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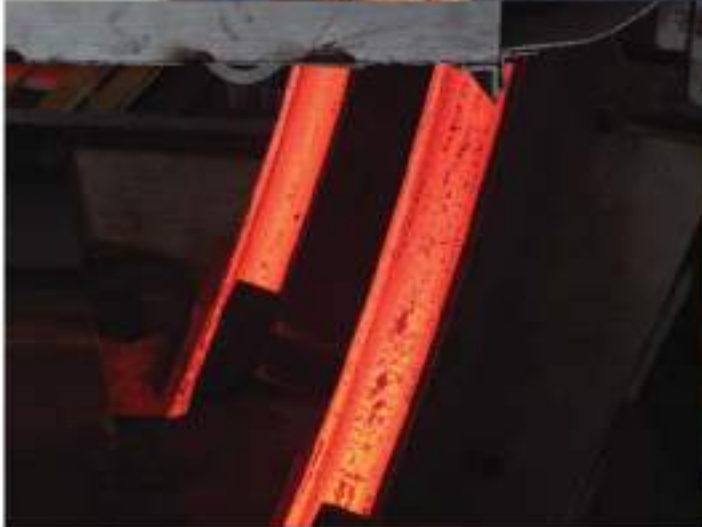## this issue contains...

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President's Message......

Dear members..

In the September issue of MEJ we discussed in detail about the Supreme Court's judgement dated 25th July 2024 enabling States to collect Royalty on the minerals and levy tax on the mineral bearing land. The Central Government has recently sought SC's review of the order arguing that the issue raised by it pertains to fundamental rights of the citizens of the country and raises a larger issue of public interest. The financial implication on public sector undertakings without interest has been estimated to be Rs. 70,000 Crore. This jumps to 1.5 lac Crore if the arrears due from 2005 to be realized from private sector industries are included. The matter is still pending in the Court. Let's hope for the best.

Meanwhile, as suggested by me in the September issue, The VP-I and the Chairman of the Conferences Committee has already started working out for Panel discussions on the issue during the next Council meeting scheduled at Hutti on 9th November. Let us hope for some fruitful outcome which may help us in making a strong representation to the competent authorities.

India's first ever all women Mine Rescue team from Hindustan Zinc Ltd. has recently won 2nd position at the XIII International Mine Rescue Competition in Colombia. Our women of valor are a powerful testament to the strength and leadership of women in the mining sector. It's a matter of great pleasure and pride for all of us. Let's honour the entire team in a befitting manner during the next council meeting. We can even think of offering the team members "Honorary membership of the Association", in recognition of their achievement.

During the last Council meeting the only women Council member, Ms Gunjan Pande, Secretary Ahmedabad Chapter suggested inducting more women members in the Council. The suggestion was appreciated by all members present. In this connection, I suggest that while electing the next Council for the term 2025-27, let each Chapter which nominates more than one Council members, may nominate one woman candidate. If needed the Council may pass a resolution to this effect. Similarly, Chapters may resolve to have at least one-woman office bearer or Committee member in their next Executive Committees.

By the time this MEJ issue reaches your hand the great Hindu festival of Navratri will commence. It is a time for spiritual renewal and cleansing and to pray to the Divine Mother for inner strength and skill to overcome their own problems. It is celebrated differently in different regions of the country. I wish all members a very happy and prosperous Navratri.

S.N. Mathur
President

Mining Engineers' Association of India

Regd. Office : Rungta House, Barbil (Odisha)

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2	Aarvee Associates, Architects, Engineers & Consultants Pvt. Ltd.	(LIM-49)	46	Panduronga - Timblo Industries	(LIM-56)
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7	Associated Soapstone Distributing Co.(P)Ltd.	(LIM-57)	51	Rajasthan State Mines & Minerals	(LIM-53)
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39	My Home Industries Limited	(LIM-70)	83	Veerabhadrappa Sangappa & Company	(LIM-44)
40	Mysore Minerals Limited	(LIM-45)	84	VS Lad & Sons	(LIM-38)
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EDITOR'S DESK

Dr. P.V. Rao
Editor, MEJ

The recent Supreme Court ruling, allowing Indian states to impose taxes on mineral-bearing lands, will have far-reaching impacts on mining companies operating in India. This decision, which applies retrospectively from April 1, 2005, has sent shockwaves through the mining industry and is expected to result in substantial financial liabilities for public and private sector mining entities.

The immediate and tangible effect of this ruling is the massive financial burden it places on mining companies. Industry estimates suggest that the total arrears could range between Rs 1.5 to 2 lakh crore. Public sector entities alone may face liabilities of Rs 70,000-80,000 crore. For instance, Coal India, the state-owned coal mining giant, expects demands of around Rs 35,000 crore and Private company Tata Steel faces a potential liability of Rs 17,347 crore. While the Supreme Court has provided some relief by allowing these arrears to be paid in installments over 12 years starting from April 1, 2026, and waiving interest and penalties, the financial impact remains substantial. For many companies, these liabilities represent a significant portion of their net worth, which could severely strain their finances and impact their ability to fund expansions and modernization efforts.

The additional tax burden is likely to impact the profitability and financial strength of mining companies. This could affect their ability to invest in new technologies, expand operations, or undertake modernization projects. In an industry where capital expenditure is crucial for maintaining competitiveness, this financial strain could have long-term implications for the sector's growth and efficiency. Moreover, the Indian mining sector already faces one of the highest tax rates globally. This additional taxation could further erode its international competitiveness, potentially making Indian minerals less attractive in the global market and impacting export revenues.

The impact of this ruling is expected to vary across different minerals and sectors. Coal and iron ore miners are likely to be more severely affected than limestone miners, as state revenue collections from limestone are significantly lower. However, even for limestone, the additional taxes will likely increase raw material costs for cement companies, potentially impacting their profit margins. For coal mining companies like Coal India, there's a silver lining in that they can pass on 80-85% of the additional costs to customers through fuel supply agreements. However, this cost pass-through could lead to increased prices for downstream industries like power generation and steel production, potentially triggering inflationary pressures in the broader economy. The ruling has significant implications for the power sector as well. Power generation companies are expected to invoke "change in law" provisions in power purchase agreements to pass on increased costs from coal companies to consumers. This could lead to higher electricity tariffs, affecting industrial and residential consumers. However, this cost pass-through is likely to face challenges from utilities, potentially leading to further litigation.

While the ruling primarily addresses taxation, it could have indirect environmental and social impacts. Increased state revenues from mining could potentially lead to more aggressive mineral extraction, raising concerns about environmental sustainability. Conversely, the additional financial burden on mining companies could limit their ability to invest in environmental protection measures or community development initiatives.

The Supreme Court ruling is expected to trigger a wave of litigations as companies explore legal options to mitigate their liabilities. While the judgment settles a point of law, it does not directly crystallize the liability of individual mining companies. Demands raised by states under different laws could be further litigated based on merits on a case-by-case basis. This situation creates a complex and potentially protracted legal landscape, with companies likely to challenge specific state demands, calculation methodologies, and the retrospective application of taxes. The mining sector may face a period of regulatory uncertainty as these legal challenges play out.

In response to this challenging situation, mining companies are likely to adopt various strategies to mitigate the impact viz. a) Financial planning b) Cost optimization c) Legal recourse d) Stakeholder engagement e) Industry collaboration, etc.

The Supreme Court's ruling on mineral land taxation represents a significant shift in India's mining landscape. While it strengthens the fiscal powers of mineral-rich states, it poses substantial challenges for mining companies. The financial impact, coupled with potential operational and competitive challenges, could reshape the industry's dynamics in the coming years. As the sector grapples with these changes, it will be crucial for companies, policymakers, and regulators to work together to ensure a balanced approach that supports both state revenues and the long-term sustainability of India's mining industry. The coming years will likely see intense legal activity, policy discussions, and strategic realignments as the industry adapts to this new reality.

- Editor

NEWS FROM THE MINERAL WORLD

➡ Gold mine discovered in Odisha; survey underway to explore more

A gold mine has been discovered in Odisha and inspections are underway to explore more gold deposits, informed Steel & Mines Minister Bibhuti Bhushan Jena today.

A gold mine has been discovered in Odisha and inspections are underway to explore more gold deposits, informed Steel & Mines Minister Bibhuti Bhushan Jena today. The presence of a gold mine was traced while the Geological Survey of India (GSI) was carrying out a G2 level inspection for copper ore at Adasa-Ramapalli area in Deogarh district, said the Minister in a reply to Jeypore MLA Tara Prasad Bahinipati in the House.

According to reports, an estimated 1,685 kg of gold ore has been detected by the GSI experts along with copper in the Adasa area. Answering the question, Jena said that the government is preparing a plan to auction the gold mine block. Moreover, the G2 level re-inspection program has been underway jointly by the GSI, Directorate of Mines and Geology since 2021-22 based on a primary survey report to trace gold deposits at Gopur-Gajipur area in Keonjhar district in 1981-83 and 1989-96.

The geologists had detected one gram of gold per tonne of ore in two quartz veins in the Telkoi tehsil area during a survey in 1989-96. However, the state government has no plan for excavation as the standard and quantity of the gold mine is yet to be fixed, Jena said. Further, the survey is underway at G4 and G3 levels by Odisha Mining Corporation (OMC) to trace the presence of gold mines at Mankadachuan in Angul district, Saleikana, and Dimirimunda in Keonjhar district.

The Directorate of Mines and Geology and GSI are also conducting a primary survey to find gold deposits at Jashipur, Suriagoda, Ruansi, Idelkucha, Marudihi, Sulaipat, Badampahar in Mayurbhanj district. This apart, gold deposits are likely at several places in Sundargarh, Nabarngpur, Angul, Koraput, Malkangiri, Sambalpur and Boudh districts. However, the survey is yet to be conducted to explore gold mines there.

Currently, the state government has no plan to set up a processing unit by extracting gold from ores, the Minister stated.

Chinmayee Dash, Sambad | Aug 2024

➡ Telangana: Govt to conduct e-auction for limestone mining bidding process

Two months ago, the central government had written to the State to auction 11 limestone blocks in the State in the first phase.

Hyderabad: The Department of Mines and Geology has reportedly decided to conduct e-auction for the selection of lessees in limestone mining, one of the heavy minerals.

Two months ago, the central government had written to the State to auction 11 limestone blocks in the State in the first phase. A deadline was set for some of them to be auctioned by June 30 by the centre and even a warning was issued that if the State fails to do so it would conduct the auction themselves.

The State government responded immediately and asked the centre for some time. After receiving permission from Chief Minister A Revanth Reddy, the Department of Mines started the tender process for the lease of three blocks on Friday.

According to officials, all the three limestone blocks to be auctioned were spread over approximately 446 hectares of forest area in different parts of Suryapet district. The mines are reportedly situated in Saidulanama, Sultanpur, and Pusupulabodu in Suryapet district.

It has already been found that there are 193.76 lakh tonnes of limestone deposits in these blocks, which are of sufficient quality to be used for cement production.

Until now in the State, those who had applied earlier were given first priority in allotment of mines, however, the new auction system was likely to increase the competition among the companies, the officials said, adding that the new initiative would generate more revenue for the government in the form of royalty. A pre-bid meeting would be held on September 24 for e-auction, the officials added.

According to the official, the State government had decided to auction nine more mines in addition to those mentioned by the Centre. In a recent letter, the Central Mines Department had asked the State government to expedite the auctioning process of 11 mines notified in the State. These blocks consist of five iron ore mines, five limestone blocks and one manganese block.

Telangana Today | 31 August 2024

➠ ➔ **India's OVL, OIL, Kabil join hands with UAE's IRH in critical mineral hunt**

India's largest international oil and gas exploration company, ONGC Videsh Ltd (OVL), along with Oil India Ltd (OIL) and Khanij Bidesh India (Kabil), signed a memorandum of understanding (MoU) on Tuesday with United Arab Emirates-based International Resources Holding RSC Ltd (IRH), according to a statement from Oil and Natural Gas Corp. Ltd (ONGC).

The partnership aims to collaborate on the acquisition and development of critical mineral projects globally.

The MoU focuses on identifying, acquiring, and developing critical mineral projects worldwide, including within India. This initiative comes at a time when China has secured a dominant position in the critical minerals ecosystem.

India's collaboration efforts align with its recently launched Critical Minerals Mission, which aims to boost domestic production, recycling, and overseas acquisition of these essential resources.

In June 2023, the mines ministry published a list of 30 minerals deemed critical to India's economy. These include antimony, beryllium, bismuth, cadmium, cobalt, copper, gallium, germanium, graphite, hafnium, indium, lithium, molybdenum, niobium, nickel, PGE, phosphorus, potash, rare earth elements (REE), rhenium, selenium, silicon, strontium, tantalum, tellurium, tin, titanium, tungsten, vanadium, and zirconium. The rare earth elements listed include neodymium, praseodymium, dysprosium, europium, yttrium, and terbium.

