

# Mining Engineers' Journal



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MONTHLY

February - 2024



Not Just Mining Minerals...

# MINING HAPPINESS



Mining Engineers' Association of India

Flat-608 & 609, Raghava Ratna Towers, A-Block, VI Floor, Chirag Ali Lane, Abids, Hyderabad - 500001  
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## this issue contains...

President's Message	5
Editor's Desk	7
News from the Mineral World	9
Improving Gold Production for Improving Indian Economy - Dr. T.M. Babu	15
E-Auction of Iron Ore Blocks: Scope to Improve The Accompanying Geological Reports - Suresh Kumar	23
MEAI News	31
Nominations for MEAI Awards 2024	38
Conferences, Seminars, Workshops etc.	42

Correspondence Address

### MEAI National Headquarters

Contact: **Secretary General,**  
**Mining Engineers' Association of India**  
F-608 & 609, Raghavaratna Towers, 'A' Block, VI Floor,  
Chirag Ali Lane, Abids, Hyderabad - 500 001.  
Ph.: 040-66339625, 23200510

E-mail : meai1957@gmail.com  
website : www.meai.org

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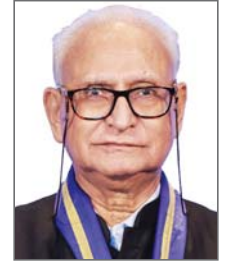
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## *President's Message.....*

**Dear members..**

**Jai Shri Ram!**

"January 22, 2024, (when the Lord Rama's Pran Pratishtha Ceremony was performed), is not mere a date on the calendar, it marks the beginning of a new Kaal Chakra" said Prime Minister Shri Modi. This temple is a symbol of peace, patience, harmony and coordination. It is indeed a very proud moment for all Indians who believe and follow Sanatan dharma. Timing of this great event has been very appropriate as it was followed by the Republic Day. The Rama Rajya will be followed by democracy in the real sense. Best wishes to all fellow countrymen.

The second Council Meeting of the Association was recently held at Jodhpur. It provided a much awaited amicable solution to the issue related to authorisation of a Council Member to officiate as Vice President- III by the President. After prolonged discussions, this action was approved. Since there was no direct provision in the constitution for by-election for any official post and considering the long-term need of an elected Vice President-III, it was also decided to take up the matter in the next AGM or EGM.

An International Conference on 'Advanced Technology in Exploration and Exploitation of Minerals' was recently conducted by the Rajasthan Chapter-Jodhpur. It was quite a successful event with wider participation and presentation of nearly 40 papers.

Few more such events are in the pipeline. Barajamda Chapter has planned yet another International seminar on 'Mining and Beneficiation Technology' in association with Tata Steel at Jamshedpur on 01- 02 February 2024. It will be followed by a Seminar by Hyderabad Chapter in association with NMDC on 'Advanced Iron Ore Beneficiation and Sustainable low grade iron ore utilisation' at Hyderabad on 16-17 February 2024.

One more feather in the Association's cap is the increase in Students Chapters. Recently two such Chapters were inaugurated at Udaipur and Sangam University Bhilwara in Rajasthan. One more Students Chapter, the JNTUCE Manthana Students Chapter, was inaugurated by the Singareni Chapter this month. In a recently conducted meeting by Rayalaseema Chapter, young mining engineers expressed interest in opening a Students Chapter there also. Students activities are not only limited to opening new Chapters but also getting involved in organising technical events. Jabalpur Chapter is organising a Seminar by & for the Students in association with AKS University, Satna on 19-21 February 2024 on 'Safe and Sustainable Mining Technology' along with a Mining & Engineering EXPO there.

The Training and Development Program Committee also inaugurated the 4<sup>th</sup> MPDP program on January 19, 2024, sustaining the spirit of vibrancy. It has received a good response. Efforts are being made to make this program further attractive.

My greetings to all our members for a happy and pleasant **Republic Day**.

**S.N. Mathur**  
President



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## EDITOR'S DESK



**Dr. P.V. Rao**  
Editor, MEJ

The Australasian Institute of Mining and Metallurgy (AusIMM), a member of JORC, published its annual compliance report 2023. The JORC (NACRI is its equivalent in India) is a member of and works closely with CRIRSCO, the Committee for Mineral Reserves International Reporting Standards to ensure international consistency in the development of reporting standards and the promotion of best practice in implementation of the relevant standards and codes. Every year, the Professional Conduct and Ethics Committees' report on their work of upholding compliance with the AusIMM Code of Ethics and professional codes is published by AusIMM. For the benefit of our members, excerpts from the 2023 annual compliance report are presented here below.

The AusIMM promotes the highest professional and ethical standards of its members through a strong focus on professional ethics and best practice implementation of professional codes. Under the AusIMM By-Laws, all AusIMM members are bound by the AusIMM Code of Ethics at all times, as well as other Board approved and recognized codes, regulations and directives (including the JORC and VALMIN Codes) when acting in certain capacities as a resources industry professional. These codes and regulations serve to protect communities, other members and the profession while providing professional reporting and valuation systems that provide the community and financial markets with confidence in the industry.

Members, upon admission, commit to the principles set out in the Code of Ethics and reaffirm that commitment as part of the annual membership renewal process. It is through processes such as these that the AusIMM confirms its position as a trusted and representative voice for resources professionals.

*Every year, the Professional Conduct and Ethics Committees' report on their work of upholding compliance with the AusIMM Code of Ethics and professional codes is published by AusIMM.*

**The complaints process:** It involves judgement by peers and is designed to ensure that members are held to account for any conduct in breach of the Code of Ethics and the By-Laws. Reported breaches of these codes are addressed through the complaints process. When a breach of the Code of Ethics and/or Professional Codes is reported, one of the following remedies can be imposed on the member concerned: a) advisory note, further education and/or training; or b) reissue of an affected public report; or c) caution/warning; or d) membership suspension or expulsion from AusIMM; or e) publication of details of the breach, including public naming of the professional found to be in breach

The intent is to ensure a remedy is appropriate to the breach while preserving the integrity of the profession and AusIMM. The process is informed by natural justice principles and includes an avenue for appeal. While there is an obligation to evaluate and determine an outcome for all matters accepted for investigation, there is also a responsibility to support members in understanding their AusIMM obligations. To this end, both committees seek to work with members in addressing any concerns to uphold professional standards and to protect the professional integrity of members. All deliberations of the Professional Conduct Committee and Ethics Committee are strictly confidential. The identity of the complainant and respondent remains confidential, except in some specific cases.

**The Professional Conduct and Ethics Committees:** These Committees are jointly responsible for investigating and determining the outcome of complaints. The Professional Conduct Committee investigates each complaint received with referrals made to the Ethics Committee if it is determined that a significant breach of the Code of Ethics has occurred.

In 2023 four complaints were submitted to end December, half the number submitted in 2022 and all were dealt with by the Professional Conduct Committee:

- One case related to an alleged breach of clauses 9, 10, 13, 14 and 19 of the JORC Code and resulted in a warning.
- One case alleged a breach of clauses 1 to 9 of the Code of Ethics, clauses 12, 17, 22, 24 and 38 of the JORC Code and clauses 18 and 19 of the VALMIN Code. Further to a comprehensive examination of the allegations, the complaint was dismissed.
- One case alleged a failure to disclose the details of the relevant Competent Person and the use of misleading language in a public post with a Caution issued.
- One case alleged a breach of clause 11 of the JORC Code with a Warning issued.

One case from 2022, where a Warning was issued by the Professional Conduct Committee, was appealed to the Ethics Committee with the appeal heard in 2023. The Ethics Committee upheld the decision on this matter. The Ethics Committee also referred a related but earlier complaint from 2022 back to the Professional Conduct Committee for further consideration after receipt of additional information. The original Warning issued was replaced with a Caution.

- Editor

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### EDITOR

**Dr. P.V. Rao**  
Off. : +91 (040) 23200510  
Cell: +91 96180 91039  
Email: editor.mej.meai@gmail.com

### PUBLISHER

**M. Narsaiah**  
Secretary General,  
Mining Engineers' Association of India  
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## NEWS FROM THE MINERAL WORLD

### ► Deep-sea mining: Norway approves controversial practice



*Knowledge of creatures living in the deep sea, which could be impacted by mining, is limited*

Norway has become the first country in the world to move forward with the controversial practice of commercial-scale deep-sea mining.

The bill, passed on Tuesday, will accelerate the hunt for precious metals which are in high demand for green technologies.

Environmental scientists have warned it could be devastating for marine life.

The plan concerns Norwegian waters, but agreement on mining in international waters could also be reached this year.

The Norwegian government said it was being cautious and would only begin issuing licences once further environmental studies were carried out.

The deep sea hosts potato-sized rocks called nodules and crusts which contain minerals such as lithium, scandium and cobalt, critical for clean technologies, including in batteries.

Norway's proposal will open up 280,000 sq km (108,000 sq miles) of its national waters for companies to apply to mine these sources - an area bigger than the size of the UK.

Although these minerals are available on land, they are concentrated in a few countries, increasing the risk to supply. For example, the Democratic Republic of Congo, which holds some of the largest reserves of cobalt, faces conflict in parts of the country.

Walter Sognnes, co-founder of Norwegian mining company Loke Minerals, which plans to apply for

a licence recognised that more needs to be done to understand the deep ocean before mining begins.

He told the BBC: "We will have a relatively long period of exploration and mapping activity to close the knowledge gap on the environmental impact."

Martin Webeler, oceans campaigner and researcher at the Environmental Justice Foundation, said it is "catastrophic" for the ocean habitat.

"The Norwegian government always highlighted that they want to implement the highest environmental standards," he said. "That is hypocritical whilst you are throwing away all the scientific advice."

He said that mining companies should focus on preventing environmental damage in current operations, rather than opening up a whole new industry.



*Environmentalists are concerned whale species like the humpback could be disturbed by deep-sea mining*

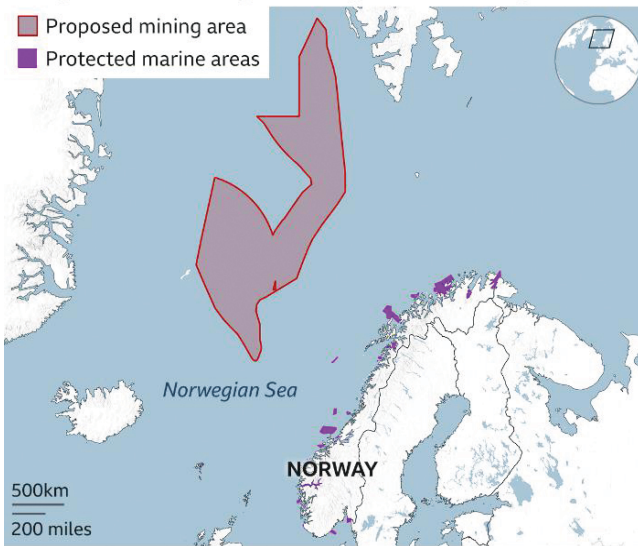
The move puts the country at odds with the EU and the UK, which have called for a temporary ban on the practice because of concerns about environmental damage.

Techniques to harvest the minerals from the sea floor could generate significant noise and light pollution, as well as damage to the habitat of organisms relying on the nodules, according to the International Union for Conservation of Nature (IUCN).

In November, in an unusual move, 120 EU lawmakers wrote an open letter calling on the Norwegian parliament to reject the project because of "the risk of such activity to marine biodiversity and the acceleration of climate change". The letter also said the impact assessment conducted by Norway had too many knowledge gaps.

As well as external criticism, the Norwegian government has also faced pushback from its own experts. The Norway Institute of Marine Research (IMR) said that the government had made assumptions from a small area of research and applied it to the whole area planned for drilling. It estimates a further five to 10 years of research into impacts on species is needed.

### Proposed Norwegian deep-sea mining area



Source: Norwegian Petroleum Directorate and Norwegian government **B B C**

The Norwegian government will not immediately allow companies to start drilling. They will have to submit proposals, including environmental assessments, for a licence which will then be approved on a case-by-case basis by parliament.

Marianne Sivertsen Næss, chair of The Standing Committee on Energy and the Environment, which considered the original plan, told the BBC that the Norwegian government was taking a “precautionary approach to mineral activities”.

She said: “We do not currently have the knowledge needed to extract minerals from the seabed in the manner required. The government’s proposal to open an area for activity enables private players to explore and acquire knowledge and data from the areas in question. Opening up areas is not the same as approving extraction of seabed minerals.”

Mr Sognnes, of Loke Minerals, added that the government’s plan would bring in much-needed investment from the private sector for research of deep marine environments.

“Develop[ing] knowledge on the deep ocean is very costly, you need to operate robots and these are very

expensive and unfortunately the universities have limited access to these kind of tools,” he said. He estimated that any actual extraction would not begin until the early 2030s.

Campaigners argue that more investment should go into recycling and reusing the existing minerals we have mined on land. The Environmental Justice Foundation estimates in a report that 16,000 tonnes of cobalt per year, about 10% of annual production, could be recovered through improved collection and recycling of mobile phones.

While Norway’s proposal concerns its national waters, negotiations continue on whether licences could be issued for international seas.

The International Seabed Authority (ISA) - a UN-affiliated body - will meet this year to try to finalise rules, with a final vote expected in 2025. More than 30 countries are in favour of a temporary ban, but countries such as China are keen to see the ISA press on.

*Esme Stallard, BBC News | January 9, 2024*

### → Saudi Arabia earmarks \$182 mln for minerals exploration in mining push

RIYADH, Jan 10 (Reuters) - Saudi Arabia has established a \$182 million mineral exploration incentive programme, a senior government official said on Wednesday, part of efforts to build an economy that does not rely mostly on oil.

The kingdom is pushing to expand its mining sector and tap vast reserves of phosphate, gold, copper and bauxite.

“This programme will de-risk investments in our exploration, securing to enable new commodities, green field projects and junior miners,” Minister of Industry and Mineral Resources Bandar Alkhorayef said, speaking at the Future Minerals Forum.

Deals worth 75 billion riyals (\$20 billion) are expected to be signed in Riyadh during this week’s industry event, he added, announcing the fifth and sixth rounds of a licensing programme offering access to 33 exploration sites this year.

Saudi Arabia, the world’s top oil exporter, is midway through an economic transformation plan known as Vision 2030 to diversify income sources away from hydrocarbons and develop sectors such as tourism, industry, and mining among others, to bolster non-oil GDP.

<https://www.reuters.com/markets/commodities/saudi-arabia-allocates-182-mln-mineral-exploration-incentives-mining-minister-2024-01-10/>

#### ► **Nickel prices keep slumping even as mines close**

Nickel futures continued to edge lower on the London Metal Exchange, despite a slew of announcements by companies cutting production in response to a collapse in prices.

The metal used in stainless steel and electric-vehicle batteries is down more than 40% from a year ago amid a growing global glut. The market has been flooded with a wave of new material from top producer Indonesia at a time when demand growth has faded.

The impact on the mining industry has been brutal. On Monday, billionaire Andrew Forrest's nickel producer Wyloo Metals Pty Ltd. said it's shutting down mines. BHP Group and First Quantum Minerals Ltd. are also being hit, while a raft of smaller producers have been forced to halt construction or fall into administration.

"The pressures in the global nickel market are becoming increasingly apparent," said Colin Hamilton, managing director for commodities research at BMO Capital Markets Ltd.

"We have noted that further temporary or permanent capacity cuts were required to balance the nickel market following last year's surplus, but it is yet to be seen whether sufficient adjustment has taken place," he said.

Inventories of nickel have surged almost 90% since June on the London Metal Exchange, rebounding from a decade-low level.

LME nickel declined 0.2% to close at \$16,007 a ton on Monday. Copper was little changed at \$8,345.50 a ton on the LME, while most other metals also declined.

*Bloomberg News | January 22, 2024*

#### ► **China, in comic strip, warns of 'overseas' threats to its rare earths**

China's chief intelligence agency posted on social media a comic strip featuring foreign-looking characters secretly extracting rare earths, in a story portraying the country's strategic metals under threat from covetous "overseas organisations".

The comic strip, published on Sunday on the State Security Ministry's official WeChat account, showed security officers uncovering "suspicious" exploration

and mapping activities by a group of people supposedly doing survey work for real estate development.



*Piles of mined and refined rare earth elements. Stock image.*

No foreign government or agencies were named in the comic strip, and the ministry did not specify any measures to counter foreign "interest" in China's rare earths.

The ministry could not be reached for further comment.

China, the world's largest producer of rare earths accounting for nearly 90% of global refined output, last year introduced restrictions on exports of the elements germanium and gallium, used widely in the chip-making sector, citing the need to protect national security and interests.

