration of Metals	<ul style="list-style-type: none"> • NALCO • BALCO • Mineral Exploration Corporation Ltd. • Bharat Gold Mines Ltd. • ONGC • Ircn • Hindustan Zinc Ltd. • Hindustan Copper Ltd. • Sikkim Mining Corporation
Iron Ore Sector	<ul style="list-style-type: none"> • National Mineral Development Corporation • Kudremukh Iron ore Company • Steel Authority of India • Orissa Mining Corporation
Bauxite Mining and Aluminium Production	<ul style="list-style-type: none"> • National Aluminium Company
Copper	<ul style="list-style-type: none"> • Ore mining • Hindustan Copper Ltd.

Rock	<ul style="list-style-type: none">• Rajasthan State Mines and Minerals Ltd.• Andhra Pradesh Mining Development Corporation
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12. IMPORTANT WEBSITES AND ADDRESSES

<http://www.dgmsindia.in/> - Directorate General of Mines Safety

www.mines.nic.in – Ministry of Mines, Govt. Of India

www.ibm.nic.in/ - Indian Bureau of Mines (IBM)

www.ismdhanbad.ac.in/ - Indian School of Mines (ISM), Dhanbad

www.portal.gsi.gov.in – Geological Survey of India

<http://www.jnarddc.gov.in/> - JNARDCC

<http://www.nimh.gov.in/> - National Institute of Miners' Health

<http://www.nirm.in/> - National Institute of Rock Mechanics

<http://www.metalseconomics.com/> - Metal Economic Group

<http://www.wihg.res.in/> - Wadia Institute of Himalayan geology

<https://www.ieindia.info/> - the Institute of Engineers (India)

<http://www.nio.org/> - National Institute of Oceanography

<http://www.niot.res.in/> - National Institute of Ocean Technology

<http://www.ngri.org.in/> - National Geophysical Research Institute

<http://www.prl.res.in/> - Physical Research Laboratory

<http://www.nrsc.gov.in/#> - National Remote Sensing Centre

<http://www.nmlindia.org/> - National Metallurgical Laboratory

<http://www.dod.nic.in/> - Ministry of Earth Sciences (Govt. Of India)

<http://www.isegindia.org/> - Indian society of Engineering Geology

<http://www.fedmin.com/> - Federation of Indian Mineral Industries

<http://www.icmm.com/> - International Council of Mining & Metals

<http://www.nma.org/default.asp> - National Mining Association, Washington, D.C.

Contact details - Ministry of Mines

3rd Floor, A wing, Shastri Bhawan,

New Delhi 110001,

India

Telephone: +91-11-23073233

Email: dom@nic.in

Contact details – Geological Survey of India

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Director General	27, J.L.Nehru Road Kolkata-700016 West Bengal	(033)22861676 (033)22861661	01001	dg@gsi.gov.in	033-22861656
Head of the Department Northern Region	GSI Complex, Vasundhara, Sector-E, Aliganj Lucknow-226024 Uttar Pradesh	(0522)2371664 (0522)2371104	05001	hod.nr@gsi.gov.in	0522-2336079
Head of the Department, Western Region	GSI Complex, Khanij Bhawan, 15-16, Jhalana Dungri, Jaipur-302004 Rajasthan	(0141)2710753	06001	hod.wr@gsi.gov.in	0141-2711100
Head of the Department, Central Region	GSI Complex, Seminary Hills, Nagpur-440006 Maharashtra	(0712)2511671 (0712)2510036 (0712)2510193	04001 04002	hod.cr@gsi.gov.in	2511671
Head of the	GSI Complex,	(040)24220857	02001	hod.sr@gsi.gov.in	040-24220958

Department, Southern Region	Bandlaguda, Hyderabad- 500068 Andhra Pradesh	(040)24220858			
Head of the Department, Eastern Region	GSI Complex, Bhu Bijnan Bhavan, Block: DK-6, Sector-II, Salt Lake Kolkata-700091 West Bengal	(033)23377783 (033)2321371	03001	hod.er@gsi.gov.i n	033-23219241
Head of the Department, North Eastern Region	GSI Complex, 'Shyla', Nongrim Hills Shillong-793003 Meghalaya	(0364)2520228	11001	hod.ner@gsi.gov. in	0364-2520033
Head of the Department RSAS	GSI Complex, Vasudha Bhavan, Kumaraswamy Layout, Bangalore- 560078 Karnataka	(080)2666288 (080)2666256 (080)26662594	07001	hod.amse@gsi.go v.in	080-26662595
Head of the Department, NEnR	GSI Complex, Bhu Bijnan1 Bhavan Block: DK-6,7 Sector-II, Salt Lake Kolkata-700091	(033)2321064 (033)2321844	03201	hod.cw@gsi.gov.i n	033-23218447

	West Bengal				
Head of the Department, M&CSD	GSI Complex, Bhu Bijnan Bhavan, 9th. floor Block: DK-6, Sector-II, Salt Lake, Kolkata-700091 West Bengal	(033)2334381	03101	hod.mw@gsi.gov.in	033-23583679
Head of the Department, GSI Training Institute	GSI Complex, Bandlaguda, Hyderabad-500068 Andhra Pradesh	(040)2422017 (040)24220859	02201	hod.gsiti@gsi.gov.in	040-24220680
Head of the Department, Central Head Quarter	27, J.L.Nehru Road Kolkata-700016 West Bengal	(033)2286167 (033)2286166	01001	hodchq@gsi.gov.in	033-23573234
Deputy Director General(PPM)	27, J.L.Nehru Road Kolkata-700016 West Bengal	(033)2286167 (033)2286166	01008	ddgppm@gsi.gov.in	033-22861770
Deputy Director General Central Geo-Physics Division	27, J.L.Nehru Road Kolkata-700016 West Bengal	(033)2286676 (033)22861661	01003	ddgcgd@gsi.gov.in	033-22861774
Deputy Director General(IT)	27, J.L.Nehru Road Kolkata-700016	(033)2286162	01002	ddgit@gsi.gov.in	033-22862625