All Indian companies involved are state-run enterprises. OVL, a subsidiary of India's largest oil producer Oil and Natural Gas Corp. Ltd (ONGC), is joined by Kabil, a joint venture created in 2019 by National Aluminium Co. Ltd (NALCO), Hindustan Copper Ltd (HCL), and Mineral Exploration Co. Ltd (MECL). Kabil was established to identify and secure international critical mineral assets to enhance India's mineral security.

The MoU outlines plans for project identification, joint due diligence, risk management, and the development of a long-term offtake strategy to establish a critical mineral supply chain, according to the statement.

This agreement is especially important as critical minerals like lithium, cobalt, and molybdenum play a pivotal role in manufacturing energy storage systems and stabilizing advanced battery cells. These minerals are also crucial for the renewable energy sector, being integral to technologies such as electric vehicles and wind turbines.

The MoU is part of a broader strategy by the Indian government to secure critical minerals for its ambition to achieve net-zero carbon emissions by 2070. For instance, India signed a similar agreement with Australia in 2020 to collaborate on the mining and processing of critical minerals. That agreement was renewed in 2022.

India is also engaging with countries rich in these minerals, including Australia and several Latin American nations.

"So far, engagements are underway with select source countries such as Australia, Argentina, Bolivia, Chile etc. which are endowed with the cited critical and strategic minerals specifically lithium and cobalt in hard rock formations as in Australia and Lithium as brine in the huge tract of SALARs as in Latin American countries," a 2022 government press release had said.

IRH, a subsidiary of International Holding Co. (IHC), holds stakes in various significant mining assets. Earlier this year, IRH attempted to purchase a majority stake in Zambia's Konkola Copper Mine, currently owned by Indian billionaire Anil Agarwal's Vedanta. However, IRH withdrew from its billion-dollar bid in July.

Manas Pimpalkhare, Mint | Sep 2024

➠ ➔ **India set to kick off its first offshore mineral auction: Mines Secretary**

He encouraged the industry to study the exploration reports of these blocks and bring in interested domestic and international players.

India is set to kick off its first-ever offshore minerals auction shortly, with 10 blocks up for grabs, Mines Secretary VL Kantha Rao said on Wednesday.

"We are ready with 10 blocks on both the east and west coasts of India. These blocks will include sand, lime mud, and polymetallic nodules," Rao said during the Federation of Indian Mineral Industries (FIMI) event.

He encouraged the industry to study the exploration reports of these blocks and bring in interested domestic and international players.

The Geological Survey of India (GSI) has identified polymetallic nodules, also known as manganese nodules, along with sand and gravel in offshore areas. Polymetallic nodules primarily contain iron, manganese, nickel, copper, and cobalt.

Moreover, offshore regions serve as reservoirs of sand and gravel, crucial for construction, beach nourishment, and land reclamation projects. Additionally, rare earth elements have also been discovered beneath the sea.

Offshore minerals are found in all three large bodies of water, the Indian Ocean, Arabian Sea, and Bay of Bengal, that surround the Indian peninsula.

Embarking on its offshore expedition, India is poised to explore its vast exclusive economic zone (EEZ), covering around 2.37 million square kilometres (915,057 square miles). This zone stretches 200 nautical miles (370.4 kilometres) from the baseline of India's territorial waters.

As India ventures into offshore mining, the nation's obvious geological potential (OGP) is anticipated to expand beyond its existing 6.88 lakh square kilometre notably.

Critical mineral exploration

The mines secretary also provided updates on the ongoing exploration of critical minerals by Khanij Bidesh India Ltd (KABIL), a joint venture of three public-sector undertakings -- National Aluminium Company, Hindustan Copper, and Mineral Exploration Company.

In Argentina, KABIL has started non-invasive exploration on three of the five blocks allocated to it.

"Within two years, KABIL will complete non-invasive exploration, after which they will seek drilling licences," Rao said. Mining activities in Argentina are expected to commence in about two years. India in January signed an agreement to acquire five lithium mines in Argentina.

KABIL has established a presence in Argentina and Australia and is actively negotiating with several countries abundant in critical minerals, such as Bolivia and Chile. It is likely to establish its presence in Zambia too.

Consulting firm E&Y has submitted exploration reports on critical minerals in Australia, which are currently under review by the government.

Coal India Limited (CIL) is also conducting exploration of critical minerals, including lithium, copper, and nickel in Chile.

Domestic exploration

On the domestic front, Rao highlighted that several public sector undertakings (PSUs) and private firms are actively involved in exploration efforts.

"Hindustan Zinc, Tata, and PSUs like NTPC are either engaging or setting up their own exploration units," he added.

The launch of offshore mineral auctions and intensified exploration efforts align with India's push for securing critical minerals and supporting its growing industrial and energy demands.

Nitin Kumar New Delhi, BS | Sep 18 2024

➡ **Coal India eyeing Argentina, Chile for critical minerals**

Lithium mine on the Salinas Grandes salt flat Jujuy province, Argentina. (Image by Earthwork, Flickr.)

State-run Coal India is scouting for critical minerals in Argentina and is in talks with officials in Chile for lithium, India's federal mines secretary V. L. Kantha Rao said on Wednesday.

India has been exploring ways to secure supplies of lithium, a critical raw material used to make electric vehicle batteries.

Prime Minister Narendra Modi's government last year listed 30 minerals, including lithium, nickel, titanium, vanadium and tungsten, as critical to drive the adoption of clean energy.

"Coal India and some other companies are looking at Argentina," Rao told reporters on the sidelines of an industry conference.

In June, *Reuters* reported that Coal India was exploring lithium blocks in Argentina along with a US company to secure supplies of the battery material as part of India's efforts under the US-led Minerals Security Partnership (MSP).

India, among the world's top greenhouse gas emitters, has been pursuing overseas pacts to secure key minerals in resource-rich countries such as Australia, Argentina and Chile.

India's state-owned firm Khanij Bidesh India Ltd (KABIL) is pursuing leads in Australia for critical minerals, Rao said, adding that KABIL had also secured permission for "non-invasive" exploration in Argentina.

"KABIL has got five blocks and for three blocks, they have permission to do non-invasive exploration," he said.

In January KABIL signed a $24 million lithium exploration pact for five blocks in Argentina.

Reuters | September 18, 2024

Global mining and metals – a quick reality check

A new report by McKinsey's energy and materials practice outlines a global mining and metals industry emerging from a few years of boom and bust and price fluctuations the consulting firm calls unprecedented in scale.

Nevertheless, says McKinsey, the industry is in healthier financial shape compared to historical averages.

From 2000 to 2023, metals and mining revenues grew by $1.7 trillion, a jump of roughly 75% and affording the industry a 70% slice of the overall materials business which also includes plastics, pulp, and building materials. As a whole, materials represent some 7% of the global GDP.

Profits in the industry have also been robust with mining, refining and metal fabrication EBITDA nearly doubling over the almost quarter century going from $500 billion to $900 billion.

Moreover, Mckinsey points out, mining and metal companies' debt burden has decreased with net debt over EBITDA ratios of 1.3 times, well below the through-cycle average of 1.8 times.

"However, 2024 has already proven to be a more challenging year for the industry as overall economic growth slows down and the shift toward low-carbon technologies unfolds more slowly than expected, both of which are putting downward pressure on price levels, especially for battery materials, such as nickel and lithium," McKinsey says.
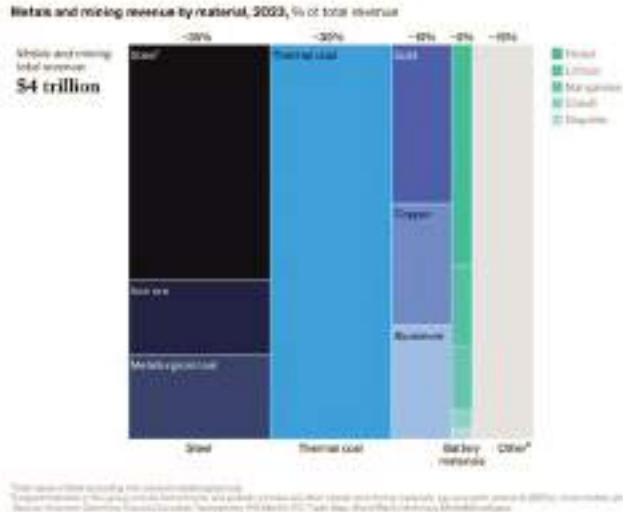
Source: McKinsey's Global Energy & Materials Practice – Global Materials Perspective 2024

Not only are battery and other metals associated with decarbonisation facing headwinds, the sector – even when lumping in bellwether copper – hardly makes up 15% of global metals and mining revenues. Until such time the copper price reaches the levels predicted by more outlandish scenarios, the share is not likely to grow much.

For instance, the market size of rare earths mining, and metal and alloy production (included in the other section of the graph) which is used in defence applications and many energy transition applications including wind turbines and motors for electric vehicles, is below $20 billion.

Thermal coal and steel account for around 60%–70% of revenues and production volumes of 7 billion tonnes and 2 billion tonnes respectively are more than 30 times higher than all other metals and minerals combined. Output by the largest among the latter, aluminum, at roughly 100 million tonnes, does not make much of a dent in the overall total.

The bulk of mining and metals activity and revenues remains subjected to the ups and downs of the global economy, particularly the outlook for China where the signs are not great.

While the green energy transition may rightfully represent a new dawn for mining, it's still very early in the morning.

Frik Els, Mining.com | September 19, 2024

SAFETY DATA ANALYTICS APPLICATIONS IN THE MINING INDUSTRY

C.K. Ala[1], D.P. Tripathy[2]

Abstract

Despite comprehensive safety measures and regulations, accidents persist in all hazardous industries, especially mining. Due to complex working conditions, hazards related to slope failure, dumper collisions, inundation, roof falls, side falls, blasting, electricity, and movable and non-movable machinery are inevitable in the mining industry. They need to be properly mitigated. This article explores the application of safety data analytics within the mining industry to enhance workplace safety. It examines the mine hazards, outlines the methodology of safety data analytics, and explores its diverse applications, including descriptive, diagnostic, predictive, and prescriptive analytics. It also illustrates the potential benefits of these analytics techniques in reducing accidents and improving overall safety in mining operations. The application of data analytics in the Indian mining industry is limited due to a lack of available safety data related to mines. The utilization of a set of technologies like IoT, Big data, and data science can improve the working conditions in Indian mines also.

Keywords: *Safety, mining, hazard, descriptive analytics, predictive analytics*

1. INTRODUCTION

Safety in a workplace is a very basic requirement for all kinds of industries but often neglected either intentionally or unintentionally. Especially, in hazardous industries like the mining industry, safety is of paramount importance. The most fundamental reason for prioritizing workplace safety is the well-being of individuals working in the mining industry. Mining operations often expose workers to various risks, including physical hazards, chemical exposure etc., and may result in accidents. Ensuring safety measures are in place helps prevent injuries and fatalities. The other reasons are to ensure legal compliance, save medical and compensation costs, enhance productivity and efficiency, improve the reputation of the organization, and boost employee morale.

Over the years, safety in the mining industry worldwide has improved significantly through framing new legislative statutes and updating them as per the requirement, adopting relevant technology, providing training and re-training to the workers, incorporating practical occupational safety management measures in policies, promoting occupational safety and preventive culture [1]. Most of the mining organizations around the globe have included the 'Zero Accident Plan' in their policy. However, the analysis of accident statistics of USA mines as represented in Figure 1 revealed that a large number of accidents are still occurring in the mines, despite the various safety measures adopted and followed.

The mine work environment is an Employee-Equipment-Environment system, which is not always favourable to the safer completion of the assignment because of the inherent hazards present [3]. Because of the dynamic working conditions in both opencast and underground mines, complete elimination of hazards and their associated risks is not possible. Nevertheless, safety management approaches can be used for managing and regulating the hazards present in the workplace. Over the last few decades, Australia, New Zealand, Canada, the UK, the USA, South Africa, and India have made conducting risk assessment and management mandatory for mines. In India, Regulation 104 of Coal Mines Regulation, 2017 [4] directs all coal mine owners, agents, and managers to prepare a "Safety Management Plan" that includes identifying the hazards, assessing the risks, recording the risks, and eliminating or mitigating the recorded risks.

Figure 1. *Fatal accidents in USA mines [2]*

The analysis of fatal accident statistics in Indian coal mines as presented in Figure 2 shows that there is a decreasing trend in the number of accidents occurring after the

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implementation of the Safety Management Plan [5]. Figure 2 also reveals the rise of fatal accidents from 2022 to September 2023. It can be concluded from Figure 2, that fatal accidents are still occurring even after the implementation of Safety Management Plans. The reason for that is the safety management approaches are often reactive in nature and are effective to a certain extent only.