It also banned the export of technology to make rare earth magnets, in addition a ban on technology to extract and separate rare earths.

The restrictions have fanned fears that the supply of rare earths might ignite tensions with the West, particularly the United States, which accuses China of using economic coercion to influence other countries. Beijing denies the claim.

The United States has previously imposed restrictions on China's access to advanced chips and chip-making tools that could fuel breakthroughs in artificial intelligence and sophisticated computers for its military.

Rare earths, used widely in lasers, military equipment and consumer electronics, have grown in demand along with the rapid development of new energy vehicles, wind power and inverter air conditioners.

"As technology grows in leaps and bounds, some primary minerals have become rare strategic resources," a police character in the comic said.

“China boasts rich resources of these minerals. Overseas organizations have already had their eyes on them.”

Set in fictional Xishan Mining Area – described as an area rich in critical and scarce mineral deposits that could bring breakthroughs in super-semiconductor technology – the comic depicts two officers that were sent to the area undercover as lost hikers to gather information.

State-controlled *Global Times* described the comic as underscoring the importance of safeguarding key mineral resources as China-US trade frictions and global geopolitical tensions have turned the global competition for rare earths into an issue of national security.

The newspaper said the United States, Japan and the European Union, among others, have for a long time “coveted China’s rare earth mineral resources”.

“They have even resorted to infiltration, bribery, and espionage to achieve their goals,” *Global Times* said, quoting Li Baiyang, an associate professor of intelligence studies at Nanjing University.

*Reuters | January 22, 2024*

➡ **Congo and China talking \$7 billion in finance, Tshisekedi says**

China and Democratic Republic of Congo are discussing \$7 billion in financing as part of a renegotiated minerals-for-infrastructure deal, President Felix Tshisekedi said Saturday at his second inaugural address in the capital, Kinshasa.

Tshisekedi has been pushing for a restructuring of a 2008 \$6.2 billion contract between the countries, which he says has provided little benefit to Congo. The original deal promised \$3 billion in infrastructure projects paid for by proceeds from a copper and cobalt mine known as Sicominés.

While the mine has operated for years, less than a third of the development money was ever disbursed, according to Congo’s government.

Tshisekedi said a new infrastructure initiative to open up the enormous country would be financed “thanks to the upcoming allocation of funds from the envelope obtained as part of the renegotiation of the Sicominés project and which should reach a total amount of \$7 billion.” He did not offer further details.

Congo is Africa’s second biggest country by landmass, and is deeply poor despite huge mineral riches, including

key green-energy metals like copper and cobalt. China, where most of those minerals are processed, is by far the country’s largest trading partner.

China’s embassy in Congo did not immediately respond to two emails requesting comment Saturday outside normal business hours.

Tshisekedi was sworn in for a second five-year term before tens of thousands of supporters and more than a dozen African heads of state at Congo’s national stadium.

The president won more than 70% of ballots in the country’s Dec. 20 election, which was marred by delays that stretched the voting for days. Opposition leaders have rejected the poll and called for protests Saturday. But the international community has in large part accepted the results given Tshisekedi’s margin of victory and the generally peaceful elections.

In his speech, Tshisekedi also vowed to reduce inflation, stabilize the exchange rate and expand industry to create employment in the country. More than 62% of Congo’s nearly 100 million people live in poverty, according to the World Bank.

*Bloomberg News | January 20, 2024*

➡ **Global inventory of world’s mines needed – researchers**



*Open-pit mine in Jharia, India. (Reference image by the International Accountability Project, Wikimedia Commons.)*

A lack of a comprehensive inventory of the world’s mines and the absence of robust data on various aspects of mining operations is hampering sustainability efforts, a recent commentary in the journal *Nature* states.

In the article, Victor Maus, a researcher in the Novel Data Ecosystems for Sustainability Research Group of the IIASA Advancing Systems Analysis Program, and Tim Werner from the University of Melbourne, point out that even though in recent decades there has been increased exploitation of lithium for batteries, cobalt for smartphones, or neodymium for wind turbines, scientists, policymakers and even industry leaders know very little about what’s going on in the mining sector on a global basis and the extent to which the

activity is causing deforestation, biodiversity loss, air, water and soil pollution, human health hazards, community displacement and the loss of land and livelihoods.

"Independent research is essential to decipher the extent of risks posed by mining and its impacts on the environment and communities all over the globe, as well as to help identify major challenges and build public trust," Maus said in a media statement.

The reasons for such data scarcity, which the researchers say has meant that about half of the world's mining impacts remain undocumented, range from limited corporate reporting to disused, informal, or illegal sites.

Maus and Werner, thus, propose four steps to address this challenge. This includes acknowledging and addressing the underestimation of mining impacts and risks worldwide; improving data gathering and sharing practices among scientists; enhancing corporate transparency in the mining sector; and utilizing advanced techniques like remote sensing and artificial intelligence to fill data gaps.

"The urgency and scale of this problem cannot be overstated. With the global appetite for minerals expected to rise sharply in the coming decades, especially for clean energy technologies, comprehensive and transparent data on mining impacts is critical," the paper's authors said. "We can't manage what we can't measure."

*Staff Writer, Mining.Com | January 21, 2024*

### ➡ **Major miners pledge no exploration-related activities at world heritage sites**

The International Council on Mining and Metals (ICMM) said on Wednesday that its members would stay away from exploration-related activities at world heritage sites and focus on ensuring no net loss of biodiversity at any mining sites.



*The ancient Roman gold mining area of Rosia Montana, in western Romania, is now a world heritage site.*

At the ongoing World Economic Forum in Davos, major mining companies, including Freeport-McMoRan, Teck

and Newmont, committed to taking urgent action to support a "nature-positive future" by 2030.

ICMM members, representing around 30% of the global metals market, said meeting demand for critical materials to drive sustainable development should not come at the expense of nature.

"In addition, we have committed to take steps in our value chains, landscapes, and the wider systems in which we operate so that the total impact of our actions contribute to a nature positive future," said Rohitesh Dhawan, CEO of ICMM.

*Reuters | January 18, 2024*

### ➡ **India's NMDC says it has no plans to export iron ore to China**



*Donimalai Mine - Image courtesy of NMDC Ltd*

India's NMDC Ltd, the country's largest state-owned iron ore miner, on Thursday said it has no plans to sell iron ore to China and it is scaling up production to meet domestic demand.

*Reuters* reported on Wednesday that the federal government had turned down a request from the company to export iron ore to China.

Currently, NMDC has no interest in supplying ore to China, the company said in an emailed statement to *Reuters*.

"We are a Government of India enterprise committed to the demands of our domestic market and very well-tuned to the realities of the nation's international relations," the company said.

"Currently, NMDC harbors no interest in supplying iron ore to China," it said.

*Reuters | January 18, 2024*

### ➡ **China's rare earth exports hit 5-year high on demand from EV, high-tech sectors**

China's exports of rare earths in 2023 rose 7.3%

*(Continued on Page 41)*

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# IMPROVING GOLD PRODUCTION FOR IMPROVING INDIAN ECONOMY

Dr. T.M. BABU

## Abstract

India is one of the largest consumers of gold in the world. Every year India requires about 800 tonnes of gold. But the country's present production is not meeting even 1% of its demand. There are 283 gold occurrences identified in India spread over from northern Himalayan Mountain ranges right up to south Indian states. However, there is just only one company viz. Hutti Gold Mines Ltd in Karnataka producing gold, about 2 tonnes per year.

Once India had a glorious past producing significant gold and diamonds, dominated world trade and marketing spread over to different countries as found in records and seen in the presence of hundreds of abandoned gold mines in the country.

Past and present Government of India's Acts, Rules, Regulations, restrictions and policies did not yield desired good results in improving the gold mining industry. By reorientation of strategies there is scope to boost up gold production. Gold production in turn could improve national GDP, economy, employ, enrich more people and help to regain the good old glorious golden days of pre-colonial India.

Key words: India Gold production, 283 occurrences, mining Acts, Rules, Restrictions, GDP-Economy

### 1.0 Introduction

As per International Monetary Fund and Forbes analysis, India is 5<sup>th</sup> largest economy in the world in 2023 with Gross Domestic Product (GDP) of \$3.74 trillion (fig.1). It is behind the US, China, Japan and Germany but ahead of the UK, France, Italy, Canada and many other developed countries. It registered a 7.2% growth rate and aims to become 3<sup>rd</sup> largest economy in the world. Mining sector contribution to India's GDP now ranges from 2.2 to 2.5%. India with a population of over 1.4 billion people is producing about 95 minerals starting with coal, iron ore, chromite, aluminum and other metals giving employment to 700 thousand people. But gold mining and production is the most neglected field though consumption is one of highest in the world. Indians use gold for jewelry, investment and as hedge against inflation. They have sentimental, emotional attachment and spiritual overtones for gold.

Now, India is a large importer of gold as country's production is not even 1% of its requirement. In 2021, it imported 924 tonnes of gold estimated at over Rs. 3.4 trillion. Such a huge import of gold contributed to India's trade deficit and is affecting its foreign exchange reserves. But there are gold occurrences in India which are not yet tapped due to the reasons more than one.

GDP US \$ TRILLION

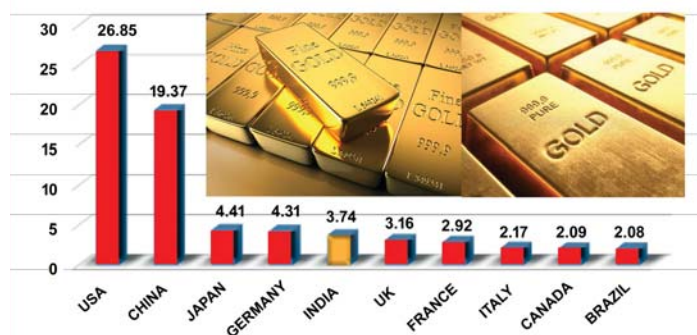


Fig.1 Top ten world's largest economies based on 2023-year GDP. Figures in Trillion US\$. Improving gold production will improve Indian economy to US\$ 5 trillion and more

### 2.0 Good old golden history

Once India was known to the world as "Golden Sparrow", in Hindi language as "Sone-ki-Chideya" (fig.2). Vedas, the ancient Indian scriptures of more than 3000 years old mentioned gold as symbol of prosperity. Chanayka, also known as Kautilya and Vishnugupta, a great scholar who lived from 350 and 275 BCE in his treatise Artha sastra wrote that gold is best form of wealth as it is durable, portable,

Vice president-African Resource Group; (Email: babutm@hotmail.com; Mob: 9440843037)

divisible and universally acceptable. He recognized the value of gold as a symbol of power and prestige, as well as a medium of exchange and a source of revenue. The period between 300 BC to 650 AD of Ashoka empire and Mauryan dynasty is acknowledged as Golden Age of India with wide spread activity in gold production, trade and marketing. Even William Shakespeare, English playwright mentioned about bountiful mines in India in his play Henry IV.



Fig. 2 Once India was known to the world as “Sone-ki-Chidiya” the golden sparrow. The period from 4<sup>th</sup> to 6<sup>th</sup> century was golden era of India which attracted people all around the world.

### 3.0 Holes in the earth

Attracted by its immense wealth mainly of gold and diamonds, Alexander the Great from Greece in 327 BC, Genghis Khan of Mongolia in 1221 CE, Vasco da Gama of Portuguese in 1498, Babur of Mughal empire in 1526, William Hawkins of Britan in 1608, Francois Caron from France in 1667 and many others came to India as invaders and traders and became conquerors. Ruthless colonial rules continued for about 500 years looting its wealth and taking it back to their own home countries. Though all of them left now, their imprints remained back as indelible marks, the empty holes

on the earth in the form of old workings of abandoned mines of gold, diamonds and other metals (fig.3). India is yet to regain back its past glory of golden era.



Fig. 3. Hundreds of empty holes in the earth are found in India as remnant imprints of abandoned old workings of gold and other metals and minerals.

### 4.0 Kolar- once world’s rich gold mines

Kolar Gold Fields called in short as KGF is located in Karnataka state about 100 km from Bangalore the state capital and about 2,200 km from Delhi, from where it was being administered and controlled. Gold mining spread over an area of about 20 sq km has history way back to Gupta kings’ rule of 5<sup>th</sup> century, Chola rulers of 9<sup>th</sup> to 10<sup>th</sup> century, Vijayanagar dynasty in 15<sup>th</sup> century and under Muslim ruler Tipu Sultan till the year 1799. In 1802, Captain Warren reported about these rich gold mines to the British colonizers. Around 1850 it was taken over by John Taylor and sons, London who carried out gold mining continuously for 75 years (fig.4). They established a township with luxury clubs, golf courts, rest houses in British style and called that place as “Little England” due to its temperate climate and landscape like that of Britain. After India got independence, these gold mines were taken over by the State Government of Mysore.

The main gold bearing lode called as Champion Reef located near Andersonpet is about 8 km long, about a meter wide traced to a depth of 3.2 km. As per old records, the average grade was 45 grams of gold per tonne, which was one of the highest in the world. Underground workings carried out on this body up to 3.2 km deep, developing 100 shafts and total workings were of 1400 km long. In addition to Champion Reef, other gold ore bodies are called as Nandydurg, Oorgaum and Mysore. As per all records, KGF produced near about 1000 tonnes of gold until now. No body is sure where all that gold mined during colonial period gone. Some people claim that like Kohinoor diamond, gold also has reached London.





Fig.4 Kolar gold field of South India taken over by British John Taylor and company produced gold for 75 years and called the place as “Little England” establishing clubs, golf courts in the town.

### 5.0 BGML- birth and death

Bharat Gold Mines Limited (BGML) was formed in 1972 as public sector undertaking of Government of India under Ministry of Mines, New Delhi. It took over Kolar Gold Mines from state government of Mysore. Later it has taken up a few more small mining operations in Karnataka and adjoining state of Andhra Pradesh. It was producing 2 to 4 tons of gold per year and was employing about 3,800 people, which was unusually high for such gold production. Ironically, when BGML produced highest record production of 6 tonnes of gold in the year 2000, a death sentence was sent from Delhi to close down all mining operations. This act itself speak million words about gold management in India.



Fig.5 Bharat Gold Mines Ltd (BGML), premises after closure of Kolar gold fields now has a deserted ghost town appearance.

All operations were closed with effective from 1<sup>st</sup> March 2001 declaring gold mining there as uneconomical. It was estimated that still about 3 million tonnes of gold ore were present in

the underground abandoned workings. All underground workings submerged in water and the mining equipment allowed to rust and decay. The miners approached courts with grievances for inadequate compensations. BGML could not commence and continue gold mining from any other part of India where gold occurrences were reported. Finally, BGML died within 30 years of its birth. It taught a lesson that government should only govern and should never enter into gold mining business. Even after mine closure, labor issues still not settled in the courts. KGF once known as “Little England” bubbling with luxury clubs, now has a deserted look like a graveyard or ghost town with abandoned and rusting mining machinery and submerged shafts. (fig.5).

### 6.0 Hutti

Hutti gold mines (Fig.6) are about 500 km from Bangalore from where it is being controlled. In 1947, it was known as Hyderabad Gold Mines. Now Hutti Gold Mines Limited (HGML) is a State Government of Karnataka undertaking. It is one of the most ancient mines of India dated back to the pre-Ashokan period. About 300 old working pits are found scattered all around. Some of the workings were dated as old as 3000 years. As per records from 1900 to 1920 about 7 tonnes of gold recovered from nearly 380,000 tonnes of ore with average grade of ore recovery of 19 grams per tonne. Now HGML has both open cast and underground mining operations like Hutti in Raichur district, Chitradurga in Chitradurga district, Ajjanahalli in Tumkur district and other places in Karnataka state. After closure of Kolar gold mines Hutti became the only gold mine in India for some time. As per an estimate, this mine has 31.02 million tonnes of gold ore, which could yield about 150 tonnes of gold.



Fig. 6 Hutti Gold mines is located about 500 km from Bangalore is claimed as only one significant gold mine in India after closure of Kolar mines.

Hutti gold mines were running in profit for a few years and in loss for few other years. It was closed in 1920 completely and reopened in 1946. From 1995 to 2000, it had Rs 30 crores (\$7.5 million) loss. In 2002-2003, it was on the verge

of closure like Kolar, but survived gaining some profits afterwards. However, its gold production was less than 3 tonnes and never increased substantially. As per its recent reports, HGML identified 21 new potential prospects for future development.