	West Bengal				
Deputy Director General(CGL)	27, J.L.Nehru Road Kolkata-700016 West Bengal	(033)22861716	01029	ddgcgl@gsi.gov.in	
Deputy Director General(M&P)	29, J.L.Nehru Road Kolkata-700016 West Bengal	22861603		ddgmp@gsi.gov.in	22521534
Controller of Stores	Dharitri Building,GN-40 Sector-V,Salt Lake City Kolkata-700091 West Bengal	(033)23573959	10007	cosgsi@gsi.gov.in	033-23573466
Deputy Director General(P)	27, J.L.Nehru Road Kolkata-700016 West Bengal	(033)22861642	01006	ddgper@gsi.gov.in	22861674
Deputy Director General(F)	27, J.L.Nehru Road Kolkata-700016 West Bengal	(033)22861616 (EPABX)	01007	ddgf@gsi.gov.in	22861624

Indian Bureau of Mines

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Divisional offices - Indian Bureau of Mines

Name of the Division Office	Name /and Designation of the Divisional Head	Postal Address	Telephone No.	Fax No.	E-Mail
ORE DRESSING DIVISION	Director (Ore Dressing)	2 nd Floor, Block 'B', Indira Bhavan, Civil Lines, Nagpur-440102 India.	91-712 - 2565024	91-712- 2562631	cododo@ibm.gov.in
MINES CONTROL & CONSERVATION OF MINERALS DIVISION	Chief Controller of Mines	2 nd Floor, Block 'A', Indira Bhavan, Civil Lines, Nagpur-440102 India.	91-712- 2560961	91-712- 2565488	ccom@ibm.gov.in
PLANNING & CO-ORDINATION DIVISION	Controller of Mines (Co-ordination)	2 nd Floor, Block 'D', Indira Bhavan, Civil Lines, Nagpur-440102 India.	91-712- 2561824	91-712- 2565073 and 91-712- 2565488	com.plcdn@ibm.gov.in

TECHNICAL CONSULTANCY, MINING RESEARCH & PUBLICATION DIVISION	Controller of Mines (TMP)	(TC) 7 th Floor, Block 'D', Indira Bhavan, Civil Lines, Nagpur-440102 India.	91-712 - 2562143	91-712 2561110	com.tc@ibm.gov.in
		(MR) 8 th Floor, Block 'D', Indira Bhavan, Civil Lines, Nagpur-440102 India.	91-712 - 2561110	91-712- 2561110	com.mr@ibm.gov.in
MINERAL ECONOMICS DIVISION	Chief Mineral Economist	3 rd Floor, Block 'D', Indira Bhavan, Civil Lines, Nagpur-440102 India.	91-712 - 2565471	91-712- 2565471	cme@ibm.gov.in
MINING & MINERAL STATISTICS DIVISION	Deputy Director General (Statistics) & In-charge MMS Division	5 th Floor, Block 'D', Indira Bhavan, Civil Lines, Nagpur-440102 India.	91-712- 2564934	91-712- 2564934	mms@ibm.gov.in

Zonal offices - Indian Bureau of Mines

Name of the Zone & Regions (Sub-Region) in its jurisdiction	Name and Designation of the Zonal Head	Postal Address	Telephone No.	Fax No.	E-Mail
CENTRAL	Controller of Mines (CZ)	6 th Floor, Block 'D', Indira Bhavan, Civil Lines, Nagpur-440102	0712 -2565603	0712 -2565603	com.cz@ibm.gov.in
SOUTH	Controller of Mines (SZ)	29, Industrial Suburb, Hind Stage, Tumkur Road, Yeshwantpuram, Bangalore-560022	080 - 23373287 080 - 23375366 / 080 - 23375367 (PBX)	080 - 23373287	zo.bangalore@ibm.gov.in
NORTH	Controller of Mines (NZ)	Type-IV, Block B/9, IBM Colony, Adarsh Nagar, Balupura Road, Ajmer-308 002	0145 -2681831	0145 -2441244 Ext. 28	zo.ajmer@ibm.gov.in

Sub-regional offices - Indian Bureau of Mines

Name of the Sub-Region	Name and Designation of the	Postal Address	Telephone No.	Fax No.	E-Mail

	Officer-in-charge				
GUWAHATI (Under Kolkata Region)	Assistant Mining Geologists	I-A, K.C.Sen Road, Palton Bazar, Guwahati - 781 001	0361 2636184	-0361 2636184	ibmuser@sify.com sro.guwahati@ibm.gov.in
NELLORE (Under Hyderabad Region)	Officer in Charge	57, Sri Sai Nilayam, D.No.26 / II / 3361-A, 3rd Lane, Vedayapalem, Nellore - 524004-	0861 2327294	- 0861 2327294	ibmnlrr@yahoo.co.in sro.nellore@ibm.gov.in

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