More proactive approaches are required to improve safety conditions in the workplace. In the era of the Fourth Industrial Revolution, the convergence of data analytics and safety management will open new horizons for ensuring the well-being of workers and the sustainability of the mining industry. The application of data analytics for improving safety in the workplace in the mining industry is limited due to the lack of availability or recording of safety data. The availability of cheaper sensors and powerful computers has led to 'big data'. Big data analytics is advancing rapidly as it helps to proactively analyse and predict the future outcomes in the workplace.

Data analytics approaches were applied for safety data in a wide variety of industries. Different safety data analytics were conducted for improving highway traffic safety [6-8]; evaluating the human, environmental, and circumstantial factors contributing to road accidents in Lisbon City [9]; predicting possible crimes in New York City [10]; predicting the need for evacuation after railway incidents [11]. Studying the evolution of wrist, hand, and finger injuries in the US mining industry [12]; evaluation of accidents in the manufacturing industry [13]; process safety and risk management [14]; development of predictive safety management system for the aviation industry [15]; predicting safety risks for railways [16]; and enhancing construction safety [17]. Safety data analytics can also help the mining industry to identify, analyze, and control risks, improve safety performance, and reduce accidents and injuries. Deloitte reported that the mining industry could achieve zero accidents by utilizing artificial intelligence and advanced data analytics [18].
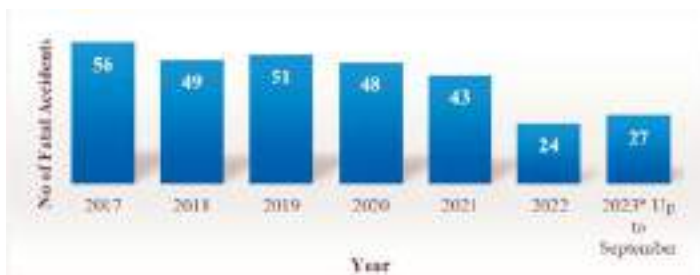

Figure 2. *Fatal accidents in Indian mines*

In the mining industry, where safety is a paramount concern, data analytics can play a critical role in identifying, predicting, and mitigating risks. The integration of data analytics into mining operations can significantly improve safety by

addressing various scenarios like incident and accident analysis, predictive maintenance of the machinery, hazard prediction and prevention, real-time monitoring and alerts, emergency response and recovery, and compliance and regulatory reporting.

2. HAZARDS IN MINES

Hazards are the main identifiable cause of the accidents in workplaces; its control will offer a great chance of reducing injury or accident. Therefore, prior knowledge of the type of hazards present in the workplace is required to evaluate the safety risks effectively. A hazard may originate from different sources and can take many forms. Therefore, it is essential to identify the sources of the hazards and the scenarios in which they may originate.

In a mine i.e. Employee-Equipment-Environment system, possible hazards related to workers, the machinery employed, and inherent environment conditions will be present as shown in Figure 3. The actions of employees will influence the employee and equipment (zone 4); employee and environment (zone 5), self or other employees (1), and combination of employees, equipment, and environment (zone 7). The defect/ malfunction of equipment will affect the employee and equipment (zone 4); equipment and environment (zone 6), equipment (2), and a combination of employees, equipment, and environment (zone 7). The hazardous environmental conditions will affect the employee and environment (zone 5); equipment and environment (zone 6), environment (3), and combination of employees, equipment, and environment (zone 7). At the top of these, organizational safety policies will govern the procedures to be followed, equipment/ tools to be used for completion of the task, and environmental conditions to be maintained in the workplace. Tripathy and Ala have developed a safety hazards database for Indian underground coal mines [19]. Various hazards identified from the different literature are presented in Table 1. Safety data analytics can be instrumental in identifying, understanding, and mitigating these hazards through comprehensive data analysis.

Table 1. Hazards identified from the literature review

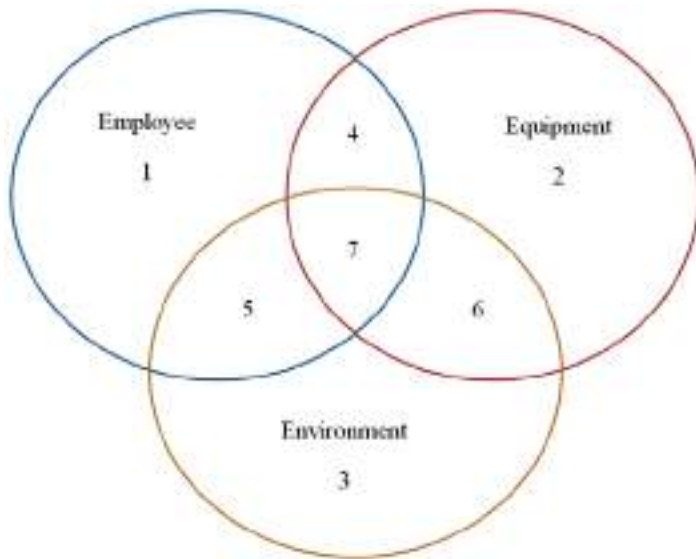| Hazard(s)	References
Ground control - Roof fall and side fall, slope failure	20, 21, 22, 23, 24, 25
Haulage, Conveyor, Machinery	20, 21, 22,23, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
Explosives/blasting	22, 26, 27, 29, 30
Electricity	22, 23, 28, 29, 33
Dust, gas and other combustible materials	22, 23, 28, 29, 30, 33, 37, 38, 39
Fall of persons	21, 29
Inundation	22, 23, 28, 29, 30, 33, 37

Figure 3. *Possible hazards in Employee-Equipment-Environment system*

The scenario of a hazard leading to a mishap is represented in Figure 4. The details of hazards/ contributing factors related to human actions, preconditions for human actions, organizational influences, deficient procedures, failed defences, environmental conditions are presented in detail in various literatures [19, 40-42]. To improve the safety conditions, hierarchy of control i.e., Elimination, Substitution, Engineering Controls, Administrative Controls and Personal Protective Equipment should be applied to the hazards or to the hazard components present in the state transition path [43]. The consequence of an accident can also be reduced by framing and following proper rescue and recovery operations.

3. BASICS OF DATA SCIENCE

Data science is an interdisciplinary field that combines techniques from computer science, statistics, and domain knowledge to extract valuable insights and knowledge from data. It involves the process of collecting, cleaning, analyzing,
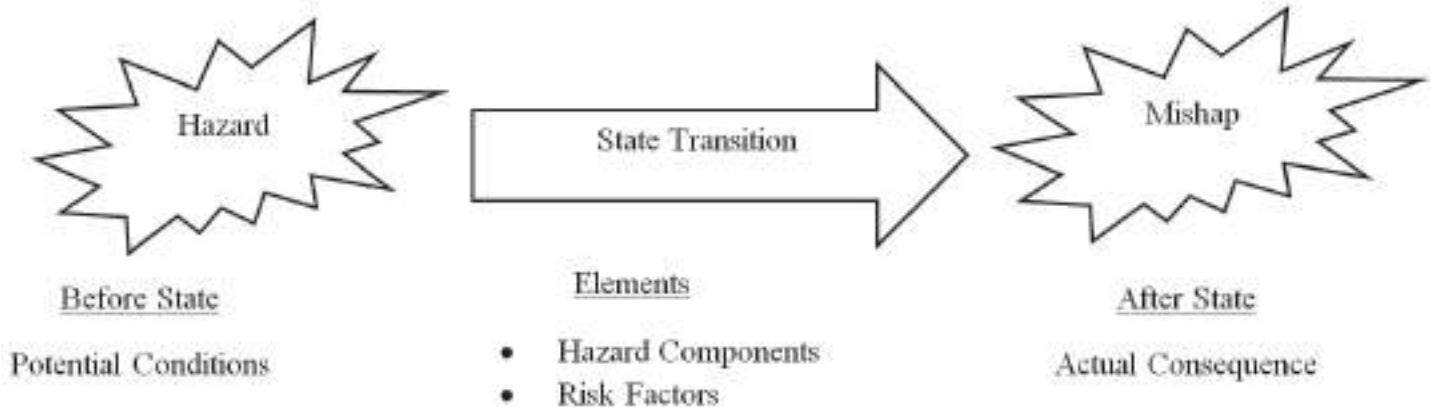

Figure 4. *Conversion of hazard into an accident in a workplace*

and interpreting large and complex datasets to make data-driven decisions and predictions. The initial steps of data science i.e., collecting and processing of exceptionally large data sets can be referred as Big Data. The next step i.e., interpreting big data with machine learning, statistical modeling, and often computer programming can be referred as Data Analysis.

Data analysis is a fundamental component of both data science and big data, focusing on the examination of data to draw conclusions. Big data deals with the management and analysis of extremely large datasets using specialized tools and technologies. Data science on the other hand is a comprehensive field that encompasses data analysis but also includes machine learning and predictive modeling to extract valuable insights and solve complex problems. Data science can involve working with both traditional datasets and big data, depending on the specific goals of the project. The fields of data science are shown in Figure 5.
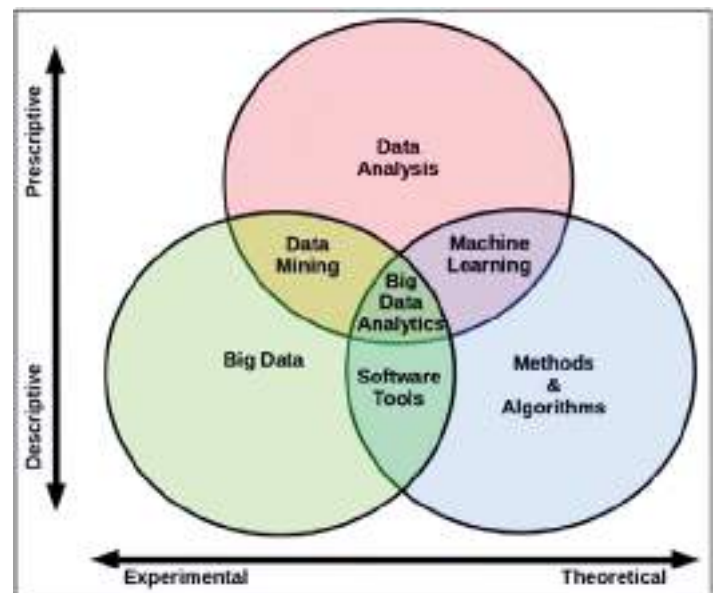

Figure 5. *Fields of data science*

1. 2. 3. Data mining is a process of discovering valuable patterns, trends, associations, or knowledge from large data sets. It involves using various techniques from statistics, machine learning and database management to explore and analyse data, with the goal of uncovering hidden insights and making data-driven decisions [44]. The steps in data mining are as follows:

- Data Collection
- Data Pre-Processing
- Data Exploration
- Data Transformation
- Model Building
- Model Evaluation

Data mining employs various algorithms and techniques to build models that can reveal hidden patterns. Some common data mining techniques are represented in Figure 6.
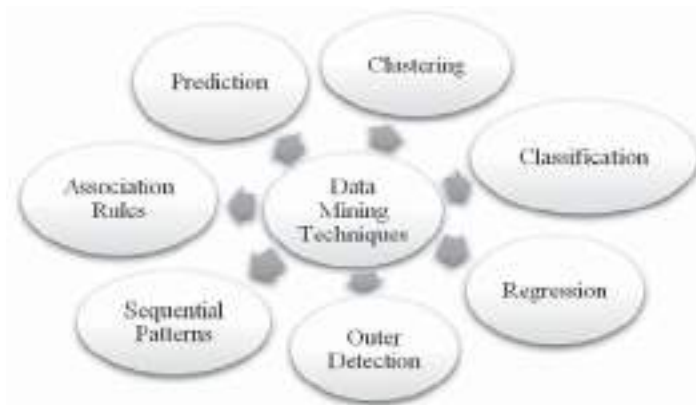

Figure 6. *Data mining techniques*

4. SAFETY DATA ANALYTICS
Safety data analytics is the process of collecting, analysing and interpreting safety data to identify patterns and trends, and to develop insights that can be used to improve safety performance. The methodology is presented in Figure 7 [45].

4.1. Data Collection
The first step in safety data analytics is the systematic collection of data from various sources within an organization. These sources include accident reports, worker activities, equipment sensor data, and environmental conditions. The data collected is typically both historical and real-time.

4.2. Data Pre-processing
The data collected from various sources often contain different formats, inconsistencies, or missing values. In the data pre-processing step, the data will be cleaned, transformed, and integrated into a unified dataset to ensure it is accurate and reliable for analysis.
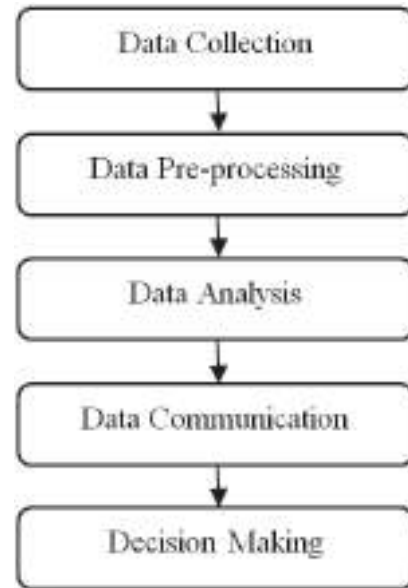

Figure 7. *Methodology of data analytics*

4.3. Data Analysis
The most important step in the methodology is the analysis of the pre-processed data. Pre-processed data can be analyzed using a variety of statistical analysis, machine-learning algorithms, and data mining methods. This can be done to identify patterns and trends, predict accidents, and investigate root causes. The most common methods for data analysis are as follows [46]:

- Descriptive analytics – What happened?
- Diagnostic analytics – Why did it happen?
- Predictive analytics – What is likely to happen?
- Prescriptive analytics – Artificial Intelligence-based decision making.