**7.0 Kunder Kocha**

Kunder Kocha gold mine is about 50 km south of Jamshedpur-Tatanagar, the steel city of India. It is in Potka taluk, East Singhbhum district, Jharkhand state. It was an abandoned mine site with old workings spread over about 2 sq km area. Here three abandoned shafts and two adits are found. As per Geological Survey of India 1974 publication of Ziauddin and Narayanaswamy geologists, few samples assayed 17 to 1300 grams of gold per tonne.

That area was taken up for mining by Man Mohan Mineral Industries Pvt Ltd. Chief Minister of Jharkhand state opened it on 2<sup>nd</sup> December, 2003 as per the rock inscription found there. (Fig.7) The mining lease covers an area of 19.5 hectares valid up to 16<sup>th</sup> May 2027. As per the IBM inspection report July 2017, this mine has 3,846 tonnes of reserves and 19,978 tonnes of gold ore resources. From 2012 to 2016, 4,297 tonnes of gold ore treated with grades ranging from 3.24 to 6 grams per tonne. During the financial year 2018-19, just 3 kg of gold produced from here. Now no production and mining activity is reported.

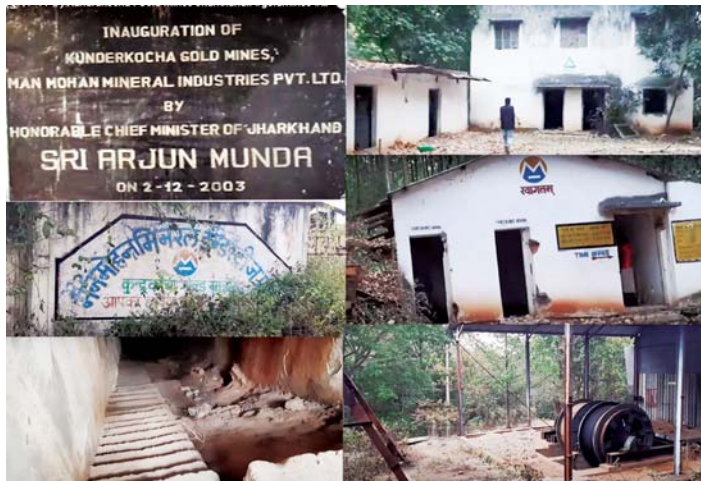


Fig.7 Kunder Kocha once remote abandoned mine in Jharkhand was inaugurated by State Chief Minister in 2003 to produce gold metal.

**8.0 Gold occurrences in India**

Radhakrishna, the doyen of Indian gold geology with more than 50 years of life long experience and recipient Padma Sri Award from President of India published two books on gold in India in 1991 and 1999. He enlisted and described 283 gold occurrences right from North Himalayan Mountains down to South Indian states (table No.1 and fig.8). However, enough efforts were not made to convert those occurrences to gold producing mines. He wrote “It would be unfair to condemn

large number of old workings as uneconomical to operate without exploring them more thoroughly... there is need for organizing gold panning as rural industry providing new venues for employment to the local people. They should be encouraged by grant of suitable incentives to locate sources of gold”.

Table No.1. Gold occurrences published in Gold in India by Radhakrishna and Curtis in 1999 from 16 states and regions.

No	Gold Occurrences	Total
1	Andhra Pradesh	24
	1)Mallapuram, 2) Chigarguta, 3)Bisanattam, 4)Kuditinapalli, 5) Palachchuru, 6)Veligallu, 7)Cherlopalle, 8)Kutagulla, 9) Erradoddi, 10. Virapallipeta, 11)Jibutil, 12)Ramgiri, 13)Ompratima, 14) Kottapalli, 15) Chinnabhavi, 16)Thallimadugula, 17) Balepalyam, 18) Ramapuram, 19) Bhadrampalli, 20) Penakacherla, 21) Jonnagiri, 22) Gavanikonda, 23)Dona temple, 24)Gani-kalva	
2	Arunachal Pradesh	7
	1)Bharma-putra-Tertiary-gold, 2)Siwalik conglomerates. 3) Subansiri, 4) Lohit, 5) Dehang, 6) Buri Dehang, 7) Bhareli	
3	Assam	19
	1)Mawphlang, 2)Tyrsad, 3)Tyrsad-Barapani shear zone, 4) Patkoi-Arakan belt, 5)Bhareli, 6)Subansiri, 7) Desoi, 8)Jangla Pani streams, 9)Dihang, 10)Desai, 11)Dhansiri, 12)Dibang, 13)Dikrong, 14)Gotejan, 15)Lohit, 16)Noa Dihing, 17)Sisi, 18) Sonai, 19)Tipam	
4	Bihar	22
	1)Pahardia, 2)Goilker, 3)Sonapet, 4)Babaikundi, 5)Birgaon, 6) Lawa, 7)Rudiya, 8) Khokhro, 9)Tamadungri, 10)Turamdih, 11) Nandup and Ramachandrapur Pahar, 12)Jadugoda (Jaduguda), 13)Rakha mines, 14)Sonagora, 15)Kundarkocha, 16)Surda, 17) Dhobani, 18)Mosabani, 19)Karmata, 20)Subarna-rekha, 21) Kankani, 22)Bonai	
5	Gujarat	5
	1)Janjodhpur-Alech hills, 2)Ambamata, 3)Ambaji, 4)Jambi 5) Narmada river terraces	
6	Himalayas	8
	1)Ophiolite belt-5000 km long, 2) Siwalik conglomerate, 3)Drias, 4)Shru, 5)Indus rivers, 6)Tatrot, 7) Pinjor 8) Ninghitu River-Manipur	
7	Karnataka	82
	1)Karajgi, 2)Chimulgund, 3)Kudrekonda, 4)Palavanahalli, 5)Chorana Edehalli, 6)Honnuhatti-Hosur-Tambadhalli, 7) Jalagarahundi, 8)Siddarhalli, 9)Nandi, 10)Hanni-Bukkambudi, 11)Honnayakanahalli, 12)Karthikere-Kalaspura, 13)Devrukal, 14) Yelavari-Gollarhalli, 15)Jalagaran-halli, 16) Aladahalli-Honnena-halli, 17) Tagadur, 18) Kempinkote, 19) Anekere-Kallennahalli, 20)Pura-Bellibetta-Katargatti, 21) Hosur-Shirunj, 22)Yelisorur-Venkatapura, 23)Nagavi-Beldadi-Nabhapur, 24)Kabuliyatkatti-Attikatti, 25)Mysore-Sangli, 26)Konganhour, 27) Honnemaradi, 28) Chikkanna-halli, 29) G.R.Hailli, 30)Gonur-Kotemardi, 31) Madakeri-pura, 32)Kunchiganhal, 33)Ingaldhal, 34)Kallehadlu, 35)Halekallu, 36) Bodimardi-Iplara, 37) Dindivara, 38) Anesdri, 39)Javanhalli, 40)Ramenhalli, 41)Ajjanahalli, 42)Bellara, 43) Honnebagi, 44)Kalinganahalli, 45)Nagamangala,	

46)Hunjanakere-Tittanamangala, 47)Lingada-halli, 48)South-Vibhutigudda, 49)Naranhalli, 50)Kilarhatti, 51)Mangalur, 52)Hutti, 53)Virapur-Yathkal, 54)Tippadhur, 55)Buddini, 56)Maski, 57)Sanbal, 58)Ramaldinni, 59)Udbal, 60)Kadoni, 61)Uti, 62)Wandalli, 63)Chinchergi, 64)Hira-Buddini, 65)Bullapur, 66)Chikkonna-kuni, 67)Manighatta, 68)Patna-Tambahalli, 69)Betrayanbetta-Kamandahalli, 70)KGF-West lode, 71)KGF-Champion reef, 72)Mallappakonda, 73)Nadapanhalli, 74)Karimadanahalli, 75)Sonhalli (Honhalli), 76)Woolagiri-Volagere, 77)Amble, 78)Hadabanatta-Porse dyke. 79)Kudre-Konda, 80)Palavana halli, 81)Sura-honne, 82) Nyamti.		
8	KERALA	18
1)Manantody, 2)Tariyod, 3)Chundale, 4)Vayittiri, 5)Meppadi, 6)Mannucheeni, 7)Maruda, 8)Thannikadavu, 9)Nilumbur, 10)Aruvacode, 11)Arippamadu, 12)Kappil, 13)Ponkkunnu(Porur), 14)Theyapadikuttu, 15)Chebarrassery, 16)Kadannamanna-Mankada, 17) Valambur, 18) Attapadi.		
9	MADHYA PRADESH	10
1)Sudda, 2)Guhar-pahar, 3) Sleemnabad, 4)Malanjkhand, 5) Sonakhan, 6)Devagaon, 7)Sonadehi, 8)Surwandi, 9)Sona-pahari, 10)Bihwa.		
10	MAHARASHTRA	10
1)Bhiwapur, 2)Ranmangli, 3)Kolari, 4)Parsoi, 5)Pular, 6)Nerla, 7) Kitari, 8)Dahegaon, 9)Pipalgaon, 10)Bhagri		
11	ORISSA	11
1)Gorumahisani, 2)Tuliga Parbat, 3)Dhosra Parbat, 4)Lonsila, 5) Sayamba, 6)Taldhi, 7)Gopur, 8)Telkoi, 9)Ramachandra Pahar, 10)Raimal, 11)Malkangiri		
12	PUNJAB	3
1)Rupar, 2)Hoshiarpur, 3)Gurudaspur		
13	RAJASTHAN	38
1)Kalinjera, 2)Talwara, 3) Undwala-Khamera, 4)Kanpura-Bhuwer, 5)Kundli-Dunripara, 6)Jharka-Tartai, 7)Makanpur-Dagal, 8) Pipalkhunt, 9)Bhukia-Jagpura, 10)Loharia, 11)Bharkundi-Hinglazmata, 12)Parsola-Amber, 13)Chari-Manpura, 14)Bedwal, 15)Salumbar, 16)Sona Mata, 17)Anjeni, 18)Zawar, 19) Newania-Viladkar, 20) Rajpur-Dariba, 21)Pindwara, 22)Rohira, 23)Pipela-Watera, 24)Danva &Ajari, 25)Pindwara, 26)Pur-Banera, 27) Banera, 28)Devlai-Jhikri, 29) Amargar, 30)Chandi-Mata-Basni-Luhari-Kalan-Birmata, 31)Sawr-Bajta, 32) Rampura-Agucha, 33) Chitar-Kalbar, 34)Kayar-Ghugra, 35)Babai-Akwali, 36)Khetri, 37) Kolihan, 38)Madan-Kudan.		
14	TAMIL NADU	10
1)Nadugani, 2)Alpha-Victoria, 3)Rousdenmalai, 4)Harewood and Solomon, 5)Richmond, 6)Phoenix, 7)Glenrock, 8)Kotagiri, 9) Naralapalli, 10)Maharajagadi,		
15	UTTAR PRADEH	14
1)Sonbhadra, 2)Narmada-Son-lineament, 3)Gurhar Pahar, 4) Mirchadhur, 5)Gulaldiha, 6)Sona-Pahari, 7)Amaranian, 8)Sonrai, 9)Alaknada, 10)Lakshman Jhula, 11)Gomti, 12)Pindar River, 13)Karna Prayag, 14)Ramganga.		
16	WEST BENGAL	2
1)Tamar-Porapahar, 2) South-Purulia		
TOTAL GOLD OCCURRNCE IN INDIA FROM STATES and REGIONS		283

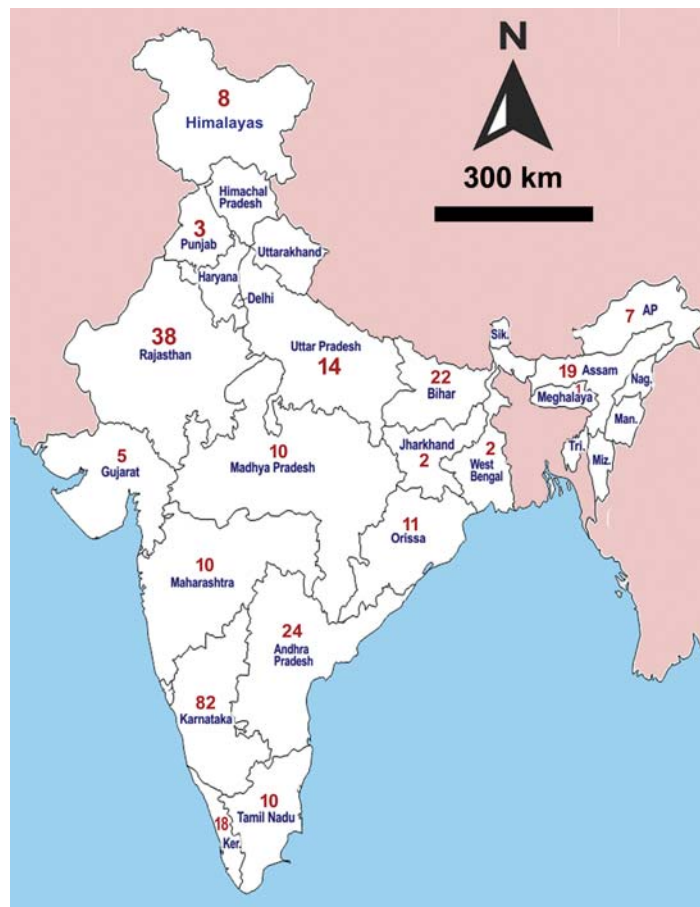


Fig.8. Gold in India published in 1999 by Geo Society of India described 283 gold occurrences spread in 16 states and regions as shown in table No. 1.

**9.0 GSI-IBM-MECL and others**

There are several organizations (fig.9) in India involved with gold in some form or other. Geological Survey of India (GSI) formed in 1851 is more than 170 years old, started by British colonial rulers to explore and mine coal. It has about 2500 geologists now with budget of about Rs 800 crores (about \$100 million) carries out geological mapping and related earth science studies with headquarters at Kolkata with regional and circle offices all around the country. It carries out initial preliminary exploration for minerals and metals including gold. Nevertheless, it has very limited expertise or experience in carrying out detailed economic feasibility studies, gold metal extraction metallurgy and related fields as per current international standards. It prepares auctioning gold exploration blocks for government.

Indian Bureau of Mines (IBM) was set up in 1948 with its head office at Nagpur and regional offices in different states close to the mining centers. It keeps inventory of all minerals resources, mines, production, imports, and exports, and publishes as Indian Mineral Year book. It approves mine plans submitted for getting mining lease, help mining companies in mineral beneficiation and related studies.

In 1972, with some experienced geologists working in Mineral Exploration Division (MED) of Geological Survey of India, an independent body as Mineral Exploration Corporation Limited (MECL) was created at Nagpur. Its objective was to bridge the gap between initial mineral discoveries until final extraction. In addition to this, several organizations like National Mineral Development Corporation (NMDC), Metals and Minerals Trading Corporation of India (MMTC), Council of Scientific and Industrial Research (CSIR), Regional Research Labs (RRL), National Geophysical Research Institute (NGRI), State Trading Corporation of India (STC) and many others have been created with various objectives.



Fig.9 Several Indian organizations are involved in promoting industry, scientific research and development. Better co-ordination needed for gold exploration-gold extraction to gold marketing.

### 10.0 Mining Rules and Policies

The first Mine Act was enacted in India in 1901 under Lord Curzon of British colonial period. After independence, India made several Acts, Rules and Regulations. The Mines Act 1952, Mines Rules-1955 are among the first. In 1957, Mines and Minerals Regulation and Development Act (MMRD) was enacted. In 1960, Mineral Concession Rules (MCR) introduced. In 1988, Mineral Conservation and Development Rules (MCDR) created for various minerals and metals. In all these rules gold, platinum, diamonds, tin, tungsten, lithium, niobium, tantalum, uranium and such other metals were kept strictly under government control. No other private individual Indian or company has right to explore or mine and produce gold.

In 1994, the MMDR Act-1957 amended de-reserving gold and other 13 minerals for exploration and exploitation by private sector. Consequently, many modifications introduced in the mining policies. In 2016 Mineral Concession Rules of 1960 once again modified introducing “bidding system” for getting permission to search, and reapply for mining.

Now the gold investors, explorers and miners have to understand all the prevailing Acts, Rules, Regulations in India. The list starts with 1923-Workman compensation

Act, 1947-Industrial dispute Act, 1948-Factories Act, 1952 Mines Act, 1955-Mines Rules, 1961-Metalliferous Mines Regulations, 1963-Maternity Benefit (Mines), 1974-Water Prevention and Control pollution, 1980-Forest conservation Act, 1981-Air (Prevention and Control of Pollution) Act, 1985 Mines (Rescue) Rules, 1986-Environmental Protection Act, Environmental Laws, Labour Laws, Health safety laws and 2016-MCR Rules and more.