4.4. Data Communication
The analyzed results should be properly communicated through various visualization tools like graphs, charts, and images to easily convey the findings. These tools emphasize patterns discovered in existing data and shed light on predicted patterns, assisting the results' interpretation.

4.5. Decision Making
More informed decision-making is possible based on the analysis results. When unsafe conditions are detected, alerts can be generated in real-time, enabling immediate action to mitigate risks.

Safety data analytics is not a one-time process but an ongoing effort. Regularly collecting and analyzing data allows for continuous improvements in safety protocols and practices. Lessons learned from incidents and near misses are used to refine safety procedures and enhance overall safety.

5. DATA ANALYTICS APPLICATION TO IMPROVE MINE SAFETY

Ideally, safety conditions will improve in a mine, when a worker does not do any unsafe act, when there are no preconditions that affect the workers' actions, when the supervision is good, when the equipment/ machinery/ tools used are not defective, when there are no hazardous environmental conditions. Data analytics can continuously monitor the worker's behaviour/ actions, the health of the equipment/ machinery/ tools, environmental conditions through the sensor data.

The first step in the methodology of data analytics is data collection. This process involves the collection of data from various sources within the mining operation. In the mining industry, data is generated continuously and in different formats. In mine safety, related data can be classified into three levels as presented in Table 2.

i.   Data collected by industry consortiums such as Coal India Limited, Singareni Collieries Company Limited, National Mining Development Corporation, Vedanta, Hindalco Industries Limited, Tata Steel Limited and many more.

ii.   Data collected by regulatory agencies such as the Directorate General of Mines Safety (DGMS), the Indian Bureau of Mines, and similar agencies in other countries.

iii.   Data collected by various manufacturing units related to Heavy Earth Moving Machinery, auxiliary equipment, drilling equipment and blasting chemical plants etc.

Table 2. Safety data sources

Industry Consortium	Regulatory Agencies	Manufacturing Facilities
Fatal Accident Reports	Accident and Statistics Database	Design Data
Serious Accident Reports	Improvement Notices and Prohibitory Orders	Operational Data
Reportable Accident Reports	Occupational Health Survey Conducted	Production Data
Near Miss Reports	Cases Filed by DGMS	Alarm Logs
Safety Audits	Inspection & Enquiries Records	System Fault Records
Production Data	Improvement Notices & Prohibitory Orders	Standard Operating Procedures
Safety Management Plans		Quality Reports
Equipment Sensors Data		Lab Test Reports
Maintenance Records		Training Records
Environment Sensor Data	Testing and Approval of Equipment, Machinery, Apparatus, Appliances, and Other Materials used in Mines	Audit Records
Gases Concentration Data		
Air Quality Data		
Temperature Data		
Humidity Data		
Geological Data		
Worker Activities through Wearables, RFID Tags, or Tracking Systems		
Hydrological Data		

The second stage is data pre-processing. The raw data collected from mining industry consortiums, regulating agencies, and manufacturing facilities can be static and/or dynamic type. Where static or dynamic type data can be in structured and/or unstructured format. Therefore, the data needs to be cleaned or pre-processed to make the data into uniform databases. Data pre-processing includes data cleaning, data transformation, and data integration.

Data cleaning: the inaccurate or incomplete data is removed or corrected to improve data quality; data transformation: data is converted into a suitable format for analysis; data integration: data from various sources is combined into unified databases.

The most important step in data analytics is to extract valuable information from the pre-processed data. The data

in the form of information or developed databases can be analysed for extracting value from it and converting into intelligence. These then lead to appropriate actions and support decision-making [14]. Advanced techniques, like artificial intelligence, machine learning, and data mining can be employed to analyze the pre-processed data. These algorithms identify hidden patterns, correlations, and trends within the databases. Data analytics approaches can be applied in the mining industry for incident analysis, risk assessment, predicting accidents, predictive equipment maintenance, real-time environment monitoring, workers tracking, safety training and behaviour analysis, and emergency response optimization.

5.1. Descriptive Analytics

Descriptive analytics is the simplest but still powerful method of all the data analytics approaches. It focuses on analysing historical data to identify trends and describe what has happened. Figures 1 and 2 are examples of a simple descriptive analysis, where the trend of fatal accidents occurred in the USA and Indian mines are analyzed respectively. Various conclusions can be drawn from a single analysis. From the Figure 1, it can be inferred that

i. Stone quarries are more dangerous than other mines.

ii. From 2020-2023, the trend line of metal mines is similar to sand & gravel mines and the trend line of non-metal mines is similar to stone mines.

iii. The accidents in sand & gravel mines have drastically decreased since 2021.

The descriptive analytic tools can be applied in the mining industry to:

i. Study the fatal, serious, reportable accidents and near-miss incidents to understand the potential risks and prevent actual accidents.

ii. To identify common actions leading to accidents in zones involving employee interactions with equipment (zone 4), environment (zone 5), other employees (zone 1), and combination of employee, equipment, and environment (zone 7).

iii. To identify patterns in equipment malfunctions affecting employees (zone 4), the environment (zone 6), equipment (zone 2), and the combination of employee, equipment, and environment (zone 7).

iv. To identify hazardous environmental conditions affecting employees (zone 5), equipment (zone 6), environment (zone 3), and combination of employee, equipment, and environment (zone 7).

v. To identify the effectiveness of current safety policies and identify areas for improvement; and to address the safety hazards related to all the zones.

vi. To track safety performance over time.

vii. Analyse the historical environmental data, such as air emissions, water quality, toxins, and gases generated, to identify the trends and safety hazards.

viii. Examine the historical data on equipment downtime to identify common failure patterns and plan preventive maintenance accordingly.

Descriptive analytics is easy to complete, particularly with the help of Microsoft Excel or Python. The output of the analysis can be in the form of reports, visualizations like charts or graphs, and a dashboard (Figure 8). The disadvantage of descriptive analytics tools is that the analysis does not go beyond the data surface.

Figure 8. *Dashboard of accident statistics*

5.2. Diagnostic Analytics

Diagnostic analytics is a more advanced approach than descriptive analytics. This approach focuses on the analysis of historical data to identify the root causes of the problem and answers why the accident has happened. The steps in root cause analysis involves identifying the underlying cause of the accident including both immediate and systemic factors. Common techniques for root cause analysis include 5-Why analysis, Fault Tree Analysis, and Fishbone diagram. The root cause analysis using any of the common techniques involves:

• Detail investigation by incident/ accident analysis team,

• Brainstorming session to identify the intermediate events and basic events,

• Validation of the identified events and

• Calculation of probability of a top event based on the intermediate and basic events

Such analysis is time-consuming, requires a skilled team, and is costly. Data-driven diagnostic analysis can be used to analyze historical equipment performance data, environmental conditions, and human data through sensors and wearables/ tracking devices. Machine learning models can be employed to predict equipment failures, risk behaviour patterns, and approved and acceptable environmental limits.

Other than root cause analysis, diagnostic analytics techniques like drill-down analysis, data discovery, data

mining, correlation analysis, regression analysis, and time series analysis can be used to understand why something happened the way it did in the past. Below are the various diagnostic analytic tools that are widely available are Alteryx, BM SPSS Modeler, KNIME, Looker, Microsoft Power BI, Python and R Programming Languages, QlikView, RapidMiner, SAS Analytics, Tableau [47].

The diagnostic analytic tools can be applied in the mining industry to:

i. Identify the root causes of the incidents and accidents, and equipment failures (zone 2).

ii. Analyse data from past safety incidents to reconstruct the sequence of events leading to the incident.

iii. Study the near-miss incidents to diagnose the potential risks and systemic issues that need to be addressed to prevent future accidents.

iv. Identify the training needs based on the risk behaviour of the worker (zone 1).

v. Identify the recurring safety issues and implement measures for improvement.

vi. Identify the instances of non-compliance with environmental regulations.

vii. Identify the root causes of environmental incidents (zone 3) like water contamination, noise generation etc.

5.3. Predictive Analytics

Predictive analytics is a more advanced approach than diagnostic and descriptive approaches. The predictive analytics approaches use historical and real-time data to make predictions of future events and outcomes. It is a valuable forecasting tool. These predictions are valuable for optimizing operations, improving safety, and enhancing decision-making. The diagnostic analytic tools in combination with advanced machine learning or statistical techniques can perform the prediction analysis. Weather forecast is the most common example of predictive analytics.

Predictive analytics is often associated with big data and data science. Predictive analytic techniques are classified as machine learning and statistical methods. The machine learning techniques are further classified into classification and clustering models. Classification models fall under supervised machine learning models. Clustering models fall under unsupervised machine learning models. Classification models include logistic regression, decision trees, random forest, neural networks, and Naïve Bayes. Clustering algorithms include k-means clustering, mean-shift clustering, density-based spatial clustering of applications with noise (DBSCAN), expectation-maximization (EM) clustering using Gaussian Mixture Models (GMM), and hierarchical clustering. Time series models include autoregressive (AR), moving average (MA), autoregressive moving average

(ARMA), and autoregressive integrated moving average (ARIMA) models [48].

Common predictive analytics software platforms and solutions are Alteryx Analytics, Automation Platform, Amazon SageMaker, H20 AI Cloud, IBM SPSS, RapidMiner, SAP Analytics Cloud, SAS Viya, and TIBCO [49].

Predictive analytics helps to look for meaningful patterns in the cumulative database, and then build models that predict the occurrence of events in the future in the workplace. The predictive analytic tools can be applied in the mining industry to:

i. Develop predictive models that can forecast when equipment (zone 2) is likely to fail based on historical maintenance records, sensor data, and environmental conditions (zone 3).

ii. Predict high-risk areas and activities by analyzing historical safety accident and incident data, geological information, and environmental conditions.

iii. Forecast emission levels and environmental impacts of mining activities based on historical environmental conditions and regulatory compliance requirements.

iv. Alerting workers and operators of potential safety hazards based on real-time predictive analytics using wearable devices and worker tracking.

Predictive analytic tools allow proactive equipment maintenance to minimize downtime and prevent accidents, mitigate safety risks, and reduce environmental harm.

5.4. Prescriptive Analytics

Prescriptive analytics is the most advanced analysis. It takes the conclusions obtained from descriptive, diagnostic, and predictive analysis and suggests the best future course of action. Prescriptive analytics uses various types of tools like machine learning, artificial intelligence, and simulation. The examples of tools are presented in Table 3 [50]. The common prescriptive analytics software is FICO Decision Management Suite, IBM Decision Optimization, and SAP Analytics Cloud [50].

Table 3. Tools used in prescriptive analytics

Tools	Examples
Optimization tools	IBM ILOG CPLEX, Gurobi, FICO Xpress
Simulation tools	AnyLogic, Simul8, Arena
Machine learning algorithms	Neural networks, decision trees, regression analysis
Business intelligence tools	Tableau, QlikView, Power BI
Natural language processing (NLP) tools	Google Cloud Natural Language API, Microsoft Azure Cognitive Services, IBM Watson NLU

The prescriptive analytic tools can be applied in the mining industry to:

i. Prescribe the safety protocols and procedures to minimize the risks based on real-time environmental data (zone 3), workers' locations (zone 1), and equipment status (zone 2).

ii. Recommend specific actions and evacuation procedures in the event of safety incidents or emergencies.

iii. Prescribe actions and strategies to ensure compliance with environmental regulations and reduce the environmental footprint of mining activities.

6. CASE STUDIES

6.1. Case 1: Caterpillar

Caterpillar Inc. is one of the world's leading manufacturers of mining equipment, which has started an Analytics & Innovation Division in 2015. Caterpillar Inc. has developed a "failure model" by integrating advanced analytics and machine learning models. The "failure model" is a proactive approach to equipment maintenance. The model leverages machine learning to detect patterns in equipment data and identify possible issues before they lead to component failure. The developed predictive models can also be used for fleet monitoring and to track fuel efficiency, idle times, and location of the mining machinery.

One of the failure models focuses on the dilution of engine oil, which can cause damage if left undetected. Using the model, the dilution detection time is reduced to 2.4 hours from 10 days. This saved the customer an estimated $3,60,000 in maintenance costs. Other failure models focus on wheel slippage, which can lead to brake failure and reduce the life of tire and axle assembly. Detecting wheel slippage through an analytics model and promptly alerting customers to issues, such as poor road conditions as the likely cause, have saved an estimated $500,000 in downtime costs [51].

6.2. Case 2: Hitachi and Wenco

The use of big data in the U.S. mining sector, as demonstrated by Hitachi (Hitachi Construction Machinery Co. Ltd.) and its subsidiary, Wenco's (Wenco International Mining Systems Ltd.) longstanding involvement, highlights the industry's early adoption of advanced data collection and analysis. Hitachi has been collecting data from mining machinery for the past two decades with the help of sensors. The collaboration between Hitachi and Wenco has led to the development of advanced mining solutions such as the Avoca Intelligence Suite, the ReadyLine health management system, and the advanced Collision Avoidance System [52].

The Avoca Intelligence Suite integrates data from various mining systems to provide a holistic view of operations. This eliminates data silos and offers actionable insights, helping answer important questions related to production bottlenecks and loading efficiency.

The ReadyLine health monitoring system enables real-time monitoring of critical equipment health parameters. It helps maximize equipment uptime, reduce operational costs, and can be used as a standalone tool or integrated into the mine fleet management system.

The Fleet Awareness V2X, an advanced Collision Avoidance system, developed by Wenco, utilizes advanced technologies such as high-precision GPS, peer-to-peer communication, and proximity sensing to prevent collisions in real-time. The system provides real-time monitoring of vehicle positions and alerts drivers with automated warning sounds based on proximity detection and advanced algorithms. It enhances safety in mining operations by preventing collisions and improving operator response to potential hazards.

6.3. Case 3: CR Powered by Epiroc

CR powered by Epiroc, has developed various digital technology solutions for the mining industry through real-time analytics and open integrations [53]. They are as follows:

- **GET Loss Monitoring:** GET Trakka, is a real-time GET (Ground Engaging Tools) detection (teeth and shrouds) for wheel loaders, hydraulic excavators (backhoes and face shovels), and electric rope shovels. It provides immediate GET loss alarms and the ability to locate the lost components on the ground.

  CR powered by Epiroc developed GET Trakka was applied to solve a major problem faced by a gold mine in Australia. The problem faced by the mine is operational downtime caused by GET entering the crushing circuit. This issue led to productivity losses and raised safety concerns within the processing plant.

  GET Trakka utilizes sensors that are inserted into the GET components. These sensors enable real-time detection of failures in lip shrouds, wing shrouds, adapters, and teeth. The IoT-connected sensors create a dependable alarm system with minimal false alarms. When the GET components are lost, the system provides immediate alerts to operators. These alerts allow operators to stop digging activities promptly, preventing damage to the lip system and minimizing the need for unplanned maintenance. GET Trakka also offers the capability to locate lost components on the ground.

- **Thunderbird 1110 - Drill Optimization:** The Thunderbird 1110 high-precision GPS and rock strata measurement system for rotary blast drills is an innovative solution designed to enhance the surveying process in mining and drilling operations.

  A Chilean copper and gold miner sought a solution to capture mechanical energy and steel stress data during the drilling process. This data collection aimed

to identify the rock hardness of the in-situ rock being excavated. The thunderbird system was installed onto three rotary blast hole drills. It collected critical data including penetration rate, torque, pressure, and drill diameter. The data collected was utilized to generate a geological model of the site, which in turn be used to optimize drilling and blasting configurations and patterns. Such data-driven approaches are integral to improving mining efficiency, reducing costs, and enhancing the overall success of mining operations.

- **Titan 3330 – Load Haul Optimization:** Titan 3330 is a real-time payload management system. Powerful artificial intelligence is applied in the Titan 3330 system to continuously learn and improve the ability to identify a productive load, bucket by bucket.

An iron ore mine in Pilbara, Western Australia, has experienced a high number of truck overloads daily. These overloads were causing a bottleneck in production, which can lead to reduced efficiency and increased operational costs. To address this challenge, the Titan 3330 payload management system was installed on the miner's fleet of Liebherr backhoes. Sensors fitted on the excavators are used to identify individual bucket cycles and truck payloads. This technology allowed for precise monitoring of the loading process.

7. CONCLUSIONS

The mining industry around the world has been trying to improve safe working conditions in the workplace for many decades. The trend of accidents in mines showed that accidents are still occurring in the era of Industry 4.0. Data analytic tools vary from simple descriptive analytics tools to highly sophisticated prescriptive tools. The application of descriptive analytics to the safety data in the mining industry can help to understand what has happened and identify patterns, while diagnostic analytics uncovers why the incident has happened and enables targeted interventions. Predictive analytics predict the outcome of the incident, and allows for preventive measures, and prescriptive analytics suggest the future course of actions to be done when a particular incident has happened.

In the mining industry, data analytic tools can be applied to assess incidents, and risks, predict accidents, predict equipment maintenance requirements, monitor the real-time environment, track workers, assess safety-training requirements, analyze behaviour of workers, and optimize emergency response. Application of data analytic tools to safety data helps in taking informed decision-making and proactive measures to prevent accidents and create a safe working environment. This proactive approach not only saves lives but also reduces operational downtime and costs associated with accidents and equipment failures.

The case studies presented in the paper demonstrated the advantages of different data analytic approaches. However, the application of data analytics in the Indian mining industry is limited due to a lack of available safety data related to mines. The utilization of a set of technologies like IoT, Big data, and data science can improve the working conditions in Indian mines also.

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PRIDE OF INDIA

Hindustan Zinc's First All-Women Mine Rescue Team Represented India on the Global Stage & Won 2nd position globally

(L-R): Ms NEHAL, Ms Sandhya Singh, Ms Sakshi Gupta, Ms Sandhya Rasktla, Ms Alka, Ms Yijitha, and Ms Kavita

We are beyond proud to share those seven trailblazing women from HZL that represented India at the XIII International Mine Rescue Competition in Colombia (South America) & has made history, securing 2nd place & becoming the World's Second-best Women Task Force. These women of valour are a powerful testament of strength & leadership of women in mining.

Their participation itself marks a historic moment as they showcase their exceptional rescue skills in a competition featuring over 26 teams from across the globe. This extraordinary & remarkable achievement reaffirms its unwavering commitment to driving change by fostering a diverse & inclusive workforce in the metals & mining sector. MEAI joins larger mining sector stakeholders in cheering them as they break barriers and lead the way for women in the mining Industry.

MEAI extends its heartfelt congratulations to HZL's 1st All-Women Mine Rescue Team for representing India on the global stage. This is a moment of immense pride not only for the metals & Mining sector but for the entire nation. Their participation is a testament to the power of diversity & Inclusion and they are true trailblazers, breaking barriers & setting new standards for women in mining. We cheer you on as you lead with courage, skill & determination- paving the way for future generations of women in this field.

Chak de India!

FIFTH COURSE OF MPDP
(MEAI PROFESSIONAL DEVELOPMENT PROGRAM)

Enthused by the phenomenal success of the previous courses MPDP-I to IV, MEAI launches the **FIFTH Course** in the month of **November / December 2024,** online.

The previous courses were successfully held online on WebEx platform on three consecutive week-ends and were well attended by 35 participants from 08 reputed mining organizations including NMDC, Tata Steel, MSPL, OMC, HGML, JSW, besides a few independent consultants.

24 technical sessions were held by **16** eminent faculties and industry experts covering **20** relevant subjects. Participants were awarded Certificates of participation. Attendance and Assessment test are mandatory for all participants to be eligible for the "**MPDP Certificate**". An added attraction of the MPDP Course is that the RCPs who attend the course would get a credit of 40 PDP hours!

TOPICS & FACULTIES

TOPIC	FACULTY
Hyperspectral Remote Sensing & It's Applications	Prof Anup Prasad IIT(ISM)
(a) MMDR; (b) MCDR; (C) Mineral Laws & Environmental Clearance	Mr AR Vijay Singh, BE (Mining), FCC (R), FCA, Chartered Accountant
National Exploration Licensing Policy & National Mineral Policy	Mr Susheel Kumar, Director, Govt of Telangana, Hyderabad
Forest Clearances	Mr K. Madhusudhana Past President MEAI& CEO, MSPL
Role of Electronic Detonators in Blasting	Dr Karra Ram Chandar, Prof & former Head of Deptt, Mining Engineering, NITK
Geostatistics in Mineral Industry	Prof Bhabesh C. Sarkar IIT (ISM)
Technological Developments in Autonomous dump trucks in Mining	Mr Suresh Nair, VP, Tata Hitachi Sales & Marketing
Mineral Auctions	Mr Sabysachi Nayak, Director Mine Magma
(a) Mine Safety Management; (b) AI & IoT in Mine Safety; (c) Tech Revolution in Mining; (d) EHS (e) Cost Parameters in Mineral Industry	Mr Deepak Vidyarthi, Consultant Mining, Assessor NABET-QCI
Mineral Resources & Reserves - Classification & Reporting	Dr Abani R Samal, Principal, Geo Global LLC, USA
Future of work & Managerial Excellence	Dr Debabrat Dash, VP - HR & Admin, MSPL
(a) Openpit Optimization; (b) Mine Planning & Scheduling	Mr Suryanshu Choudhury, Head, Mine Planning, GMDC.
Tech Revolution in Mines	Mr Deepak Vidyarthi, Consultant Mining, Assessor NABET-QCI
The Environmental Protection Act -Landmark Judgements w.r.t. Mining Industry	Mr KAV Prasad, VP Legal, MSPL
Recent Changes in Mining Plan Submission & FMCP	Mr T.R. Rajasekhar, Consultant
Digitalization in Mines	Mr Mahesh Kumar, Consultant IT, Minematics

WHO SHOULD ATTEND
The MPDP Course will benefit Mining Professionals, Engineers, Geo-technical Engineers, Mineral Exploration Geologists working in the mineral industry (*mid-level to senior level)*

SCHEDULE

The **5ᵗʰ Course (MPDP-V)** is scheduled as follows:

Nov 2024: 04ᵗʰ (Mon),16ᵗʰ (Sat), 17ᵗʰ (Sun),

Dec 2024: 8ᵗʰ (Sun), 14ᵗʰ (Sat), 15ᵗʰ (Sun) 28ᵗʰ (Sat) & 29ᵗʰ (Sun)

SESSIONS: 03:00 PM /04:30 PM & **04:45 PM/06:15 PM**

INAUGURATION: Nov 04ᵗʰ (Mon): 03:00 PM / 04:30 PM

PARTICIPANTS FEEDBACK & ASSESSMENT:

Dec 29ᵗʰ (Sun): 03:00 AM (followed by

VALEDICTORY FUNCTION: **Dec 29ᵗʰ (Sun): 05:00 PM**

COURSE FEE

For MEAI Members: **Rs. 15,000.00 + 18% GST**

For Non-Members of MEAI: **Rs. 20,000.00 + 18% GST**

Interested professionals may please contact the **Secretary General**, MEAI at **meai1957@gmail.com** / Phone no: 040-66339625/ 040-23200510 or Mr. Deepak Vidyarthi, Chairman, Training, Development & Program Committee of MEAI at **vidyarthikud@hotmail.com** for more details.

Payment of **Course fee** may be made on line at A/c No. **037810100028696**; IFSC: UBIN0803782; Bank: UNION Bank of India Nampally Station Road, Hyderabad Telangana-500 001.

REGISTRATION
Please click on to the following link: https://forms.gle/mzTM11o4WgTefVps6
Hurry up ! We have *limited Seats*!! *Allotment would be on* ***First Come First Served Basis***!!!

Deepak Vidyarthi,
Course Coordinator, MPDP /
Chairman, Training, Development & Program Committee of MEAI

Prof. Dr. Raghupatruni Bhima Rao formerly CSIR Chief Scientist has been felicitated on 29ᵗʰ August 2024 at Kochi, by Dr. Deependra Singh the CMD of IREL (India) Limited, Mumbai, Dept. of Atomic Energy, Govt. of India and President of Rare Earth Society of India with a citation at the International conference organised by South African Institute of Mining and Metallurgy, Indian School of Mines Dhanbad Association Kolkata Chapter and Rare Earths Society of India. The image behind is The Chief Guest, Dr. Ms. N. Kalaiselvi, the first woman as Director General of CSIR, Delhi and Secretary DSIR, Govt. of India. Further Mr. A. Mishra, Director (Technical), IREL (India) Limited, Mumbai and Dr. Satish Chandra Saxena, ISMAA, Kolkata etc are also present on the dais.

MEAI NEWS

AHMEDABAD CHAPTER

Ahmedabad's 28th Foundation Day: A Step Towards Sustainable Mining

Celebrating Nearly Three Decades of Excellence in Mining the Ahmedabad Chapter celebrated its 28th Foundation Day on June 14, 2024. Established in 1997, the Chapter has completed an impressive 27-year journey, setting new standards in the mining sector. The celebration was a grand affair, featuring a series of events aimed at raising awareness about India's energy transition, the importance of critical minerals, and the application of Artificial Intelligence (AI) in the mining industry.