### 11.0 Ending Government monopoly

In 1993, after about 46 years of independence, government of India declared liberalization of mining policy by opening the doors for private and foreign direct investment (FDI). Government monopoly of holdings on 13 minerals and metals like gold, diamonds, platinum and others were de-reserved to private companies including foreign investors. In April 1994 an “International Round Table Conference on Foreign Investment in Exploration and Mining in India” was organized at Delhi. About hundred investors attended it from various international companies like Rio Tinto, BHP, De Beers and others. Three stages called Reconnaissance Permit-RP, Prospecting License-PL and Mining Lease-ML were set. Though liberalized on paper, its ground implementation took several years making investors to lose interest, leading to frustration. In May 2014, Central co-ordination and Empowered committee (CEC) declared that there was a huge pile up of 63,395 pending permits.

### 12.0 Inordinate delays

One Australian investor in the year 2000 investigated 49 gold targets under Reconnaissance Permits applied for 32 Prospecting Licenses and 6 Mining Leases covering 11,066 sq. km across India and estimated to contain about 1.36 million ounces of gold. When there was inordinate delay, the company discovered that a PL request in Indian government has to pass through 140 persons through 41 desks from various local, state and central government offices. There was 12 years of waiting for getting a PL at North Kolar in South India. Those inordinate delays and frustrating details were published in 2014 as “India’s Mineral Security-Urgent Need for a New Mining Industry in India”. In that report, it was mentioned, “investors driven out by corruption and delays of present system, Indian companies are choosing for opportunities overseas rather than home. The situation is a shameful and cannot be allowed to continue”. But, things did not improve.

### 13.0 Introduction of New System

Few years back Government of India auctioned coal-bearing blocks for mining and got substantial money. Such type of auctioning blocks system is introduced to other metals even for giving permissions for searching. As per new policy, no Indian has right or freedom to search and discover any gold occurrence or deposit on his own. Government will first offer some blocks prepared by GSI with specific boundaries for

auctioning. The investor has to bid and search gold within the block boundaries. If an economically viable gold deposit is not found within those fixed boundaries all the investment and efforts will be in-vain. Even after discovering a good gold deposit, he has to reapply for mining permits, which takes years to get with so many hurdles and clearances required.

Gold deposit is very different from coal deposit. Same yardsticks and methods should not be applied for gold and coal. Auction is possible to any visible commodity, which the bidder could physically see. But, invisible gold quantity buried deep in an area cannot be easily evaluated at the time of bidding process by any investor.

#### 14.0 Gold Head and Gold Authority

For coal exploration and mining, there is a Coal Minister and Coal-India, an exclusive organization with more than 237,000 employees with assets of more than Rs. 211,000 crores equivalent to US\$ 26 billion as per its financial statement-2023. For Oil exploration, development and production there is Oil India limited. For copper there is Hindustan Copper Limited. Likewise, there are other departments for certain commodities. However, in India, there is no single fulltime National Gold Head or Gold organization making this metal an orphan with no guardian.

The first step now is to create Gold Authority of India with a Head to look after all aspects of gold right from collection and storage of all information on gold in India, exploration, mining, production, value addition, trade, marketing, imports, exports and other related matters. Gold warrants better status than coal. India is yet to identify a dedicated person like M.S. Swaminathan who brought green revolution in India or B.K. Dhruvarao who was a dedicated gold geologist of India. Even Kautiilya in his Artha Sastra wrote that there should be Swarnadaksha- a Gold Head to look after all matters of gold in a country.

#### 15.0 Where is mining area for mining?

In India to protect trees, there is Reserve Forest Area. To protect tigers and animals there are Wild Life Sanctuaries. But, there is no Reserved Mining Areas for mining. Due to this the miner is answerable to too many controllers and bosses like Forest Heads, local civil administration revenue officials, environmental-pollution-water-irrigation controllers and many more. Contrary to general thinking, gold mining is a risky venture involving hard work, which could be understood by those with knowledge and experience about mining activity. Wild animals could be shifted to other area. Forests could be subjected to deforestation and afforestation. But, a gold deposit cannot be shifted. It has to be mined where it is found. GSI or any authority should identify, specify and declare such potential areas meant for mining with exclusive rights and privileges for mining and gold production like in some African countries.

#### 16.0 Left hand to right hand coordination

There is no co-ordination among various organizations in India like GSI-IBM-MECL-Forest-NMDC-State-Mines-departments, environmental-Pollution controllers, and other bodies as found in many instances. GSI discovered and explored many years a gold-tungsten, copper and zinc mineralization in Kolari area near Nagpur, which was followed up by MECL in 1989. A private company obtained exploration permit and spent US\$ 1 million for evaluation. In June 2012, suddenly and unilaterally that area was declared as Umred-Karhandla Wild Life sanctuary (fig.10) for sheltering about 11 tigers and other animals resulting a blanket ban for any mining. All hard work, efforts, money and time spent by GSI, MECL and private investor have become fruitless futile. The investor who spent money was disgusted, frustrated and had to quit that area bearing irreparable loss to the company and to the country. It made people say that in government the left hand does not know what the right hand is doing. The right hand says YES-GO. But, the left hand says NO-STOP. Exit of Rio Tinto an international company from India for not getting mining lease even after discovering diamonds bearing kimberlites speak volumes for itself. But, who cares?

Talented, efficient and capable private Indians and entrepreneurs are migrating to other countries for better mining opportunities. NMDC an arm of government created to develop minerals in India is also moving out to other countries. Instead of developing any of the 283 identified gold prospects of India is going to develop a gold mine at Mt Celia-Kalgoorlie Western Australia. Such a move is not in the national interest and is against policy of *Atmanirbar Bharat*, the self-reliant India.



Fig. 10. Gold and tungsten bearing Kolari area near Nagpur is declared as Umred Karhandla Wild Life sanctuary to shelter tigers banning grant of any mining permits and gold production.

#### 17.0 Conclusions: Good hope and scope

Gold is a unique metal. It deserves special status and more attention in India in all aspects from search to marketing. As

furnished in the table No.1, there are 283 gold occurrences not known to many policy makers at Delhi. Of these even if at least 20 good occurrences are made into gold producing mines each of one tonne per year production, there will be substantial increase in the Indian economy. There is proof that once India was producing gold from pre-Ashokan period with the presence of hundreds of ancient workings and abandoned mines. Gold mining activity is affected due to invasions and long colonial rules.

The next-door neighbor country which was once producing just about 2 tonnes per year increased up to 400 tonnes of gold production per annum now. There are many Indian gold experts heading several international worldwide gold organizations who spent their entire life in improving gold production in many countries. Problems related to a meagre gold production in India have been realized. Right identification of problems means half solving it. International gold experts confirmed that there is significant potential in India to kick start producing more gold.

Now government could review, rethink and reorient its policies, rules and regulations, avoid undue procedural delays in granting permits and support the investors that are willing to invest their money, efforts and hard work without migrating to other countries with their cash bags. There is ample scope, hope and excellent opportunity to produce more gold in India in foreseeable future to boost up its GDP to more than \$ 5 trillion economy.

**18.0 Acknowledgements**

I sincerely thank Dr. PV. Rao for his relentless encouragement and giving an opportunity to share free and frank views after 50 years of world-wide experience for improving the gold mining industry of India.

**19.0 Dedication**

This paper is dedicated to B.K. Dhruva Rao, an outstanding gold geologist, though identified many gold occurrences for taking mining, was ignored and insulted had to quit BGML and died in 2016 as unknown forgotten Goldman of India.

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# E-AUCTION OF IRON ORE BLOCKS: SCOPE TO IMPROVE THE ACCOMPANYING GEOLOGICAL REPORTS

Suresh Kumar

## *Abstract*

*Pursuant to the Mines and Minerals (Development and Regulation) Amendment Act 2015, Mineral (Auction) Rules, 2015 & 2021, and its subsequent amendments made thereunder, most of the State / Central government departments have issued notifications for grant of Mining Lease / Composite License (prospecting cum mining lease), to the highest bidder, through e-auction, for those explored blocks of bulk minerals, subject to fulfilling various conditions. Further, the Ministry of Mines, Government of India, vide its notification “Minerals (Evidence of Mineral Contents) Rules, 2015 & 2021” (MEMC), set the terms for preparation/ compilation of a Geological Report (GR) that is to be accompanied for an e-auction. As, an Advisor to a Consulting company, the author had the opportunity to review more than 60 Geological Reports of Iron Ore that were put up in connection with e-auctions. A study of these GRs revealed, not only the limitations in disseminating data but also found wanting in conforming to the critical parameters listed in the MEMC 2015 & 2021. This article thus brings out such lacunae found in GRs and recommends certain mitigation measures to address the shortcomings, thereby improving the quality of GRs. Such improved GRs will provide the appropriate technical inputs required for the evaluation of the deposit, enabling the bidder to make an informed decision and offer a price for the block commensurate with its value.*

**Keywords:** *Minerals (Evidence of Mineral Contents) Rules, Geological Report, Geological Survey of India, Mineral Exploration Consultancy Ltd, State Directorate of Mines & Geology.*

### 1.0 PREAMBLE

Under the Mines and Minerals (Regulation and Development) Act, 1957 (67 of 1957), the Ministry of Mines was notified on 17<sup>th</sup> April 2015, a short title called the Minerals (Evidence of Mineral Contents) Rules, 2015. The notification covers all minerals, excluding petroleum & natural gas, coal, lignite, and sand for stowing, minerals listed in Part B of the First Schedule to the Mines and Minerals (Development and Regulation) Act, 1957 (67 of 1957); and (iv) minor minerals under these rules.

The exploration stages lead to the categorization of resources under four categories, viz. Reconnaissance Mineral Resource, Inferred Mineral Resource, Indicated Mineral Resource, and Measured Mineral Resource, respectively, reflect the degree of geological assurance given as per the United Nations Framework Classification (UNFC) version 1997.

Two types of leases are auctioned under MMDR Act, 2015: mining leases (MLs) and composite licenses (CLs) (prospecting license-cum- mining lease). The Minerals (Evidence of Mineral Contents) Rules, 2015 Section 7 provides details on the exploration requirements to determine whether a CL or ML would be granted for a particular mineral block depending upon the degree of exploration undertaken.

Holders of CLs are given the right to undertake prospecting operations, followed by a grant of mining lease to carry on mining. These licenses are granted in areas where limited exploration is done / weaker evidence exists to show mineral presence (MMDR Act, 2015, Section 11).

The notification outlines in detail the Geological Parameters to be established and the Norms for the exploration of different types of deposits. Geological study report for estimation and reporting of Mineral Resources shall integrate all exploration data, including aerial, geophysical, geochemical & geological surveys, and outcrop sampling, followed by Drilling, sampling of drill core/cuttings, and analysis. The technological study could be undertaken for every exploration stage, i.e., from G4 to G1, for proper assessment of the resources. The contents of the Prefeasibility Report on “Estimation and Reporting of Mineral Reserves” shall be based on such a Geological Report and to be attached as part of such a Prefeasibility Report.

The above notification was improved by further amendments and re-notified in April 2021 as the “Minerals (Evidence of Mineral Contents) Amendment Rules, 2021”. This includes all the parameters listed in the MEMC 2015, plus the addition of Beneficiation studies. Further, this notification emphasizes the definition of the various stages in the three vectors of a

*Former Chief, Natural Resource Division, Tata Steel Ltd & Advisor, BMRC Consultancy Services; E-mail: suresh@yadoo.com*

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“feasibility study”, “economic viability,” and “geological study” (including classes of mineral resources and reserves).

## 2.0 INTRODUCTION

The exploration agencies from the Central Government viz Geological Survey of India and PSU Mineral Exploration Consultancy Ltd, and respective State Directorate of Mines & Geology are involved in the exploration and preparation of GR. In addition, it was also observed that the state DMGs have also compiled the GR based on the exploration work carried out by Prospecting License holders who were not granted mining leases as well as that of erstwhile operating mines whose leases have lapsed or expired but not renewed, due to changes in MMDR 2015 act.

As an Advisor to a Consulting company, the Author had the opportunity to review more than 60 Geological reports of Iron Ore blocks that were put up for auction. These blocks were all from the major Iron ore-producing states of Odisha, Chhattisgarh, Madhya Pradesh, Jharkhand, Andhra Pradesh, Maharashtra, Rajasthan, and Karnataka. The reports studied were prepared by the Geological Survey of India/ Mineral Exploration Consultancy Ltd / respective State Directorate of Mines & Geology.

The geological reports reviewed mainly dealt with the Hematite type of ore (it may be noted that the MCME 2015 & 2021 notification did not address the specific requirement for exploration of the Magnetite type of deposit). Moreover, few Magnetite blocks have been auctioned as of date. However, the author had an opportunity to review the GRs of two Magnetite blocks put up for auction where neither Magnetic survey results nor the Davis Tube recovery test work results were reported. Needless to mention these are the two essential prerequisites for evaluating magnetite-type of deposits.

The GRs studied, in general, are found to lack some of the critical parameters, such as the “Resource Potential” of the deposit, which is essential for evaluating the “in-ground value” for the bidders to make an informed decision for placing his successful bid for the blocks.

Therefore, the objective of this article is to highlight the shortcomings in GRs of those critical parameters and emphasize their importance in assessing the techno-economic feasibility of the blocks put up for auction. As an outcome of this article, it is assumed that in the future, the exploration agencies will thus take care of these aspects at the Exploration stage itself and collate the data as required to comply with MCME 2015 & 2021 notifications.

The following are identified as the critical sections that will have an impact on the assessment of the deposit and, therefore, addressing which appropriately will improve the quality of GR

- a) Topographic survey
- b) Drilling techniques

- c) Sampling & Sub Sampling
- d) Quality of Assay data and Laboratory tests
- e) In-situ Bulk Density:
- f) Resource estimation techniques
- g) Reporting of Mineral Reserves
- h) Beneficiation studies
- i) Lumps: Fines ratio
- j) Data dissemination
- k) Independent Regulatory body for vetting the GR / Expert Peer Review of the GR

## 3.0 DISCUSSION

The critical sections that have an impact on the assessment of the deposit and the resultant quality of the Geological report thereof, as mentioned earlier, is discussed below in detail:

### 3.1 Topographic Survey

The accuracy and quality of survey methods pertaining to Block boundary (Old PL/ ML applied in the past) and locations of the drill hole points are very important. The block boundary, nowadays, is surveyed using DGPS by the respective state Government by approved third-party services. (which is mainly a state government entity). There is no mention of whether any Ground Control Points (GCP) have been established along the boundary of the block or lease, and if erected, how these points have been validated by the topographic survey is not clear in any GR. The accuracy of GCP is critical in the validation of the topo plan of the area.

Further, the topographic survey details are provided as part of GR, along with the methodology used for the topo survey. However, while the collar coordinates of drill holes are given, how these points were surveyed & how the accuracy of these points was validated is not mentioned. Since the collar level of the drill holes is very important in defining the surface level of the configuration of the deposit and deciphering the individual litho-units, and based on which Overburden/waste / Ore/subgrade is delineated in the calculation of Ore and Waste, the importance of this aspect need not be overemphasized.

### 3.2 Drilling Techniques

The drilling techniques employed are mainly Diamond Core drilling; however, in some cases, Reverse Circulation (RC) drill holes are also supplemented with Core drilling. In some of the historical reports, there are mentions of Down-the-hole Hammer drill holes (DTH).

The majority of the deposits explored with Core drill holes are drilled vertically since the ore body is gently dipping. However, angular drill holes have been drilled in some cases where the ore body is steeply dipping. It was observed that all the drill holes drilled were not angular but with a combination of vertical drill holes. Where angular holes are drilled, there



is no azimuth, and angle of drilling is provided. It is to be mentioned in all fairness that only GSI reports provide the details of drill hole Azimuth and Angle of Drilling.

Another essential point in Drilling pertains to drill core recovery. The loss of core recovery directly affects the litho-type, ore, and grade. However, this particular aspect of Core recovery is not given due importance in exploration. Often, it is mentioned that the recovery is cent percent without giving full details of drill run-wise core recovery. This is all the more important considering the soft nature of ores like Friable ore / Powdery ore / Blue dust, etc., which are often encountered. All the State /Central agencies / Private sector have been carrying out exploration in the iron ore belt and are experienced enough to know how these soft ore are encountered. Though, to maximize Core recovery, the use of Triple tube core barrel and Polymer has been in vogue for many years, these techniques are not used extensively by all agencies.