The Foundation Day commenced with a heartfelt memorial lecture in honour of the Founder Chairman of the Ahmedabad Chapter, the late Shri B.K. Antia. The lecture was delivered by Shri Rajnath Ram, Advisor (Energy) at NITI Aayog, Government of India. Shri Ram's address highlighted the Energy scenario of Government of India & its ambitious targets to address the climate challenges and Net Zero emissions.

He also highlighted significant contributions of Shri Antia to the mining sector and emphasized the importance of continuing his legacy of innovation and excellence. The lecture was attended by notable dignitaries, including Shri S.N. Mathur, President of MEAI; Shri L.S. Shekhawat, Vice-President-III of MEAI; and Shri Swagat Ray, Chairman of the Ahmedabad Chapter. The presence of government officials, stakeholders, and council members of MEAI added to the event's prestige and underscored the importance of the topics discussed.

(L to R): Sh. Swagat ray, Chairman MEAI Ahmedabad Chapter, Sh. Rajnath Ram, Advisor Energy NITI Ayog, GOI, Sh. S N Mathur, President MEAI, Sh. L S Shekhawat, VP-III

In his address, Shri S.N. Mathur emphasized the Association's role in enhancing the knowledge and skills of mining professionals across the nation. MEAI has been instrumental in organizing seminars, workshops, training sessions, and other events that provide valuable learning opportunities for industry professionals. Shri Mathur highlighted how these initiatives have helped professionals stay updated with the latest industry practices and technological advancements.

Dignitaries paying tribute to Founder Chairman late Sh. B K Antia

Sh. Rajnath Ram, Advisor Energy NITI Ayog, GOI presenting the memorial lecture

Shri Swagat Ray spoke about the Chapter's commitment to making a positive impact on the mining industry and society as a whole. He emphasized the importance of adhering to best practices, environmental stewardship, and safety standards. "Our celebration is a testament to our commitment to shaping a more responsible and efficient future for mining operations," he said. Shri Ray's remarks underscored the Chapter's dedication to promoting sustainable and ethical mining practices.

Following the memorial lecture, a technical session was held, focusing on critical minerals and the application of AI in the mining industry. This session aimed to equip professionals with cutting-edge knowledge and advancements in these fields, ensuring they remain at the forefront of industry trends and innovations. Critical minerals, such as lithium, cobalt, and rare earth elements, are essential for various high-tech and clean energy applications. The session provided insights into the global demand for these minerals, their availability in India, and the strategies for sustainable extraction and utilization. Experts discussed the importance of developing a robust supply chain for critical minerals to support India's energy transition and technological advancements. The application of AI in mining was another key topic. AI technologies are

revolutionizing the mining industry by enhancing exploration, improving operational efficiency, and ensuring safety. The session covered various AI applications, including predictive maintenance, autonomous mining equipment, and real-time data analysis. These innovations are not only making mining operations more efficient but also significantly reducing their environmental impact.

(L to R): Felicitation of Speakers (Sh. S Sen and Sh Deepak Vidyarthi) by session chairs Dr. R D Shah & Sh. P N Rao

Professionals from various sectors of the mining industry, including engineers, geologists, environmentalists, and policymakers, came together to exchange ideas and experiences. The event provided a platform for meaningful discussions on the challenges and opportunities facing the mining industry today. Participants had the chance to engage in one-on-one discussions with experts, attend interactive sessions, and participate in panel discussions. These interactions facilitated the exchange of best practices and innovative solutions, fostering a collaborative approach to addressing the industry's challenges.

The event also underscored the importance of regulatory support and policy frameworks that facilitate the adoption of new technologies and practices. There was a consensus that a supportive regulatory environment is crucial for attracting investments and promoting sustainable mining practices.

28th AGM of Ahmedabad Chapter
Ahmedabad Chapter held its 28th Annual General Meeting

(AGM) on June 14, 2024. The AGM provided a platform for members to discuss the Chapter's achievements, challenges, and plans. It was also an opportunity to recognize the outstanding contributions of members through the Chapter's Annual Award function.

(L to R): Ms. Gunjan Pande, Sh. D.Kumar, Sh. S. Ray, Sh. S N Mathur, Sh K C Bera, Sh. H M Patel

At the outset, the Chapter's report was presented by Ms. Gunjan Pande, Secretary of Ahmedabad Chapter, including the membership drive of the Chapter.

Chairman Sh. Swagat Ray in his address, emphasised the commitment of Chapter to support the professional development of its members and promote best practices in the industry. He added, the chapter plans to continue organizing events that provide valuable learning opportunities and facilitate knowledge sharing. By staying at the forefront of industry trends and innovations, the chapter aims to contribute to the sustainable and responsible growth of the mining sector in India.

President MEAI Sh. S N Mathur congratulated the members on completing 27 glorious years of the Chapter and encouraged them to shape the future of mining in India. With a rich legacy and a forward-looking vision, the MEAI Ahmedabad Chapter is well-positioned to lead the way in shaping the future of the mining industry in India. He recalled that the Foundation Day celebration was not just a reflection of past achievements but a testament to the Chapter's ongoing commitment to excellence and innovation.

AGM was followed by the awards function to celebrate the achievements of individuals and organizations that have made significant contributions to the mining industry. Awards were presented in various categories, including excellence & stewardship in the Mining Industry.

"Shri P K Samantray Best MEMBER of the Chapter Award" was conferred on Shri Himanshu Praveen Sharma and "MEAI Ahmedabad Chapter's Best LOCAL CENTRE Award" was presented to Kutch Local Centre.

The recognition of these achievements not only highlighted the exemplary work being done in the industry but also inspired others to strive for excellence.

The event reinforced the Chapter's commitment to promoting excellence, sustainability, and ethical practices in the mining industry.

Inauguration of Aid Training Centre held on 2-9-2024 at Ahmedabad

Shri S N Mathur, President, MEAI inaugurating MEAI First Aid Training Program at Ahmedabad

Practical Demonstration of First Aid

First Aid Training Officer and the Training Instructor teaching First Aid classes

Presentation of Certificates

MEAI members and participants that attended the First Aid Training Program

BALLARY-HOSPET CHAPTER

Independence Day celebrations: August 15, 2024

The Independence Day celebration at the BH Chapter Registered Office was marked by a vibrant and patriotic spirit. The event was organized to honor the significance of India's independence, foster a sense of national pride among the members, and strengthen the sense of community within the organization.

The celebration commenced with a formal flag-hoisting ceremony. The senior members of the BH Chapter hoisted the National Flag, accompanied by the singing of the national anthem. Life members and guests attended the ceremony.

Nature Walk

On 1.9.2024 a Nature walk was organized in the picturesque hilly region of Joladarashi Gudda. The purpose of the nature walk was to explore the natural beauty of the area and promote environmental awareness among the participants. Chairman Shri. SHM Mallikarjuna and Secretary Shri. P. Venkateswara Rao and other office bearers of the Chapter participated.

The Nature Walk commenced at 6:00 AM from Joladarashi Gudda Hill Bottom with 55 enthusiastic participants, including nature enthusiasts, students, and local volunteers. Led by experienced guides, the group traversed through lush green forests, meandering trails, and cascading streams, immersing themselves in the serene ambiance of the hilly landscape. Participants had the opportunity to observe diverse flora and fauna native to the region, including rare species of birds, vibrant wildflowers, and towering trees.

Throughout the journey, the Chairman & Secretary of the Chapter provided insights into the ecological significance of the area, highlighting the importance of preserving

biodiversity and maintaining ecological balance. Participants engaged in interactive discussions, sharing anecdotes and knowledge about the local ecosystem, fostering a deeper appreciation for nature and environmental conservation.

The nature walk to Joladarashi Gudda is an enriching experience, fostering a deeper connection with nature and promoting environmental stewardship among the participants. By engaging in immersive nature exploration and proactive cleanliness initiatives, the event underscored the significance of conserving natural landscapes and fostering sustainable practices for the well-being of present and future generations.

As we reflect on the event, it serves as a reminder of our collective responsibility to cherish and protect the beauty of our natural world, inspiring us to continue our efforts towards environmental conservation and promoting a cleaner, greener planet.

Workshop on bearing fundamentals by ARB Bearings on 5.9.2024

On 5.9.2024, BH Chapter, in collaboration with ARB Bearings, successfully organized a workshop entitled "Bearings Fundamentals" at Hotel Malligi, Hospet. The workshop was aimed at providing valuable insights and practical knowledge on bearings technology and its applications in the mining and metallurgical industries.

Objectives of the workshop
• To enhance understanding of the latest advancements in bearing technology.

• To Deliver the products information including Customized Bearings
• To discuss practical applications and challenges in the mining and metallurgical sectors.
• To foster collaboration between industry professionals and suppliers.
• To provide hands-on experience with ARB Bearings' products.

The workshop was well-attended by 170 participants from various sectors including mining, metallurgy, and manufacturing. Notable attendees included professionals, engineers, and academic researchers.

Shri. Gautam Haldar, a distinguished Technical Consultant from ARB Bearings, delivered an insightful presentation on the "Bearings Fundamentals". His presentation was aimed at providing a comprehensive understanding of bearing technology, its applications, and its significance in various industries.

Bearings are mechanical components that facilitate smooth rotation or linear movement by reducing friction between moving parts. They are essential in various applications, from automotive to industrial machinery.

Outlined different types of bearings, including ball bearings, roller bearings, and thrust bearings. He explained their specific uses, advantages, and limitations.

The presentation detailed the primary components of bearings, including the inner and outer races, rolling elements (balls or rollers), and the cage or retainer.

The choice of materials for bearing components, such as steel, ceramic, and plastic, was discussed. Emphasized the

impact of material selection on performance, durability, and cost.

The workshop organized by the BH Chapter in association with ARB Bearings was a significant success, meeting its objectives of enhancing industry knowledge and fostering collaboration. The event not only provided valuable insights into bearing technology but also strengthened the relationship between industry professionals and suppliers.

Annual General Meeting-2024
Date: 05.09.2024
Venue: Hotel Malligi, Hosapete

Shri. SHM Mallikarjuna opened his address by warmly welcoming all attendees. He acknowledged the presence of members and guests, emphasizing the importance of their participation in the meeting. His welcome words underscored the significance of each individual's contribution in the Chapter's success.

The Chapter Chairman reflected on the year's accomplishments and challenges. He highlighted key milestones achieved by the Chapter and recognized the collective efforts that led to these remarkable successes. At the same time, he addressed the challenges faced and underscored the resilience and determination of the Chapter in overcoming them. He outlined the agenda for the meeting, including a review of progress, strategic discussions, and setting new objectives. He reaffirmed the Chapter's mission and values, encouraging everyone to align their efforts with these guiding principles as they plan for the future.

Confirmation of the Minutes of AGM for the year 2022-23: The Annual General Meeting (AGM) of the Bellary-Hospet Chapter for the year 2022-23, was held on 5.9.2024. The meeting was chaired by Shri. P Venkateswara Rao, Secretary, BH Chapter, who welcomed all members and presented the agenda. The minutes of the previous AGM were reviewed. The minutes had been circulated to all members prior to this meeting. Members were given an opportunity to review and suggest corrections if any.

Address By Shri. Prabhakar Reddy, Senior Member of MEAI BH Chapter: During the Annual General Body Meeting (AGM) of the Bellary-Hospet Chapter, held on 05.09.2024, Shri. Prabhakar Reddy, a Senior Member of the Chapter delivered a significant address. His insights and perspectives were highly appreciated and contributed greatly to the meeting's agenda. He also suggested to arrange the training for field persons working in mines, Drilling& Blasting Workshop for unorganized Sector, and advised to increase the Membership strength of the Chapter and also addressed the membership fees will be paid by BH Chapter on repay basis, student chapter should participate actively in all activities.

Secretary Report for the year 2023-24: The Secretary's Report for the fiscal year 2023-24 was presented by Shri. J Srikant during the Annual General Body Meeting. This report provided a comprehensive overview of the Chapter's activities, achievements, challenges, and financial status over the past year.

- **Program and Project Successes:** The chapter successfully launched and completed several key programs, including New Site Purchase for the BH Chapter. These initiatives had a positive impact on our community and advanced our mission.

- **Membership Growth:** Membership is increasing, reflecting the Chapter's growing influence and outreach efforts. The report highlighted various membership drives and recruitment strategies that contributed to this growth.

- **Awards and Recognition:** The chapter received following awards:
  i. Best Chapter Award
  ii. Service Excellence Award – Shri. SHM Mallikarjun & Shri. P Venkateswara Rao
  iii. Gold Award for Quiz- Shri. Guruprasad & Shri. R S Desai
  iv. Best Audience Award- Shri. Ravindra S & Shri. Guruprasad

- **Collaborations:** Established partnerships with Various organizations related to the mining industry to enhance the chapter's activities and outreach.