Often, where the Core could not be recovered for various reasons, the sludge recovered from return water is picked up and filled in the Core box, tested, and suitably incorporated in assessment of quality. Here, caution is warranted, as the drill holes are cased up to the soft overburden, and thereafter, they are left open (without casing). and therefore, the recovered material from return water is often a mix of the previous drill run's inner casing material, and if it is soft, tends to get filled in the bottom of the drill hole and is recovered in the sludge, the form of sludge, when flushed out. Hence, the sludge recovered does not truly represent the actual material "lost as core" of that particular drill run. Such sludge recovered and kept in the Core box thus tends to mislead, and therefore, it is essential to recognize these as such and report it appropriately to arrive at a proper appraisal.

If the deposit is explored with a combination of Diamond Core drill holes and RC holes, it is important to find out the difference between Core and RC holes in terms of litho-type ore encountered and the grade of the Ore. Hence, twining of holes is carried out to compare the lithology and grade of litho units encountered in these drill holes, and then a call is taken by a geologist to suitably mix these two types of drill hole data. As per best exploration practices, it is recommended to carry out at least 20 % of twin holes (of the total Core hole meterage). These twin holes should be distributed over the entire area to get an overall idea of the lithological variation, if any, and the grade thereof. Based on the outcome of the results of twining, the Geologist has to make a call on whether mixing of Core & RC is in order for assessment or RC drill hole data is used only for lithological demarcation.

### 3.3 Sampling & Sub sampling

A sample is a representative unit of rock or ore that is selected from a larger mass or volume to reflect that larger

body / some specific feature or variation within it. The Drill core samples generated are crushed and pulverized to draw a representative (by Coning–Quartering, Riffing, and or rotary samplers) sample for chemical analysis. The sample preparation process, in general, goes through two stages; in the first stage, it is crushed and reduced to approximately 3 mm in size. In the second stage, the representative fraction drawn is further subjected to sub-sampling by pulverizing it to 75 or 150-micron size depending upon the requirement for feeding to the analytical equipment used.

As per best practices and compliance with international reporting standards viz JORC / NI 43 – 101, QAQC samples like Certified Reference Materials (CRMs), Pulp duplicates, Blanks, Coarse duplicates, and field duplicates are used. The total QC percentage of samples represented by CRMs, Pulp duplicates, Blanks, Coarse duplicates, and field duplicates is approximately 10 to 15% of the total exploration samples generated.

To check the reliability of chemical analysis of the primary lab, samples are sent to the secondary lab along with QC samples. The total quantity of Check samples sent to the secondary lab constitutes around 10 to 15% of the total QC samples generated. A perusal of GR prepared by exploration agencies does mention briefly the sampling process. However, there is no mention of how the samples were reduced to obtain a final pulp for sending to the laboratory for chemical analysis. This information is very crucial to understand how the samples have been prepared, representing the total mass.

### 3.4 Quality of Assay Data and Laboratory Tests

The nature and quality of the assaying method, laboratory procedures, and the appropriate techniques used are, no doubt, very important. The nature of quality control procedures adopted in using CRM standards, Pulp duplicate, Coarse blanks, Pulverized blanks, Field duplicates & Coarse reject, and check samples used as a secondary test to confirm whether the results are repeatable, in acceptable levels of accuracy (i.e., lack of bias) and precise are all necessary and thus requires to be established as part of the best exploration process. The following types of samples are recommended for use:

**3.4.1 Certified Reference Materials (CRM):** These are samples with a known reference value used to assess the given laboratory tests accuracy, as the CRM samples have well-established grades, prepared under specially controlled conditions. CRM sample analyses are plotted on line graphs with  $\pm 2$  and  $\pm 3$  standard deviation as control gates, extending for  $\pm 3$  and  $\pm 5$  limits in case of some radicals falling outside the limits of CRM samples. If any test results fall outside  $\pm 3$  standard deviation line, then it should be informed to the lab, and the lab should reanalyze and correct the deviations.

**3.4.2 Pulp Duplicate (PDUP):** The Pulp duplicates consist of second splits of finally prepared samples, used for analysis by the same laboratory (where the original samples were analyzed) under different sample numbers to check the repeatability & accuracy of the erstwhile analysis. The PDUP also helps checking the sample swaps, if any, during the analysis.

**3.4.3 Coarse Blank:** The Coarse blank samples are used to assess contamination, if any, during sample preparation and are inserted into the test -batch before dispatching the samples for preparation. Coarse Blanks are inserted where similar lithological sequences are found.

**3.4.4 Pulverized Blanks (PBLANK):** The pulverized fine blanks are pulverized samples of barren material used to assess the eventual contamination during assaying. In the case of Iron ore, normally pure quartz is used as blank.

**3.4.5 Field Duplicate (FDUP):** These are samples taken from the first split of the original bulk reverse-circulation samples without any previous crushing. The field duplicates are mainly used to assess the reverse-circulation drilling sampling precision. To ensure repeatability, both the original and the twin/duplicate samples should be taken by the same crew and submitted to the same laboratory (the primary laboratory), in the same sample batch, and under a different sample number. This is done to monitor and establish that preparation and assaying follow similar procedures.

**3.4.6 Coarse Reject / Duplicate (CDUP):** These are the retention samples of the remaining quantity after the pulverization of samples at the secondary crusher (of size 3mm). The quantity of the CDUP for QC is about 2-3% of the original samples. These check not only the analysis results of the pulverized as well as the retention samples while assaying but also to provide confidence regarding the rifle splitting procedures.

In this regard, it may be pertinent to point out that MCME 2015 notification also stipulates that check analysis of at least 10 % of samples may be analysed from third-party NABL accredited / Department of Science & Technology (DST) / BIS recognized laboratories/government laboratories for assessing the acceptable levels of accuracy.

As far as possible, the selection of check samples should be such that it represents different ore types in the deposit. Hence, while selecting these samples, one should try to collect from different drill holes representing different ore types in the same proportion as that of the deposit.

### 3.5 In-situ Bulk Density

Bulk density is defined as the ratio of a material/substance's mass to volume, including the inter-particulate void volume. The bulk density may be expressed in grams per cubic centimetre (g/cm<sup>3</sup>) or Tonne per cubic meter (t/m<sup>3</sup>). To

calculate the tonnage of a given deposit, usually, bulk density is required to be determined in the field, and the same is used for that deposit. In many Geological reports, the bulk density is not determined but assumed. Such assumed values are found to be invariably higher than the actual ones. As bulk density plays a critical role in tonnage calculation, albeit with financial implications for the bidder, this parameter has to be dealt with properly.

This aspect has also been stressed in the MEMC 2015 notification, that any such assumption made should be spelled out. Further, it requires a clear mention about the determination viz, by wet or dry method, the measurement type, the nature, size, and representativeness of the samples used for that purpose.

In a few historical GSI reports, the bulk density was considered from nearby deposits; for example, the in-situ bulk density determined for each type of ore by MECL in the Chiria iron ore deposit in Jharkhand investigated in 1979 was used for blocks explored in the Keonjhar district in Odisha. This is in spite of both the deposits being more than 100 km apart.

Indian Bureau of Mines had invited stakeholders' suggestions for determining the bulk density of minerals vide letter File No. A-285(47)/CGPB/2018-19/CMG dated 03.03.2020. Although the procedure for the determination of bulk density has been well explained, this has not been translated into an Official circular. Hence, Government agencies like GSI, MECL, and the State's DMG have not taken it seriously to ensure that the Bulk density is determined and used in every case. Considering that the guideline by IBM is now in place, at least from hereon, the exploration agencies involved in Geological investigation shall take note of this guideline and implement it in letter and spirit.

Different types of iron ore like Lateritised Hard laminated ore (LHLO), Hard Laminated Ore (HLO), Hard Massive Ore (HMO), Soft laminated Ore (SLO), and Friable Ore (FR), Powdery Ore (PO) and Blue Dust (BD) are often encountered. Each ore type occurs in different proportions in a deposit with its own characteristic features, viz. mineralogy, chemical constituents, and physical properties. These ore types also have different densities due to their varying physical and chemical constituents. Hence, assigning a single value for the entire deposit is not proper, as these will have major implications in the evaluation of the grade and tonnage.

### 3.6 Resource Estimation Techniques

The GR outlines the detailed description of the methods used to estimate the tonnages, mainly the Geological cross-sectional area method. However, in some GRs, the resource estimation is by polygon or slice plan method.

In only one GR, prepared by MECL, the author had the opportunity to peruse the Resource estimation was carried out by 3-D Resource modelling using Surpac software.

This was in addition to Cross sectional area method. The comparison of resources estimated by both methods was also described.

In a few GRs, it was observed that the estimation of resources is based on the grade of iron ore viz < 45 % Fe - Reject, 45 to 55% Fe - Sub grade ore/ Mineral rejects, and > 55% Fe - Ore. However, no such demarcation of these different ore types, as encountered, could be seen in the corresponding geological sections. Resource estimation done only by the grade, without giving due weightage (and also not demarcating these) to the different ore types encountered, will impact tonnage due to the density of individual lithology.

Invariably, the GR prepared by GSI and MECL stated the methodology followed in the estimation of resources and extrapolation of grade made therein; it was also observed that in the majority of cases, two methods had been followed in the reporting of resources. However, in a few GRs prepared by State DMG, the methodology used in resource estimation was not spelled out very clearly.

In some of the GR prepared using historical exploration data, there is no explanation of how the continuity of mineralization was synthesized when drill hole spacing varied from 100 to 400 m. However, extrapolation of mineralization was carried out up to 400 m, assuming the ore body continued, without ascertaining the same.

However, the basis for categorizing the Mineral Resources into varying confidence levels, based on the spacing of drill holes, was religiously followed by exploration agencies.

### 3.7 Reporting of Mineral Reserves

For Blocks that are to be auctioned, the MEMC 2015 & 2021 notification mandates that Resources within the Block and also describes how the Mineral Resource's estimate was used to convert it to Mineral reserves, if any. It also, further states that a clear mention is to be made in the GR, whether the Mineral Resources reported is in addition to, or inclusive of, the Mineral Reserves.

To be fair, it is pertinent to mention that Geological Survey of India has been restricting in reporting only Resource in Geological report under Geological axis as mandated under UNFC classification.

The majority of the GRs studied confined itself to reporting only the Resource, without any mention of the Reserves. Therefore, it left squarely on the bidder to take a call on the Reserves, based on their experience / data sourced from adjoining operating mines or using a domain expert to determine the Mineral Reserve from the Resource reported in the GR. In the absence of a Reserve being reported, the bidders have to apply modifying factors to calculate the Mineral Reserve from the estimated resource reported in the GR.

In a few of the GRs, mineral reserve as reported, was derived from the resource by using various methodologies. These are briefly summarized:

- a) If the entire block/lease area is mineralized, the resources within the 7.5 m safety zone, all along the entire lease boundary, have been subtracted from the resource and reported as Mineral Reserves.
- b) If the entire block/lease area is mineralized, the tonnage in the Mining Ledges is subtracted while designing the benches and reported as Mineral Reserves.
- c) In a few more cases where the mining leases expired / leases not renewed by the Government, consequent to the amendments of MMDR 2015, also came up in auction. In these cases, the GR sources the data from their approved IBM mine plan, wherein Resources as well as Reserves are reported, but without giving any explanation as to how it was arrived at.

Further, it is also to be pointed out that, to determine Mineral reserves from Resources while carrying out a detailed Mine design, the important factors viz. Geotechnical (slope stability), hydrogeological factors, and Recovery of Ore where permanent structures or village habitation cannot be relocated are to be considered. If the Pre-feasibility study is conducted, the above factors should be considered and explicitly mentioned as such in GR.

### 3.8 Beneficiation Studies

As per the notification, details of beneficiation studies carried out on representative bulk samples, be it at laboratory scale or bench scale, should suggest an appropriate flow sheet for optimum recovery of the given mineral commodity, stating the technological factors thereof, along with the by-products / co-products that could be recovered from the ore.

Among the GRs reviewed by the author, a few GRs prepared by the Geological Survey of India in Odisha carried out laboratory-scale beneficiation studies at IBM Pilot Plant, Nagpur. The Beneficiation studies carried out on Iron ore bulk samples had an average grade of + 61.5 % Fe. It would have been more appropriate if the bulk samples tested were segregated into two samples, viz low-grade samples - as it occurred/represented in the deposit - such as one in the range of 55 to 60 % Fe and the other > 60 %. The author felt that the beneficiation studies should have been focused only on low-grade Ore (55 to 60 % Fe) to assess the improvement in grade vis-à-vis yield by subjecting the samples to different processes while carrying out the test work. This would have enabled not only the beneficiated ore to be blended with > 60 % Fe at an optimum level & fed to the steel Plant directly as usable grade, but also facilitated in reducing the subgrade tailings both in grade & quantity.

### 3.9 Lump: Fines Ratio

Considering the Iron ore price listed by IBM is in terms of Lumps and Fines, it is essential for each mine to find out the

ore types in their mine that can yield lumps and, if so, the recovery thereof. These details can be generated only by bulk sampling of different ore types found in their mine and carrying out the required trials in a portable crusher.

The MCME 2015 & 2021 notification does not address this Lumps / Fines Ratio, although this plays an important role in the pricing of ore, and which directly impacts the valuation of Blocks auctioned. Consequently, this particular parameter is not addressed in most of the GRs. However, one of the GRs prepared by GSI did mention this factor. The methodology adopted by GSI for finding out the Lumps: Fines ratio in a hard ore was by excavating a pit with a dimension of 1m X 1m X 1m. The recovered Lumps and Fines are separately segregated and weighed to determine the ratio. This method is inappropriate since the excavation of the pit is very small, and that is done manually by breaking the ore or using locally made explosives. If the ore is hard, the different fractions of Lumps & Fines generated will depend on how much “hammering” it was subjected to or the quantity of explosives used, and thus might not reflect the actual Lumps / Fines ratio of the deposit.

### 3.10 Data Dissemination

As of now, a tender document for auctioning a block for a composite Mining lease includes either the GR, relevant drawings and annexures in PDF format or the IBM Mine Plan in case of a mine whose operation has been terminated.

The Government of India has been stressing the importance of digitization and dissemination of data/information online. However, dissemination of data/drawings, which is part of the Geological report, is still provided in PDF files, and the drawings are in the form of scanned copies. Due to the above practice, the bidder has to re-enter the exploratory data in Excel format to quickly assess the quality and the drawings to be digitized, using the geo reference provided, to prepare the 3d resource modelling. This practice has to be corrected as this is a sheer waste of time in an advancing digital technology scenario.

### 3.11 Independent Regulatory Body for Vetting the Geological Report

The Geological Report prepared by the agencies/ Departments are submitted to the respective Directorate of Mines & Geology / Directorate of Geology, who in turn provides this GR while putting up the Blocks for E-auction. Though it is understood that some of the states have a committee consisting of domain experts from the State and Central government to review and correct the GRs, before auction, it is still observed that there is still a gap in the critical information/data that are required for the bidder. Therefore, the bidder is made to take some unnecessary & avoidable risks by making certain assumptions for assessing the block in connection with participating in the auction process.

Therefore, it is necessary that the GRs are reviewed/vetted by an Independent Regulatory body or Peer Reviewed by an

expert who possesses domain knowledge in this field before the same is enclosed as part of the bidding documents.

## 4.0 RECOMMENDATIONS

So far, the lacunae found in the Geological Reports that accompanied the Iron Ore Blocks put up for auction were discussed. The suggested recommendations below, if incorporated in the Geological Reports in line with MCME 2015 & 2021 notifications, will go a long way in proper assessment of the Blocks put up for auction, enabling the interested parties to bid for the blocks appropriately. This will also ensure that no blocks won in the auction remain as such & unworked, depriving the Govts. of any anticipated revenues.

### 4.1 Topographic Survey

The agencies involved in carrying out exploration should provide details of Ground control points used in demarcating the lease/block boundary and how this has been validated while carrying out the topographic survey. Further, the validation details of Drill hole location points and their accuracy are to be provided.

### 4.2 Drilling

Considering the importance of Core recovery, the Triple tube core barrel and Polymer to be deployed, wherever necessary, to ensure a maximum core recovery. Further, the driller should be advised to record & report where and when the core loss had occurred. Collecting drill hole sludge and reporting it as representing the “lost Core” should be avoided, unless the drill holes have been fully cased till the soft formations and also ensuring that the sludge collected truly represents the “lost core”.

### 4.3 Sampling

The measures taken to ensure that the samples collected/ generated & sufficiently reduced for analytical work, represents truly the in-situ material should be clearly brought out in the GR. Considering the importance of sampling & analysis, it is necessary to follow the international practice of introducing QC samples viz Certified Reference Materials, Pulp duplicates, Blanks, Coarse duplicates, and field duplicates. This practice will increase the confidence level and accuracy of the chemical analysis of samples inter alia, the quality of the deposit on evaluation.