Presentation of Audited Financial Accounts for the year 2023-24:

- The audited financial accounts for the fiscal year 2023-24 were presented to the members of the BH Chapter by Shri. J Srikant. This report summarizes the key points of the presentation and the outcomes of the discussion.

- Shri. J Srikant, in his capacity as the auditor, provided a comprehensive overview of the Chapter's financial status for the year 2023-24. The presentation included a detailed review of the financial statements, which comprised:

  a) Income Statement

  b) Balance Sheet

  c) Cash Flow Statement

Vote of Thanks: Vote of Thanks was proposed by Shri. P Venkateswara Rao, Chapter Secretary. He highlighted the collective effort and support that made the AGM successful. The message underscored the importance of collaboration and expressed optimism for continued success in the upcoming year. The Secretary's heartfelt acknowledgments and reflections were well-received by all attendees, reinforcing the chapter's commitment to its members and stakeholders.

BHUBANESHWAR CHAPTER

Knowledge Sharing Session on "Environmental challenges in Mining, Assessment & their Solution"

The Bhubaneshwar Chapter organized a "Knowledge Sharing Session" on 29th August'24 at Chrome Valley Club, Sukinda Chromite Mine of Tata Steel Limited in hybrid mode (physical as well as online mode). Office bearer of the chapter, Shri. Shambhu Nath Jha (Secretary) and other senior members of the Chapter graced the occasion. The session was attended physically by Shri. Pramod Kumar Behera (RO, Kalinganagar), Shri. Madan Mohan Sahoo (Sr. Environment Engineer) & various other members of the mining fraternity of Sukinda Valley. Mr Pankaj Satija, Chairman, Bhubaneshwar Chapter attended the session virtually.

The ceremony began with the dignitaries lighting an auspicious lamp. The Secretary, Shri. Shambhu Nath Jha then gave a welcome speech in which he extended his greetings to all the attendees, both in person and virtually. He expressed gratitude to government employees for setting aside time for the event. He also expressed gratitude to the speakers for lending their technical know-how to the occasion. The following government representatives greeted the occasion with their presence:

- Shri. Pramod Kumar Behera (RO, Kalinganagar)
- Shri. Madan Mohan Sahoo (Sr. Environment Engineer)

Welcome Address by Shri. Shambhu Nath Jha, Secretary of the Chapter

Technical presentations were made by officials from Dust-Hind-Col & Tata Steel Ltd:

- Shri. Alok Ranjan Prusty (M/S Dust-Hind-Col)
- Shri. Murugnarayanan G. (Area Mgr. Env. Climate Change), M/s Tata Steel Ltd.
- Smt. Ipsita Dash (Mgr. Env. GHG Accounting), M/s Tata Steel Ltd.

Shri. Pramod Kumar Behera (RO, Kalinganagar) had expressed his opinions on the significance of mining's response to environmental issues. He discussed ideas for developing low carbon emissions. He discussed EV policy and Green Hydrogen policy. He had been very anxious about the Sukinda Valley's groundwater contamination issues. He had cited instances from the Bhopal Gas Disaster. He expressed concern about the Sukinda Valley's numerous environmental challenges.

Address by Shri. Pramod Kumar Behera (RO, Kalinganagar)

Shri. Pankaj Kumar Satija, Chairman of the Chapter and Executive In charge (EIC) of FAMD, Tata Steel, while gracing the occasion virtually said "I believe that sustainable mining is not just an option but a responsibility. This session is a testament to industry's commitment to environmental stewardship and its continuous efforts to engage with stakeholders to drive positive change in the industry."
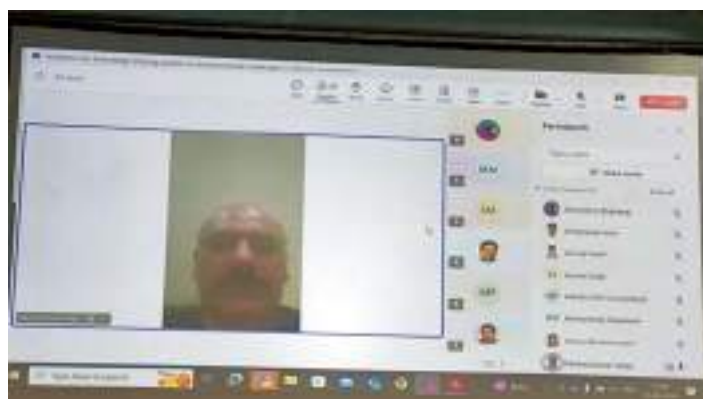
Address by Shri. Pankaj Kumar Satija

He expressed his views on India's goal to achieve Net Zero by 2070. He spoke about the measures and action plan needed for Carbon Footprint Reduction. He discussed how the public views on environmental hazards associated with mining influences positively or negatively for the people involved in legal and policy making. He emphasized on the value of these kinds of knowledge-sharing events for the benefit of individuals as well as the industry.

Shri. Madan Mohan Sahoo (Sr. Environment Engineer), expressed concerns regarding environmental issues in Delhi. He highlighted the discussions at the G20 Summit concerning greenhouse gas emissions. He shared his insights on the National Green Tribunal (NGT) meeting held in Sukinda last month. He referenced the Shah Commission's verdict from 2008 and discussed the permissible levels of particulate matter in mining operations.

Address by Shri. Madan Mohan Sahoo, Sr. Environment Engineer

Shri. Alok Ranjan Prusty (M/S Dust-Hind-Col) provided an overview of Dust Management, discussing various sources of dust. He highlighted the comprehensive dust management solutions offered by Hincol and expressed concerns regarding water scarcity issues in several mining operations. He emphasized the need for customized and integrated solutions to address diverse challenges. Additionally, he elaborated on dust classification and presented samples collected from various mines, sharing insights from case studies conducted in South Africa, Chile, Ghana, and Australia.

Presentation by Shri. Alok Ranjan Prusty (M/S Dust-Hind-Col)

He also reviewed the successful implementation of his product at the Noamundi Mine. The environmental advantages include reduced emissions and a smaller carbon footprint, along with additional benefits such as fuel savings, tyre conservation, water efficiency, enhanced safety, environmental friendliness, and increased productivity. He concluded with a discussion on the philosophy of dust control.

Shri. Murugnarayanan G. (Area Mgr. Env. Climate Change) provided an overview of greenhouse gas (GHG) emissions and their calculation within the mining sector. He made a clear distinction between climate change and global warming. He underscored the importance of the GHG protocol for assessing the carbon footprint of corporations, applicable to both steel and non-steel manufacturing sites, in alignment with science-based targets. He discussed the classification of Scope 1, 2, and 3 GHG emissions for Tata Steel in the fiscal year 2024. He cautioned about the implications of global warming potential.

Presentation by Shri. Murugnarayanan G. Area Mgr. Env. Climate Change

Smt. Ipsita Dash (Mgr. Env. GHG Accounting), addressed the topic of internal carbon pricing, detailing its processes, various project types, and sample templates. She examined the projected demand matrix for steel raw materials in India for the fiscal year 2025. She forecasted that crude steel production by 2030 would reach approximately 212 million tons. She emphasized the need for technological advancements to reduce carbon usage, including LNG fuel technologies and the adoption of electric vehicles within Tata Steel.

Presentation by Smt. Ipsita Dash, Mgr. Env. GHG Accounting

The event concluded with the vote of thanks proposed by Shri Ananga Kumar Mahanna, Sr. Area Manager Supply Chain, M/s Tata Steel Limited. The event concluded with renewed vigour for enhanced collaboration between the mining industry, regulatory bodies, and communities to achieve long-term sustainability in mining operations.

Presentation by Shri. Ananga Kumar Mahanna, Sr. Area Mgr. Supply Chain

RAJASTHAN CHAPTER - JAIPUR

Resumption of Monthly Lecture Series

The Rajasthan Chapter-Jaipur, has successfully resumed its monthly lecture series in September 2024. The series was relaunched on September 7, 2024, with a captivating presentation titled "Geoart: The Marvelous Creations of Mother Nature in India" delivered by Dr. A.K. Grover, a retired DDG from the Geological Survey of India (GSI).

GeoArt: The Amazing Creations of Mother Nature in India

Geoart, a relatively novel subject at the intersection of art and geosciences, generated significant interest among attendees. Defined as the breathtaking artwork of nature as seen from above through aerial photography and satellite imagery, geoart showcases the extraordinary landforms and landscapes that resemble various human-related objects, including humanoids, animals, divine figures, symbols, and more. Dr. Grover's lecture, featuring a wealth of colorful Earth images, was met with widespread appreciation.

The session was officially inaugurated by Mr. Lalit Mohan Soni, Chairman of the Chapter. Several distinguished members of the chapter were in attendance.

*Dr Grover presenting during the session*

Audience during the session

Skill Development Training

The Chapter recently concluded its second two-day training workshop focused on practical aspects of drilling, logging, sampling, cross-section preparation and resource estimation using manual methods. The event took place on August 31 and September 1, 2024.

Sh. Ajay Sharma, Additional Director of Petroleum for the Government of Rajasthan, graced the occasion as the Chief Guest and offered invaluable guidance and encouragement.

The workshop featured expert industry practitioners who shared their insights and experiences in various mining operations. Over 95 participants from across India registered for the program, demonstrating significant interest, particularly among students.
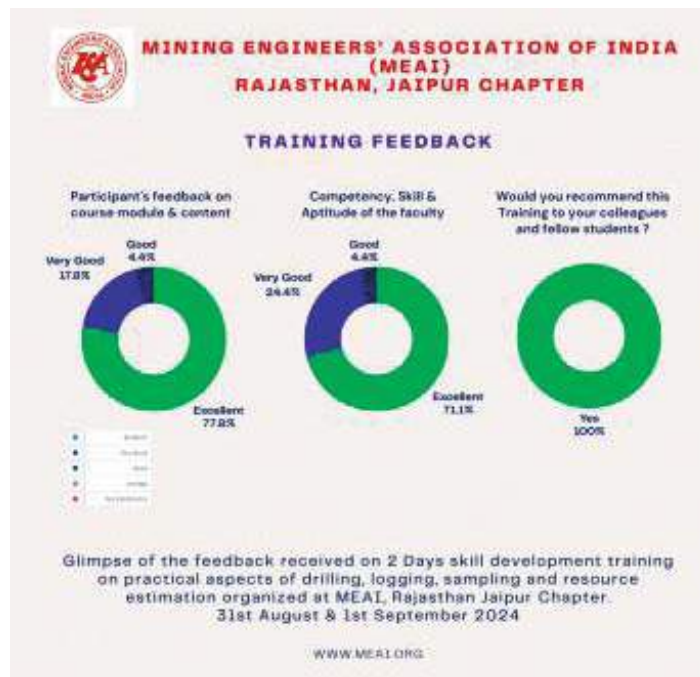
The training received positive feedback overwhelmingly, with 100% of participants recommending it to their peers.

RAJASTHAN CHAPTER - UDAIPUR
Minutes of the Tenth Executive Committee Meeting
Date: 14th July 2024, Time: 10:00 AM
Venue: MEAI Office, Udaipur

The following members were present:
1. Sh. M. S. Paliwal (Chairman)
2. Sh. R. P. Gupta (Former President, MEAI and Patron)
3. Sh. Akhilesh Joshi (Patron)
4. Sh. Praveen Sharma (Vice-Chairman)
5. Sh. Asif M. Ansari (Secretary)
6. Dr. S. K. Vashisth (Council Member & Joint Secretary)
7. Dr. S. S. Rathore (Council Member & Ex-Chairman)
8. Sh. Y. C. Gupta (Ex-Chairman)
9. Sh. M. K. Mehta (Treasurer)
10. Sh. D. P. Gaur (Executive Member)
11. Sh. R. C. Purohit (Executive Member)
12. Sh. S. N. Mali (Executive Member)
13. Dr. Hitanshu Kaushal (Executive Member)
14. Dr. S. C. Jain (Permanent Invitee)
15. Dr. Neeraj Shrivastava (Newsletter Co-Chairman)
16. Sh. M. L. Paliwal (Environment & Plantation - Small Mines)
17. Sh. R. P. Mali (Information Technology Co-Chairman)
18. Sh. S. M. Ahmed (Technical Talk Seminar Chairman)