### 4.4 Quality of Assay Data and Laboratory Tests

The quality of Laboratory analysis has a significant impact on the reported grade of the ore. Hence, it is essential to check the accuracy, repeatability and precision of analysis. The importance and significance of Quality control samples viz CRM standards, Pulp duplicates, Coarse blanks, Pulverized blanks, Field duplicates, and Coarse reject has already been explained. Therefore, the cursory check sampling hitherto being carried out should be dispensed with and instead serious sampling & analytical protocols (QC) as described earlier should be followed.

#### 4.5 Bulk Density

The importance of Bulk Density need not be overemphasized. As a matter of routine, bulk density determination for a deposit under investigation, should be carried out in the field, as part of the exploration. This can also be supplemented by Laboratory determination of Bulk density using the field samples supplied. IBM should expedite converting their guidelines on bulk density into a circular and issue the same, so that all exploration agencies follow and adopt this during their exploration activities.

#### 4.6 Resource Estimation

All lithological and ore types encountered must be demarcated and shown in geological sections. Resource estimation should be based on Ore types encountered. Due consideration should be given to the proportion of ore types intersected in each drill hole, while averaging the grade. The density factor for resource estimation should also follow the proportional representation of ore types encountered and the densities thereof. Where a particular ore type is not readily available within the prospect, the data could be sourced/obtained from the adjoining mines, rather than assuming one single value.

#### 4.7 Mineral Reserves

While, determining Mineral reserves from Resources, the impact of factors such as Geotechnical consideration (slope stability), detailed mine design, hydrogeology, Recovery of Ore, and presence of any permanent structures / village / habitation to be considered and accordingly sufficient allowance should be provided for these. If a Pre-feasibility study is conducted, the above factors need to be fully addressed therein.

#### 4.8 Beneficiation Studies

Beneficiation studies aim to address whether the subgrade material could be improved in terms of grade so that it can be used in steel making. If the deposit is of subgrade in nature, then beneficiation studies need to be carried out based on the representative bulk samples generated during exploration activities. If the deposit hosts say two grades viz. + 60% Fe (average) and lower grade material of 55 to 60 % Fe (average), it is advisable to segregate these ore types separately and carry out beneficiation studies only on the lower grade material instead of mixing both types and conducting the studies on the mixed bulk sample.

#### 4.9 Lumps: Fines

Ideally, the Lumps: Fines studies are to be carried out with a portable crusher, on the bulk samples generated. However, it will be difficult to carry out such studies at the exploration stage due to the hard & compact nature of iron ore and its concealment at depth. Therefore, as an interim measure, it would be more appropriate for the Exploration agencies to use the Lumps: Fines ratio derived from the nearest operating mine. Though some variation could be expected

when the mine is opened up, nonetheless such indicative data will help the bidder to get an idea about the Lump Fines ratio expected from the Block. Perhaps, IBM could also publish general data on the Lumps: Fines Ratio (obtained from several mines), of different ore types, as they have access to these data, from the Mining plans submitted by all these leaseholders.

#### 4.10 Data Dissemination

In order to facilitate the process of informed bidding, the Ministry of Mines could advise all the States Directorate of Mines & Geology Department, to share the exploration data / Annexures / Drawings along with tender documents in digital form, including the compactable drawing files.

#### 4.11 Independent Assessor

To improve the quality of data acquisition and preparation of the Geological report, the Ministry of Mines could constitute an independent body (for Peer Review) represented by Domain experts from the State / Central Government / Industry expert of the commodity to review the Geological report of Blocks, prior to their E-Auction, to ensure its compliance with MEMC 2015 & 2021 notifications. This will make the Exploration agencies accountable and ensure their proper scientific data acquisition at the exploration stage itself, resulting in a credible and better quality of GRs, enabling the bidder & the Govt. to save time in operationalizing the blocks won in the auction.

### 5.0 CONCLUSION

The author is confident that if the recommendations made above are considered and implemented suitably, the quality of GRs will see tremendous improvement. While this will enable the bidders to make an informed financial decision when bidding for the blocks put up for auction, the Govt. on its part, could be assured of its revenues, as these blocks will go into production quickly, unlike in the past where some of the auctioned blocks were returned, and others still remain unworked.

#### Acknowledgement

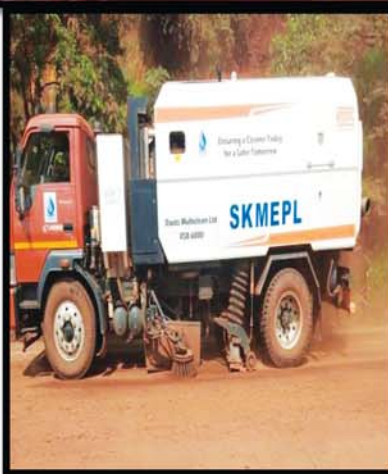
The author would like to thank Dr S Asokan, the Former General Manager, Natural Resources Division, Tata Steel Ltd., for taking out time to critically review the paper and for his constructive suggestions to improve the article.

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- 1 The Gazette notification of Minerals (Evidence of Mineral Contents) Rules, 2015, by the *Ministry of Mines* dated 17<sup>th</sup> April 2015.
- 2 The amendment to Minerals (Evidence of Mineral Contents) Rules, 2015, by the *Ministry of Mines* and gazette notification in April 2021
- 3 Rajesh Chadda and Sivamani, Geonesis, Volume 8, issue 11, October 2021 "Non-fuel Mineral Auctions: How Fair is the Game, and For Whom"?



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**Mines Office:**

**M/s. SRI KUMARASWAMY MINERAL EXPORTS PVT.LTD.**  
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Sandur (Tq), Bellary (Dist.), Karnataka- 583119  
E- Mail ID- [riom@skmepl.co](mailto:riom@skmepl.co), phone No: +91-6364516834.

**Corporate Office:**

**M/s.SRI KUMARASWAMY MINERAL EXPORTS PVT.LTD.**  
No-61, Cunningham Cross Road, Vasantnagar  
Banglore-560052  
Ph: +91 08022286954  
E-mail : [admin@skmepl.co](mailto:admin@skmepl.co)



## MEAI NEWS

### MEAI HEADQUARTERS

#### Second Council meeting held at Hotel Shriram International, Jodhpur on 08-01-2024

The 2<sup>nd</sup> Council Meeting of MEAI was held on 8-1-2024, 5.00 pm at Hotel Shriram International, Jodhpur, facilitated by the Rajasthan Chapter-Jodhpur.

The Meeting was chaired by Shri S N Mathur, President MEAI. Shri K Madhusudhana, Immediate past President, Shri Dhananjaya G Reddy, Vice President - 2, Shri Narsaiah, Secretary General, Shri B. Sahoo, Joint Secretary cum Treasurer were on the dais.

The other Council Members present were Shri Sanjay Pattnaik, Shri Vijay Singh A R, Shri Cyriac Joseph, Shri V. Lakshmi Narayana, Shri P R Dave, Shri Anil Marhur, Shri Deepak Gupta, Dr. T N Venugopal, Shri Rachappa M.S, Shri P. Venkateswara Rao, Shri K. Venkata Ramana, Shri Bhandari, Prof. R P Choudary, Shri A K Jaiswal, Dr. P C Purohit, Shri, B L Kotriwala, Shri K S Yadav, Shri K Laxminarayana, Shri Sitaram Kemmannes, Shri Ravi Chandra Raj, Shri L Krishna, Dr. C H Rao, Shri P C Bakliwal, Shri Asif M Ansari, Dr. S K Vashisth, and Dr. H S Venkatesh.

Glimpses of the Council meeting are presented below:



### Members approved in 2<sup>nd</sup> council meeting 2025-2025

#### A. Fellow Memberships approved

S No	Name	Chapter
1	Mr. Karra Ram Chandar	Bangalore
2	Mr. Kallam Sridhar Reddy	Hyderabad
3	Mr. Hitanshu Kaushal	Udaipur

#### B. Life Memberships approved

S No	Name	Chapter
1	Mr. Ramesh Kumar Yeddla	Hyderabad
2	Mr. Karthik Shankar Sachidanandam	Hyderabad
3	Mr. Malleswara Rao Thorakura	Hyderabad
4	Mr. D V S N Prashanth	Hyderabad
5	Mr. Avinash Gunti	Hyderabad
6	Mr. Jay Prakash Narayan	Hyderabad
7	Mr. Surendra Mohanty	Hyderabad
8	Mr. Japarakasha R	Hyderabad
9	Mr. Amol Laxman Bhosale	Hyderabad
10	Mr. Kalyan Kumar Patra	Hyderabad
11	Mr. Dillip Kumar Parida	Barajamda
12	Mr. Lalit Kishor Agrawal	Udaipur
13	Mr. Jagadheesan D	Tamilnadu
14	Ms. Anushka Chattopadhyaya	Udaipur
15	Mr. Devireddy Prasanth Kumar Reddy	Bellary-Hospet
16	Mr. Venkat Ramana Rao Masabattula	Hyderabad
17	Mr. Rajesh Kumar Sharma	Udaipur
18	Mr. Subramany Gopalappa	Bangalore
19	Mr. Mohan M G	Bangalore
20	Mr. Nirbhay Singh Chouhan	Udaipur
21	Mr. Vikram Singh Panwar	Udaipur
22	Ms. Bandi Gayatri	Hyderabad
23	Mr. Amit Kumar Dubey	Himalayan
24	Mr. Kapil Rai	Bellary-Hospet
25	Mr. Udyal Umamaheshwara	Bellary-Hospet
26	Mr. Rakesh	Ahmedabad
27	Mr. Ishan Ajitkumar Sur	Ahmedabad
28	Mr. Arshad Raza	Bailadila
29	Mr. Prabhu Prasad Rout	Bailadila
30	M. Nandlal America	Ahmedabad
31	Mr. Kurry Satyanarayana Reddy	Visakhapatnam
32	Mr. Syed Afroz Hussain	Udaipur
33	Mr. Vikram Vyas	Ahmedabad
34	Dharmendra Singh Rajput	Jodhpur

**BELLARY-HOSPET CHAPTER  
MINUTES OF THE EXECUTIVE COMMITTEE MEETING  
held on 29TH DECEMBER 2023**

The following members attended the meeting:

1. Sri S H M Mallikarjuna (Chairman)
2. Sri P Venkateswara Rao (Secretary)
3. Sri J Srikanth (Treasurer)
4. Sri K Madhusudhana (Past President)
5. Sri K Prabhakar Reddy
6. Sri G Laxminarayana
7. Sri Shivananda Reddy
8. Sri T Jitender Reddy
9. Sri Vinay Kumar
10. Sri Chandrashekar Halli
11. Sri YVR Krishna Reddy
12. Sri T L Yogananda
13. Sri Vishwajit Ghosh
14. Sri Gopal Joshi
15. Sri MM Rakesh
16. Sri K Krishnudu
17. Sri S Ravindra
18. Dr P Sharath Kumar
19. Sri S B Singh

Sri. SHM Mallikarjuna, Chairman, welcomed all the Office Bearers, Council members, Chapter Executive body, Development and First aid Committee members for the executive committee meeting and addressed the gathering on this occasion.

Sri SHM Mallikarjuna started discussing agenda points and all the members present in the meeting discussed previous meeting minutes and approved unanimously. He requested Sri K Madhusudhana to preside over the meeting.

Sri K Madhusudhana congratulated the Chapter team for taking up the activities continuously. He appreciated the efforts of the Chapter for arranging workshops for Student Chapter members and events like releasing new year diary etc., He expressed that the seminars and workshops will be very much useful and enrich the knowledge of all participants.

After due deliberations with all the members present in the meeting, it was finalized to organize the following seminars by the Chapter.

- a. To organize National Seminar on 23<sup>rd</sup> and 24<sup>th</sup> February, 2024 in association with VSKU, PG Centre at Nandihalli.
- b. To organize the National Conclave in Bangalore in the first week or second week of July, 2024 in Association with Mines Safety Association, Karnataka.

- c. As the BH Chapter was formed in the year 1975, it was also decided to inaugurate the golden jubilee celebrations in the month of August, 2024 along with surveyors meet at Hospet and to organize the final events of the golden Jubilee celebrations on 24<sup>th</sup> and 25<sup>th</sup> October 2025 by organizing a National/International seminar along with MEAI Council Meeting.

Apart from the above, the following points were also discussed and finalized.

- i. Decided to conduct an Awareness program at different locations/Industries depending on the requirement. It was decided to conduct a program on “CPR - A lifesaving technique” at MSPL corporate office, Hospet on 06.01.2024.
- ii. To conduct the First Aid training classes once in every quarter and aspirants can register their names at any time.

As decided in the previous meeting, it was decided to organize a nature walk at Sandur on 28<sup>th</sup> January, 2024 for all the Chapter members for refreshment and to improve the Connectivity among the Chapter members.

As discussed in the previous EC meeting, it was decided to conduct the next two Executive Committee meetings at SMIORE Deogiri and NMDC Donimalai respectively.

Sri. P Venkateswara Rao, Secretary of the Chapter proposed vote of thanks to the members present.

**WORKSHOP On OVERVIEW OF MINING AND MEMBERSHIP CERTIFICATE DISTRIBUTION CEREMONY FOR MEAI BH STUDENT CHAPTER on 29<sup>th</sup> December 2023**

Over 100 members attended the Workshop on – Overview of Mining and Membership Certificate Distribution Ceremony for the Student Chapter at Hotel Malligi, Hospet. Sri. K Madhusudhana, Past President MEAI and CEO M/s MSPL Limited graced the occasion as the Chief Guest. The Chapter Office bearers, EC & DC members, Chapter members attended the workshop.

Workshop started with welcoming the dignitaries on to the dais by Sri. Sandeep, Manager Mines and details are given below.

Sri Sandeep welcomed the dignitaries on the dais viz. Sri. K Madhusudhana, Past President MEAI/CEO MSPL Limited, Chief Guest of the programme, Sri. SHM Mallikarjuna, Chapter Chairman, Sri. P Venkateswara Rao Chapter Secretary and Sri. J Srikanth, Chapter Treasurer occupied the dais and started off the workshop by pouring water to the plant.





Sri Mallikarjuna SHM presented the welcome address to the August gathering. The Workshop commenced with great enthusiasm and anticipation as the Chapter Chairman Sri Mallikarjuna SHM delivered a warm and inspiring welcome address to set the tone for the event. The welcome address, a crucial part of any gathering, played a pivotal role in engaging the audience and establishing a positive atmosphere. He communicated the purpose and objectives of the event, ensuring that attendees understood the significance of their participation. This clarity helped in aligning the audience with the overarching goals of the gathering.



Sri Rakesh MM, Director, Co- Founder of Mine magma, commenced the presentation by providing a clear overview of the subject matter. The structure was well-organized by guiding the audience through a logical sequence of ideas. He prepared the overall slides for the students. He Explained about Various Govt Departments which are associated with mining and also explained different stages of mining viz. Exploration, Evaluation, Drilling, Blasting and the problems faced by the companies eg. Govt approvals. He explained the Life cycle of Iron ore and formation of various types of Iron ore. Also Statutory Requirements associated with Mining and various safety measures are required in mining. He concluded his speech by expressing his gratitude to the Association for giving him this opportunity.



MEAI Student Membership Certificates were distributed to the students of TMAE's polytechnic college And Nandihalli PG students by Dignitaries present on stage.



Sri. K Madhusudhana, Past President MEAI and CEO MSPL Limited and Chief Guest of the function commenced the address by expressing gratitude for the invitation and conveying warm wishes to the organizers and participants of the event. He expressed that the topic of the workshop was appropriate and the need of the hour. He explained the importance of education and also motivated the students for their future growth. He stated that only struggle and hard work are key to success. Also mentioned that this Workshop is really going to be useful for the students. He thanked the Chapter team for organizing such a wonderful workshop and Certificates distribution.



Sri. S B Singh Chief General Manager, NMDC addressed the audience. He began by expressing gratitude for giving the opportunity to be part of the event and acknowledged the importance of the occasion. The speech covered aspects related to mining and also explained the Mining in Hospet– Bellary chapter, emphasizing The Workshop on Overview of Mining. Concluded his speech by encouraging the audience.



The BH Chapter successfully organized and hosted the highly anticipated Workshop and released the New Year Dairy on 29/12/2023 at Hotel Mallige. The event marked the unveiling of our latest New Year Dairy for 2024, showcasing a blend of creativity, functionality, and thoughtful design.



Sri. P Venkateswara Rao proposed vote of thanks to the members present at the Workshop and thanked the Chief Guest for gracing the program, the Chapter members and everyone who have attended the Workshop and also thanked the staff of Hotel Mallige, Hospet for extending their support in conducting this function in a grand manner. The program concluded by hosting dinner.



### RAJASTHAN CHAPTER-JODHPUR

#### International Conference held on 8-10 January 2024

The Rajasthan Chapter- Jodhpur has organized a three day International conference during 8-10 January 2024 on "Advance Technology in Exploration and Exploitation of Minerals" fourth in this series since inception of the Rajasthan Chapter-Jodhpur in the year 2006. Conference was inaugurated at the heart of the Jodhpur at Shri Ram International Hotel on 8<sup>th</sup> January, 2024. Inaugural function was organized in the second half of the day with lamp lighting and Sarswati poojan by the dignitaries on the dais.

Prof. K. L. Srivastav, Vice Chancellor, JNVU was the Chief Guest at the inaugural function. Shri Surjeet Katewa, Director, DGMS, Ajmer Region-I, Dr. I Satyanaryan, Director DGMS, Ajmer Region - II, Shri Deepak Tanwar, ADM, DMG, Rajasthan, Brag. A. S. Rathore, CMD, FAGMIL were the Guests of Honor for the inaugural function. Shri S. N. Mathur, President MEAI was the presiding guest, Shri A. K. Jaiswal, Chairman, Jodhpur Chapter and Dr. P. K. Rajmeny, conference convener were the other dignitaries present on the Dias.

After the inauguration, two keynote addresses were delivered by Shri Cyraic Joseph and Prof. Sushil Bhandari. Shri Joseph gave a keynote address on Silkyara tunnel rescue work as his team was a part of that famous recent rescue operation. Prof. Sushil Bhandari threw light on application of digitization in mining and in controlled blasting techniques.

On 9<sup>th</sup> January, four technical sessions were conducted. The first technical session on Emerging Tech in mine operation and management of opencast mining was started with the keynote address of Shri V. Laxminaryan, Former Director, DGMS. Shri Anderu Hall, AMC, Australia, Hilton Gold finch, Mine Excellence, Australia presented his paper from Australia in hybrid mode. Shri Sanjay Khator and Dr. Rajmeny also presented their papers in this session.

In the second session of the day a total of six papers were presented. Then papers include from Dr. Janwar, CIMFR, Nagpur, Shri J. Reddy, ED, NMDC, Shri K.S. Solanki, Vedanta resources, and Shri Devraj Tiwari, GM, Tata Steel. In the third session Dr. Mohnot, CIMFR, Roorkee, Shri Bhanu Bhatnagr, Adani Cement, Shri Rajendra Bora, Wonder Cement, and Shri Lalit Mohan Soni, Infosys Ltd were the key luminaries among the presenters. In the last session of the day 2 on safety technologies and regulatory issues, Prof. K. Ramchander, NITK, Dr. Priydarshi from USA, Shri Deepak Tanwar, DGMS, Shri Vijay Singh, CA, Hyderabad, Dr. Vashishta, Dr. Sripad Nayak, NIRM and Prof.. Neelima, Manipal University, Mangalore presented papers on the concerned themes.

On 10<sup>th</sup> January, 2024, the third day of conference, in the 5<sup>th</sup> Session, Dr. Ramulu, CS CIMFR, Nagpur, Shri Dhruvjyoti from Datacode, Dr. Reddy, NITK, Dr. Matariya from GMDC, Shri R. Purohit, Former controller, IBM and Dr. Naik from NIT, Rourkela were the key presenters. In the last session on emerging technology in mineral exploration and management Prof. Pradhan, Satna University, Shri M.P. Puorhit, DMG, Dr. Aalan from Makrana, Dr. Kumar, Adani Resource and Shri Harsh Chouhan and Shri Kapil Tiwari from MEAI Student Chapter, Jodhpur were the key presenters.

In the valedictory session Prof. Ajay Sharma, Vice Chancellor, MBM University was the Chief Guest. Dr. H. S. Venkatesh, Director, NIRM, Bangalore, Shri Pukhraj Prajapat, GGM, RSMM, Shri Rajiv Choudhary, SME, DMG were the Guests of Honor for the valedictory session. Dr. P.C. Purohit, Council member from Jodhpur, Prof. R. P. Choudhary, HOD, Mining & Secretary, MEAI, Jodhpur and Shri M. P. Purohit, Co-convener of the conference were also present on the dais.

In the three-day successful international conference, over 35 technical papers were presented. 300 technocrats from Vedanta resources ltd, Adani group, NLC, JSW, Jindal SAW, Ultratech Cement Ltd, Shree Cement Ltd., Prism Cement

Ltd., RSM, FAGMIL, CSIR CIMFR, NITK, Surathakal, NIT, Rourkela, Satna University, DMG, Rajasthan, GMDC Ltd., MBM University and various reputed organization participated.



Welcome address by Shri A. K. Jaiswal, Chairman, Rajasthan Chapter-Jodhpur



Chief Guest Prof. K. L. Shrivastav addressing the gathering in the Inaugural function



Dr. P. K. Rajmeny speaking in the Inaugural function



Presiding Guest Shri S. N. Mathur delivering his speech in the Inaugural function



Welcoming the Chief Guest Prof. K. L. Shrivastav, VC, JNV University Jodhpur by Prof. D. M. Surana during inaugural function



Dignitaries and participants attending the International conference



Welcoming the Presiding Guest Shri S. N. Mathur by Shri Rajneesh Purohit during Inaugural function



Dignitaries and participants attending the International conference



Saraswati puja by the MEAI President Shri S.N. Mathur, Prof. Ajay Sharma, VC, MBM University, Dr. H.S. Venkatesh, Director, NIRM with other dignitaries in the Valedictory function



Dr. P. C. Purohit, MEAI Council member addressing in the Valedictory function



Valedictory speech by Prof. R. P. Choudhary, Secretary, Rajasthan Chapter-Jodhpur



Shri M. P. Purohit, Conference Co-convener proposing Vote of thanks

**SINGARENI CHAPTER**

**Inauguration of JNTU Manthani Student Chapter at JNTU, Manthani on 20-01-2024**

The Singareni JNTUH UCEM Student Chapter was successfully inaugurated on January 20, 2024 at JNTUH-UCE (MANTHANI). It was accompanied by a seminar focused on the Future of Coal Mining. The event was aimed at providing a platform for the students and professionals to discuss and gain insights into the evolving landscape of coal mining.

The inauguration ceremony commenced with a warm welcome address, emphasizing the significance of establishing a Student Chapter under the MEAI Singareni Chapter. Sri. G. Venkateshwar Reddy Director (P&P) SCCL attended the event as the Chief Guest. Sri. L.V. Surya Narayana (GM RG-II Area, SCCL), Sri. N. Sudhakar Rao (GM RG-III Area, SCCL) attended as a Guests of Honour. Dr. Ch. Sridhar Reddy (Principal JNTUH-UCEM), Sri. M. Narsaiah (Secretary General MEAI), Sri Cyriac Joseph (Founder & CEO Squadron infra and mining Pvt. Ltd) Dr. Ch. S. N. Murthy (Emeritus prof. JNTUH-UCEM), Sri. A. L. S.V. Sunil Verma (Secretary, Singareni Chapter) Dr. Lingampally Sai Vinay (Mining Expert-MoC, GoI) and distinguished guests, officials shared their insights, expressing their optimism about the Chapter's potential to foster collaboration and knowledge exchange.

The unveiling of the MEAI Singareni Student Chapter's plaque marked a pivotal moment, symbolizing the official commencement of its activities. The ceremony successfully created an atmosphere of enthusiasm and commitment among the attendees. The subsequent seminar on the Future of Coal Mining delved into the evolving trends, technologies, and challenges in the coal mining industry. Renowned experts delivered keynote addresses, providing valuable perspectives on sustainable practices, technological advancements, and the role of innovation in shaping the future of coal mining.

Keynote address-1 by Sri. Cyriac Joseph (FOUNDER&CEO (Squadron infra and mining Pvt.Ltd), on DRONE TECHNOLOGY - DIGITAL TRANSFORMATION THROUGH AI & ML IN TUNNELING & UNDERGROUND MINES.... THE GREAT HIMALAYAN RESCUE -MISSION ZINDAGI!!! gave an astonishing insight about application of drone technology.

Keynote address-2 by Dr. Lingampally Sai Vinay (Mining Expert, MoC, GoI) on Underground coal mining challenges and Opportunities inculcated participants with splendid insight on underground coal mining.

Keynote address-3 by Dr. K Ram Chandar (Professor, NITK Surathkal) on New trends in Slope Stability Monitoring expunged participants' knowledge on slope stability.

Panel discussions facilitated engaging conversations among participants, addressing pertinent issues such as environmental concerns, regulatory changes, and the integration of digital technologies. The seminar successfully achieved its goal of fostering a comprehensive understanding of the industry's trajectory.

The event witnessed an impressive turnout of students, professionals, and industry experts. Interactive sessions, Q&A periods, and networking breaks allowed participants to actively engage with each other, fostering a vibrant exchange of ideas and experiences.

The Singareni Student Chapter's event coordinators Shri. M. Sai Deekshith (B. Tech Mining engineering 4<sup>th</sup> year, JNTUH-UCEM), Shri. P. Suma (B. Tech Mining engineering 4<sup>th</sup> year, JNTUH-UCEM), Shri. V. Pavan Kumar (B. Tech Mining engineering 3<sup>rd</sup> year, JNTUH-UCEM), and Student coordinators actively coordinated in ensuring the seamless flow of the event, creating an environment conducive to learning and collaboration.



Shri G Venkateswara Reddy, Director Projects SCCL, Shri Sridhar Reddy, Principal JNTU, Shri M. Narsaiah, SG, MEAI, Shri N. Sudhakar, General Manager RG2, Shri L V Suryanarayana GM RG-3, Shri ALSV Verma, Secretary, Singareni Chapter Shri Cyriac Joseph, M A- Squadron Technologies, Prof S N Mathur



Shri M Narsaiah, SG MEAI addressing the gathering



JNTUH-UCEM Students with the dignitaries

## ICONIC IMAGE OF MEAI LEGENDARY LEADERS

(Contributed by Shri M Fasihuddin)



Former presidents (L-R standing): Shri KK Biran (1993-95), Shri NS Malliwala (1995-97), Shri M Fasihuddin (1990-93), Shri SS Manjrekar (1969-70), Shri TV Chowdary (1997-2001), Shri VS Rao (1983-86), Shri T Victor (2015-17). Standing Left: Shri CLVR Anjaneyulu (1997-2008)- the first appointed SG. Sitting middle: Dr PV Rao (1995-97)- the last elected Honorary Secretary.



## NOMINATIONS FOR MEAI AWARDS 2024

The Mining Engineers' Association of India presents awards Instituted by the Industry/individuals during the Annual General Meeting in July - August every year. Nominations for the following Awards are invited in the prescribed form, so as to reach the Secretary General by **30<sup>th</sup> of April 2024**. Nomination can be submitted by a member for one award only.

**1. MEAI - Sitaram Rungta Memorial Award** for the best paper on Mining-related issues during the year 2023.

### **AWARD Bylaws:**

- a. The award is known as MEAI – Sitaram Rungta Memorial Award, instituted by M/s Rungta Group of Mines.
- b. The award is presented to a Mining Engineer/ Geologist or any other qualified person involved with Mining Industry, who presented a paper on mining related issues during the previous calendar year/ financial year.
- c. The papers presented in any of the paper meetings, seminars or workshops organized by the Association/ Chapter during the calendar year are eligible for the award, provided
  1. *The paper was not published in any journal/ magazine in India or abroad other than the MEJ*
  2. *The author did not deliver lecture/ talk related to this paper on any other forum other than in the Seminars / Workshops etc., organised by MEAI.*

**2. MEAI NMDC Award** for significant contribution to Iron Ore Industry during the year 2023.

### **Award Bylaws:**

- a. The award is known as MEAI-NMDC Award instituted by M/s NMDC Ltd.
- b. The award is presented to a Mining Engineer/ Geologist or any qualified person involved in Mining Industry for the meritorious services rendered by him/ her to the Iron ore Industry.

**3. MEAI Simminds Award** for significant contribution to the limestone industry during the year 2023.

### **Award Bylaws:**

- a. The award is known as MEAI – SIMMINDS award instituted by M/s SOUTH INDIAN MINES AND MINERALS INDUSTRIES Ltd.,
- b. The award is presented to a Mining Engineer/ Geologist or any qualified person involved in Mining Industry for his/ her significant services rendered to the Limestone industry.

**4. MEAI Smt. Bala Tandon Memorial Award** in recognition of contribution to Mining Industry for improving ecology, environment and forestation during the year 2023.

### **Award Bylaws:**

- a. The award is known as MEAI - Smt. Bala Tandon Memorial Award was instituted by Padma Bhushan G.L. Tandon in memory of his late wife.
- b. The award is presented to a Mining Engineer/ Geologist or any qualified person associated with the Mining Industry, in recognition of his/ her meritorious services for improving ecology, environment and afforestation in mining and mineral industries.

**5. MEAI Abheraj Baldota Memorial Gold Medal Award** (Mining Engineer of the year 2023) in recognition of significant contribution to Mining Industry by a Mining Engineer with 20 years of experience in the Industry.

### **Award Bylaws:**

- a. The award is known as MEAI – Abheraj Baldota Memorial Gold Medal Award (Mining Engineer of the year) instituted by M/s MSPL Ltd., in memory of its founder late Abheraj Baldota.
- b. The award is presented to a Mining Engineer with a Degree or Diploma in Mining Engineering and Mine Manager's Certificate of Competency with 20 years of experience in mining and allied disciplines as on the date the nomination is forwarded and the nominee should have completed 45 years of age and contributed substantially to the mining and mineral industries in the areas of management performance, production, mining technology, human resource development, protection of environment, mineral conservation, beneficiation etc.

**6. MEAI Abheraj Baldota Memorial Gold Medal Award** (Young Mining Engineer of the year 2023) in recognition of significant service to Mining Industry by an Young Mining Engineer who has not completed 35 years of age as on 2023.

**Award Bylaws:**

- a. The award is known as MEAI – Abheraj Baldota Memorial Gold Medal Award (Young Mining Engineer of the Year) instituted by M/s MSPL Ltd., in memory of its founder late Abheraj Baldota.
- b. The award is presented to a Young Mining Engineer with a Degree or Diploma in Mining Engineering or a Manger's Certificate of Competency with five years' experience in mining industry and the nominee should not have completed 35 years of age as on the date of filing his nomination for the award.

**7. MEAI-SRG Informational Technology Award** for the year 2023, In recognition of significant contribution to Mining Industry adopting Information Technology during the year 2023.

**Award Bylaws:**

- a. The award is known as S.R.G. Award for Information Technology, instituted by M/s S.R.G. Consulting Mining Engineers (P) Ltd. in memory of late Sriram Srinivasan and late Pradeep Kumar Bhattacharya both founder directors who lost their lives in Train (Rajdhani Express) accident in the year 2002.
- b. The award is presented to a qualified Mining Engineer/ Geologist/ any qualified person for his significant contribution in Information Technology to Mining and Mineral Industries and the nominee should be a Life Member of the MEAI.

**8. MEAI Master Tanay Chadha Memorial Geologist Award** for the year 2023 in recognition of the significant contribution by a geologist in the field of Mineral Exploration, quality control, and production, mine planning, etc. during the year.

**Award Bylaws:**

- a. The award is known as MEAI – Master Tanay Chadha Memorial Geologist Award instituted by Shri G.L.Tandon (Padma Bhushan) in the name of his late grandson (S/o Smt. Sunita Chadha and Shri Sudhanshu Chadha). The award is presented to a geologist with a Master's Degree in Geology/ Applied Geology/ Geophysics with at least five years' experience in Mining and Mineral Industry who had contributed significantly in the areas

of mineral exploration, quality control and production, mine planning, etc.

**9. MEAI- Smt Veena Roonwal Memorial Award** for the year 2023 to a Mining Engineer/Geologist/a qualified person involved with the Mining Industry with 10 years of experience for presenting a paper during the year in a seminar/ symposium workshop organized by MEAI on "Water Management in and around a working mine" or "Implementation of New/Latest Technology in Mining and allied subjects.

**Award Bylaws:**

- a. The Award is known as Smt. Veena Roonwal Memorial Award instituted by Prof. G.S. Roonwal in memory of his late wife and is presented to a qualified Mining Engineer/ Geologist/ any qualified person involved with Mining Industry with 10 years' experience, for presenting a paper during the year in a seminar/ symposium/ work shop/ technical paper meeting organized by MEAI/ MEAI Chapter on "Water Management in and around a working mine or implementation of New/ Latest Technology in mining.

**10. MEAI- Smt Kiran Devi Singhal Memorial Award** for the year 2023 only to a person (MEAI Member/Non-member- need not necessarily be from mining discipline) for his/her contribution in the field of "Development and Conversation of Minerals and Environment" in and around Metalliferous mines (excluding Coal and oil) during the year 2022.

**Award Bylaws:**

- a. The award is known as MEAI - Smt. Kiran Devi Singhal Memorial Award instituted by Dr. Suresh C. Singhal in memory of his late mother.
- b. The award is presented to a member or non-member of MEAI for his/ her outstanding contribution in the field of "Development and Conservation of Minerals and Environment in and around metalliferous mines.

**11. MEAI Award to a best paper on Mining published in the Mining Engineers' Journal in the financial year 2022-23 Instituted by Dr. M.L. Jhanwar**

**Award Bylaws:**

- a. *The Award will be known as Eco-friendly Mining Award.*
- b. *The award consists of a Plaque/Medal and a Certificate. The cost of the Award will be met from the interest received on the donation of Rs. 1 lakh from Dr. M.L. Jhanwar.*

- c. *The Award will be given to a person for contributing the best paper on Eco-friendly Mining in Mining Engineers' Journal published by MEAI.*
- d. *The Award is presented to a member or non-member of MEAI.*

The paper should not have been published in any of the journals in Magazines India/ Abroad other than MEJ on Eco-friendly Mining.

**12. MEAI-SCCL Coal Award** for the year 2023 to a Mining Engineer, a Geologist, a Mechanical Engineer and a Foreman/Over man for meritorious contribution to the Coal Industry.

**Award Bylaws:**

- a. The Awards are known as MEAI- SCCL Coal Awards instituted by M/s SCCL Ltd.
- b. The Awards are presented to a Mining Engineer, Geologist, Mechanical Engineer, Overman/ Foreman

**MEAI Award Format**

- 1. Name of the Award Applied for :
- 2. Name of the Applicant :
- 3. Date of Birth :
- 4. Academic Qualification :
- 5. Professional Qualification :
- 6. Whether a Member/  
Life Member of MEAI
- 7. Specific details of the  
award applied for as per  
requirement of bylaws  
(Enclose relevant documents)

Date:

Certify that the information/details submitted for the above Award are true to the best of my knowledge

Name:

Signature:

Enclosed copies of documents on experience and achievements.

- i.
- ii.
- iii.

or any qualified person involved in Coal Mining Industry for the meritorious services rendered by him/ her to the coal industry or papers published.

❖ **For detailed guidelines please visit the website [www.meai.org](http://www.meai.org) and the memorandum of association and rules and regulations (as on 26.08.2022)**

**Applications and Guide Lines**

The application shall be forwarded/sent to Secretary General MEAI NHQ in Prescribed Format (Copy Enclosed) at Hyderabad before **30<sup>th</sup> April 2024**. (MEAI NHQ Address: Mining Engineers' Association of India, F-608&609, VI Floor, Raghava Ratna Towers 'A' Block, Chirag Ali Lane, Abids, Hyderabad – 500001. Mob – 7780117320).

Applications are to be sent along with enclosed soft copies in PDF format with the subject.

**MEAI Awards 2024 to email - [meai1957@gmail.com](mailto:meai1957@gmail.com)**





(Continued from Page 13)

from the prior year, customs data showed on Friday, boosted by competitive prices and growing overseas demand from electric vehicle makers and other high-tech sectors.

The world's largest producer of rare earths shipped 52,307 metric tons of the minerals abroad last year, the highest since 2018, data from the General Administration of Customs showed.

Demand for rare earths picked up in line with the rapid development of new energy vehicles, wind power and inverter air conditioners, analysts said. The minerals are also used widely in lasers, military equipment and consumer electronics.

China has been engaged in an escalating battle over control of critical minerals and last year introduced restrictions on exports of germanium, gallium and some graphite products, which are used in semiconductors and electric vehicle batteries.

That fanned fears that rare earths might be the next target, spurring a rush of buying.

Europe and the United States are trying to wean themselves from dependence on rare earths from China, which accounts for nearly 90% of global refined output.

The increase in demand, however, lagged a rise in supply, weighing on prices for much of last year, although fears of supply disruptions stoked by a mining suspension in Myanmar pushed prices to a 20-month high last September.

China has set its 2023 rare earth mining quota at 255,000 metric tons and the annual smelting and separation quota at 243,850 tons, both up more than 20% from the year before.

The spot price for praseodymium neodymium oxide at the end of last year was down 34% from a year earlier, at 457,500 yuan a ton, data from consultancy Shanghai Metals Market (SMM) showed.

China's exports of the 17 minerals classified as rare earths fell 18.2% in December from the previous month, to 3,439 tons, the customs data showed. That was down 20% from December 2022.

China's imports of rare earths last month were up 45% on the year at 16,381 tons, while the 2023 total climbed 44.8% from a year earlier to 175,853 tons.

*Reuters | January 12, 2024*

## JOBS OPENINGS

1. **Second Class Mines Manager**
2. **Mine Foreman**

**Location: At a Site in Central India**

Join our reputable mining company, who's a leader in the Manganese Mining industry. We are looking for skilled and experienced individuals to lead our mining operations in their designated capacities, to new heights.

If you have a proven track record of safety leadership, extensive knowledge of underground metal mining processes, and excellent communication skills, we want to hear from you.

### 1. **Second Class Mines Manager**

We are seeking a highly skilled Second Class Manager with a minimum of 10 years of experience and a Second Class Manager's Certificate of Competency (unrestricted-Metal).

Ideally, candidates should have a minimum of 3 years of experience as an Assistant or Underground Manager.

### 2. **Mine Foreman**

We are seeking a Mine Foreman with a minimum of 10 years of experience with Foreman's Certificate of Competency (unrestricted-Metal).

### **Key Requirements for above posts**

- Minimum of 10 years of experience in mining operations
- Proven track record of safety leadership and adherence to safety protocols
- In-depth knowledge of underground metal mining processes, equipment, and technologies
- Strong leadership and communication skills
- Ability to coordinate and manage mining activities efficiently
- Knowledge of relevant regulations and compliance standards
- A commitment to fostering a positive and productive work environment

### **Interested professionals may Contact**

Email: [sanjay.singh@krishnaping.in](mailto:sanjay.singh@krishnaping.in),  
Mob: +91-09923596074

# CONFERENCES, SEMINARS, WORKSHOPS ETC.

## INDIA

**16-17 Feb 2024:** National conference on “**Advanced iron ore beneficiation & Sustainable low-grade utilization**”. Organized by MEAI Hyderabad Chapter & NMDC Limited at Hyderabad, Telangana, India. For details contact: meai1957@gmail.com or sinhask@nmdc.co.in. Website: www.meai.org

## ABROAD

**8-9 Feb 2024:** **International Conference on Web Mining, Information and Knowledge Extraction (ICWMIKE 2024)**. Lisbon, Portugal. Website URL: <https://waset.org/web-mining-information-and-knowledge-extraction-conference-in-february-2024-in-lisbon>; Contact URL: <https://waset.org>

**18-19 Feb 2024:** **International Conference on Bauxite Mining and Alumina Refining ICBMAR 2024**. Jeddah, Saudi Arabia. Website URL: <https://waset.org/bauxite-mining-and-alumina-refining-conference-in-february-2024-in-jeddah>

**4-5 Mar 2024:** **Carbon Capture Summit 2024**. Dubai 12345, United Arab Emirates. Web site: <https://www.middleeast.carbon-capture-conference.com/booking>

**4-5 Mar 2024:** **International Conference on Mining Intelligence ICMI 2024**. Rio de Janeiro, Brazil. Website URL: <https://waset.org/mining-intelligence-conference-in-march-2024-in-rio-de-janeiro>

**4-8 Mar 2024:** **The 17<sup>th</sup> ACM International Conference on Web Search and Data Mining (WSDM)**. Event Location: Mérida, Yucatán. Contact [wsdm-2024-general-chairs@googlegroups.com](mailto:wsdm-2024-general-chairs@googlegroups.com)

**10-13 Mar 2024:** **EnviroTech Lisbon, 2024 - cement conference**. Hotel Cascai Miragem Health & Spa, Av. Marginal 8554, 2754-536 Cascais, Lisbon, Portugal. Contact details: 15 South Street, Farnham, Surrey, GU9 7QU, United Kingdom, Tel: +44 (0)1252 718 999, Email: [enquiries@globalminingreview.com](mailto:enquiries@globalminingreview.com)

**11-12 Mar 2024:** **Australia Carbon Capture Summit 2024**. Perth, Western Australia 6000. Website: <https://www.australia.carbon-capture-conference.com/booking>

**17-18 Apr 2024:** **Deep Sea Mining Summit**. London, UK, London, WC1 United Kingdom. Website: <https://www.deepsea-mining-summit.com/index>

**22-23 Apr 2024:** **International Conference on Recent Developments in Mining Technologies ICRDMT 2024**. London, United Kingdom. Website URL: <https://waset.org/recent-developments-in-mining-technologies-conference-in-april-2024-in-london>

**23-25 Apr 2024:** **Exhibition Mining World Russia**. 28<sup>th</sup> exhibition of machines and equipment for mining, processing and transportation of minerals. Moscow, Crocus Expo, pavilion For details contact: Ms. Natalia Medvedeva, Portfolio Director, ITE Group, Email: [natalia.medvedeva@ite.group](mailto:natalia.medvedeva@ite.group). Web link: <https://miningworld.ru/en/media/news/2023/august/17/equipment-for-mining-industry-in-russia>.

**7-8 May 2024:** **International Mining Geology Conference 2024 (IMG 2024)**. Perth Convention and Exhibition Centre, Perth, Australia. For details contact [conference@ausimm.com](mailto:conference@ausimm.com)

**17-18 May 2024:** **International Conference on Surface Mining and Land Reclamation ICSMLR 2024**. Sydney, Australia. Website URL: <https://waset.org/surface-mining-and-land-reclamation-conference-in-may-2024-in-sydney>

**21-23 May 2024:** **Discoveries 2024 Mining Conference**. Mazatlan International Center, Av. del Delfin 6303, Marina Mazatlán, 82103 Mazatlán, Sinaloa, Mexico. Website <https://www.discoveriesconference.com/>

**17-19 Jun 2024:** **Molten 2024**. Brisbane, Australia and Online. Contact AusIMM. T: 1800 657 985 or +61 3 9658 6100 (if overseas)

**18-19 Jun 2024:** **Direct Lithium Extraction Summit 2024**. Denham Grove Hotel, Tilehouse Ln, Denham, Uxbridge, UB9 5DG United Kingdom. Website: <http://energy.apexevents.cn/>

**22-23 Jul 2024:** **International Conference on Green Coal Mining Techniques and Waste Disposal ICGCMTWD 2024**. Berlin, Germany. Website URL: <https://waset.org/green-coal-mining-techniques-and-waste-disposal-conference-in-july-2024-in-berlin>

**11-15 Aug 2024:** **International Mine Ventilation Congress 2024**. The heartbeat of mining, Sydney, Australia. For details contact [conference@ausimm.com](mailto:conference@ausimm.com).

**16-17 Aug 2024:** **International Conference on Mine Mechanization and Mining Policies ICMMMP 2024**. Tokyo, Japan. Website URL: <https://waset.org/mine-mechanization-and-mining-policies-conference-in-august-2024-in-tokyo>

**29-31 Aug 2024:** **International Conference on Graphene and 2D Materials**. Valencia, Spain. Website: <https://www.pagesconferences.com/2024/graphene-materials>

**7-8 Oct 2024:** **International Conference on Design Methods in Underground Mining ICDMUM 2024**. New York, United States. Website URL: <https://waset.org/design-methods-in-underground-mining-conference-in-october-2024-in-new-york>

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MINING • STEEL • POWER



With Best Compliments  
From

**R. PRAVEEN CHANDRA**  
(Mine Owner and Entrepreneur)



**ERM GROUP COMPANIES:**

- E. Ramamurthy Minerals & Metals Pvt. Limited
- Prakash Sponge Iron & Power Pvt. Limited
- Benaka Minerals Trading Pvt. Limited
- Codeland Infosolutions Pvt. Limited



**Corporate Office:**

ERM HOUSE, #4006,  
K R Road, BSK 2nd Stage,  
Bengaluru - 560 070.

Email: [mail@ermgroup.in](mailto:mail@ermgroup.in)  
Tel: +91 80266 55930  
+91 80690 13370



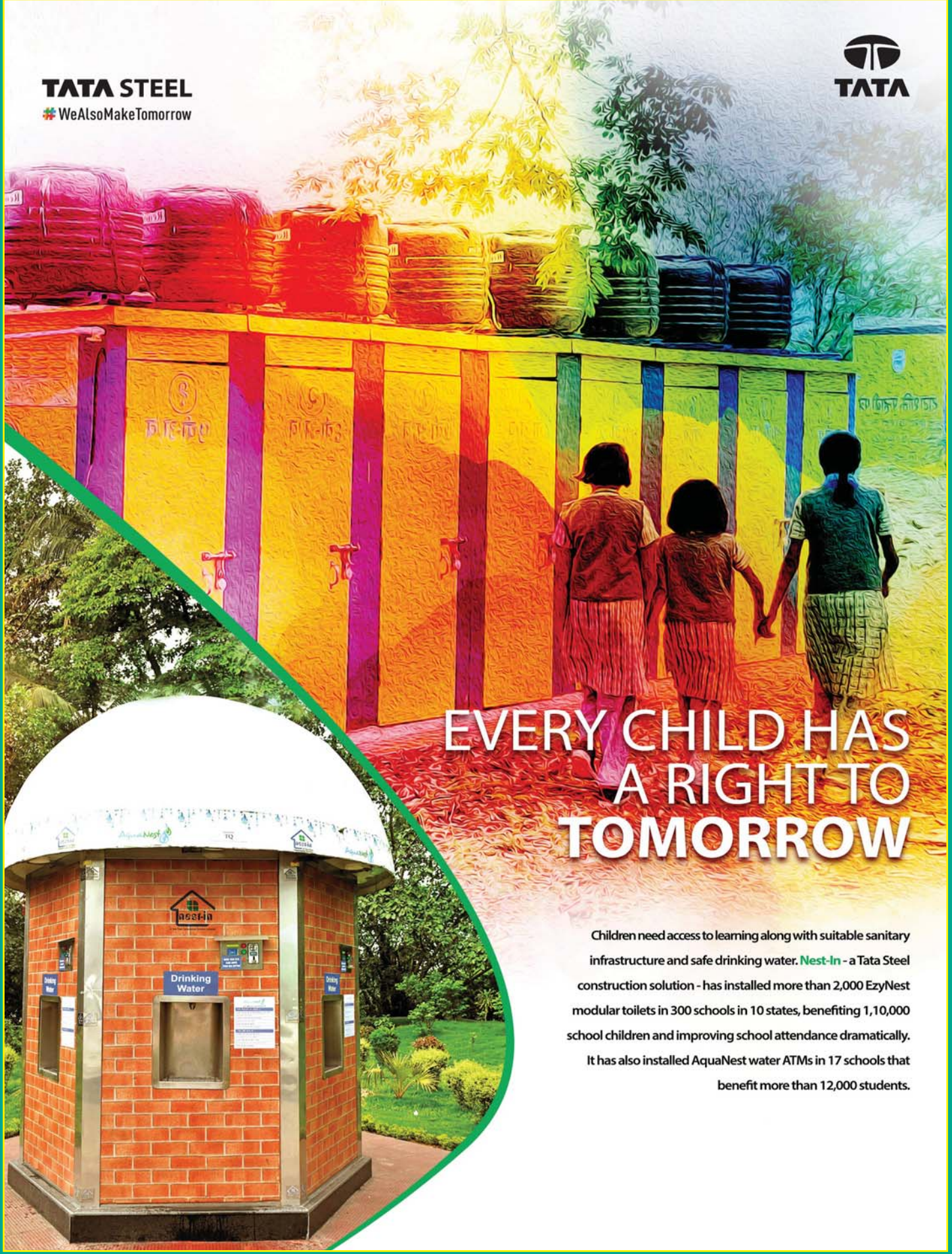
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[www.ermgroup.in](http://www.ermgroup.in) | [www.turbosteel.in](http://www.turbosteel.in)

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**TATA STEEL**  
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# EVERY CHILD HAS A RIGHT TO TOMORROW

Children need access to learning along with suitable sanitary infrastructure and safe drinking water. **Nest-In** - a Tata Steel construction solution - has installed more than 2,000 EzyNest modular toilets in 300 schools in 10 states, benefiting 1,10,000 school children and improving school attendance dramatically. It has also installed AquaNest water ATMs in 17 schools that benefit more than 12,000 students.