Proceedings

1. Welcome Address: Sh. M. S. Paliwal welcomed all members.
2. Confirmation of Previous Minutes: Minutes of the last meeting held on 13.04.2024 were confirmed without comments.
3. Action Taken Report: Secretary Sh. Asif M. Ansari presented the action taken report from the meeting held on 13.04.2024, highlighting upcoming awards to be given at the AGM in Jabalpur on 19.07.2024.
4. Awards and Honors: Secretary Sh Asif M. Ansari briefed regarding award and honor to be given by Association to the Chapter and its members in the next AGM to be organized at Jabalpur on 19.7.2024.
   • MEAI Lifetime Achievement Award: Dr. S. S. Rathore
   • Service Excellence Awards: Sh. M. S. Paliwal, Sh. Asif M. Ansari, Sh. Kuldeep Singh Solanki
   • MEAI Best Chapter Award: Udaipur Chapter
   • Special Award for enrolling maximum life members: Sh. M. S. Paliwal, Sh. Asif M. Ansari
   • MEAI - SIMMINDS Award: Sh. R. C. Purohit
   • MEAI - Smt. Bala Tandon Award: Sh. Rajendra R. Harlalka
   • Quiz Open Round First Prize: Sh. Asif M. Ansari
5. Financial Report: The audited account report was submitted and approved for inclusion in Income Tax return submitted by MEAI Headquarter. Sh. M. K. Mehta was appreciated for his efforts.
6. First Aid Training Center: Discrepancies resolved after DGMS visit on 6.05.2024. Approval waited for training batch scheduling. As we received approval we will plan for training.
7. Training Program for Mining Mate & Blaster:-To be organized at RK Marble Rajsamand after exam declaration. Sh. R. C. Purohit, Sh. S. M. Ahmed, Sh. R. P. Mali, and Sh. S. C. Suthar to coordinate. Meanwhile we should contact the Skill council for the mining sector, New Delhi for conducting courses in their association.
8. Website Update: Executive member Sh Hitanshu Kaushal mentioned that the website team will give training to our members so that updating of the portal can be done in real time.
9. International Conference: It is decided to organize an international Conference between march 2025 to July 2025 as we get approval from HQ.
10. Mineral Museum and Fossils Park: It is decided to establish the museum on our land soon if suitable or at nearby tourist place. This may be established jointly with any other tourist place or UDA. A sub-committee of three members under the chairmanship of Sh. Y. C. Gupta constituted for the mineral Museum and fossils park. The other two members will be Dr. S. K. Vashisth and Dr. Hitanshu Kaushal.
11. Rajasthan Budget 2024-25: Chairman highlighted efforts in collecting suggestions and convincing authorities. Most suggestions were accepted.
12. National AGM Suggestions: Secretary requested suggestions. Members emphasized the importance of the International Conference.
13. Returning Officer Appointment: Dr. S. S. Rathore and Sh. Akhilesh Joshi proposed Sh. A. K. Kothari as Returning Officer for the 2024-26 election, which was approved by the house.
14. Discussion on the Office Bearers and Executive Committee Members for the next term (2024-2026):- After discussion at length in the house, recommended the names of following office bearers of Executive Committee for a period of 2024-2026.

Office Bearers
• Sh. Praveen Sharma as Chairman - (LM No.- 2153)
• Sh. D. P. Gaur as Vice Chairman - (LM No.- 2116)
• Sh. Asif Mohammed Ansari as Secretary - (LM No.- 2418)
• Sh. R. C. Purohit as Treasurer - (LM No.- 3311)
• Dr. Hitanshu Kaushal as Joint Secretary - (LM No.- 3392)

Executive Members:
• Sh. Syed Maqbool Ahmed - (LM No.- 1670)
• Sh. Ram Prakash Mali - (LM No.- 5658)
• Sh. D. D. Shripat - (LM No.- 5352)
• Sh. Kishore Kumar – (LM No.- 2675)
• Sh. U. P. Pahadia – (LM No.- 1599)

Glimpse of 10th Executive Committee Meeting

On the suggestion and motivation by all executive members it was decided that Sh. M. S. Paliwal would be nominated for National Council member / Vice President from this chapter, in the next council election.

Sh. Asif M. Ansari thanked all members for their participation and support, emphasizing the importance of unity and collaboration for the betterment of the chapter.

The meeting concluded at 1:00 PM with a vote of thanks to the Chair.

RAYALASEEMA CHAPTER

ONE DAY WORKSHOP – LATEST MINING TECHNOLOGIES on *15th September 2024*

As a part of National Engineer's Day on 15th Sep 2024, the Chapter has organised a One Day Workshop on "LATEST MINING TECHNOLOGIES" at "Tarangini" – Ultratech Cement Limited, AP Cement Works, Tadipatri and followed by Annual General Body meeting in the noon session.

The dignitaries that chaired the workshop are:
- Shri Shailendra Kumar Jha, Unit Head- Ultratech Cement APCW Tadapatri
- Shri Dhananjaya G Reddy, Vice President - II, MEAI
- Shri M Narasaiah, Secretary General- MEAI
- Shri K Nagasidda Reddy, Chairman - Rayalaseema Chapter
- Shri K Sudhakar, Secretary - Rayalaseema Chapter

The Secretary started the function with a welcome address followed by lighting of lamp, Cake cutting and tribute to Sir Mokshagundam Visveswaraiah by all the dignitaries.

The first technical paper was presented by Epiroc Technical Service Team about their latest top hammer drill machine-SmartROC T40 series and its advanced technology and cost benefits.

Second technical paper was presented by the Solar Explosives Team about the recent gazette notification of phasing out of electric detonators & development of alternate initiation systems (Non electric shock tube blaster and electronic blasting system etc.).

Third technical paper presented by Mahadhan Agritech Limited (Deepak Fertilizers) on their latest product advancement and innovative mining solutions.

This workshop was sponsored by the following:

ANNUAL GENERAL BODY MEETING OF RAYALASEEMA CHAPTER

Venue: "Tarangini", UltraTech Cement Limited, APCW, Tadipatri

Date: 15th Sep 2024 @ 2:30 PM

In the post lunch session, the Annual General Body meeting of Rayalaseema Chapter was started. It was conducted under the guidance of Shri Dhananjaya G Reddy, and Shri M Narsaiah, SG. Rayalaseema Chapter Chairman, Secretary, Jt. Secretary and Treasurer were present on the dais along with them.

3 students' chapters of the below given Universities / Colleges are inaugurated:

1) Sri Venkateswara University - Tirupati

2) Yogi Vemana University - Kadapa

3) Govt. Arts College – Anantapur

Students Chapters are inaugurated by Shri Dhananjaya G Reddy, Vice President - II, MEAI, Shri M Narsaiah, Secretary General - MEAI and Shri K N Sidda Reddy, Chairman, Rayalaseema Chapter. They have issued the membership certificates to the students and welcomed all the students for their voluntary enrolment and advised all of them to actively participate in the MEAI activities and enrich their knowledge about the industry. Around 26 students attended the program and actively participated.

As the term of office bearers of the existing team has completed, nominations were sought for new office bearers for the next term. After suggestions and proposals from the members, the following persons are elected as office bearers for the term of 2024-26.

New Office Bearers for the Period 2024-26 are:

- Chairman: Shri K N Sidda Reddy, Vice President Mines, M/s Ultratech Cement Ltd, Tadipatri, LM – 2216

- Vice Chairman: Shri K Sudhakar, GM – Mines, M/s Bharathi Cement Corp Private Limited, FM – 143

- Secretary: Shri E Vasudevan, GM – Mines, M/s My Home Industries Limited, FM – 131

- Joint Secretary: Shri K V Suresh Reddy, GM – Mines, M/s Dalmia Cement [Bharat] Limited, LM – 6084

- Treasurer: Shri K Naga Thulasi Reddy, Sr. DGM - Mines, M/s Rain Cements Limited, LM – 1755

- Executive Members:

    1) Dr P Padmashree, HOD (Geology) - Govt. Arts College Anantapur, New LM

    2) Shri C Venkata Ramanaiah, DGM – Mines, M/s Panyam Cements, LM – 2699

3) Shri K Rama Krishna Reddy, Sr DGM – Mines, M/s Penna Cement Industries Limited, New LM

4) Shri O Vasudeva Reddy, Asst Manager – Mines, M/s UCIL - Pulivendula, LM – 5643

5) Shri B Janardhanam, GM – Mines, Chittoor, LM – 4475

The Chairman has introduced the new office bearers to the forum and thanked all for the election of the new members and assured to hold a lot of events during the forthcoming term 2024-26 for the benefit of the industry. Also, he has asked the student chapter members to actively take part in the MEAI events and have good collaboration with the industry professionals. The program concluded with a vote of thanks by Shri. K. Sudhakar.

OBITUARY
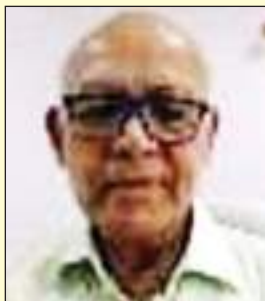
Shri. SK Pattanayak
(LM no. 138)
Bhubaneswar Chapter
(2.11.1942 to 28.6.2024)

Shri Santosh Kumar Pattanayak was born on the 2nd November 1942. He did his Mining Engineering degree from Calcutta University in the year 1965. He worked in Tata Steel Ltd during the period from 1966 to 2000 in different business units like Ferro Alloys & Minerals Division, Cement Division, etc. He worked in different capacities like Superintendent (Mines), ADM, DM, AGM and Director. He is known for introducing mechanization at the Manganese Group of Mines.

He also established the Mine Planning Cell in the Mines Division and also got the Mine Plan of Joda East Iron Mine approved by IBM, which happens to be the first Mine Plan of any mechanized mine in Eastern India.

He held the membership of MEAI, SGAT, and Bharat Vikas Parishad. Shri Pattanayak immensely contributed to the growth of MEAI in Odisha and was always keen for the professional development of the Mining fraternity.

He is survived by his wife Mrs Geeta Pattanayak, a renowned architect of Bhubaneswar.

The members of MEAI condole the sad demise of Shri. Santhosh Kumar Pattnaik and pray to the Almighty to grant eternal peace to the departed soul. MEAI also expresses profound condolences to the bereaved family. May his Soul rest in Peace.

FORMER MEAI PRESIDENT HONOURED

Mr. K. Madhusudhana, Chief Executive Officer (CEO), MSPL Limited, Hospet and Former President, MEAI was honored with the Mining, Geological and Metallurgical Institute of India (MGMI) Excellence Award 2023-2024.

The prestigious "**MGMI Award for Excellence in Non-Coal Mining**" was awarded to Mr. K. Madhusudhana **by the Mining, Geological and Metallurgical Institute of India (MGMI) at Kolkata** in recognition of his outstanding contributions to the field of Non Coal Mining.

Mr. K. Madhusudhana has more than 35 years of experience in various positions in the Non-Coal mining sector. He completed Bachelor of Engineering (Mining) from The Institution of Engineers (India) and obtained first class certificate in Mining. He also has a Master of Business Administration (HRM), and was elected **President of Mining Engineers Association of India (MEAI)** for the period 2021 to 2023.

With a wide-ranging experience in the mining sector, he has taken various steps to increase production in a sustainable manner, seamless transfer of all valid rights & approvals for auctioned mines, enhancement of production capacities etc.

Under his able leadership, MEAI has Initiated several training programs to enhance the skill development of mining fraternity in First Aid Training, Slope stability, Enhancement of blast results, Digitalization of mine operations, Resource reporting, Smart mining system for safe and sustainable mining.

Mr. K. Madhusudhana always focused on the growth of the Mining Sector. He is also secretary of MSAK to promote safety, environment, occupational standards in the mining industry by integrating the regulatory bodies, mine management and local communities. He always tried to inculcate a positive environment and have a good network within the mining industry in Karnataka as well as other states.

We, the members of MEAI, express our Hearty Congratulations to Mr. K. Madhusudhana for receiving the MGMI Excellence award 2023-2024.

OBITUARY

Shri. A. Sangameswara Rao
(10.6.1940 to 25.7.2024)

Sri. A. Sangameswara Rao began his journey in the mining sector with practical training at the Kolar Gold Fields Mines, Neyveli Lignite Mines, and Mica Mines. His professional career spanned over 39 years as a Mining Engineer with the Indian Bureau of Mines (IBM), Geological Survey of India (GSI), and Mineral Exploration Corporation Limited (MECL). In June 2000, he retired from GSI, only to continue his legacy by joining Rio-Tinto as a Consultant in November of the same year.

He served as the Honorary Secretary of the Hyderabad Chapter, and later as the Secretary General of the of the Mining Engineers' Association for six years, a role he relinquished on 29th June 2013.

He was a Fellow of the Mining Engineers' Association of India and an active member of several prestigious organizations including MGMI, Calcutta, the Society of Geoscientists and Allied Technologists (SGAT), Bhubaneswar, and the Society for Mining, Metallurgy, and Exploration (SME), USA. His expertise was often sought by the Department of Mines and Geology (DMG), Andhra Pradesh, and the Andhra Pradesh Mineral Development Corporation (APMDC) for technical advice on critical issues.

MEAI condoles the sad demise of Sri. A. Sangameswara Rao. The members of the Association pray to the Almighty to grant eternal peace to the departed soul & express their profound condolences to the bereaved family.

READERS' VIEWS

Respected Dr Rao Garu,

Here is a small submission in response to your timely and well-written Editorial on Geoscience Awards by the Ministry of Mines, in the September 2024 Issue of MEJ. It is submitted for your kind perusal and publication in MEJ.

Many thanks for your editorial in the September 2024 issue of MEJ. It was insightful and provocative towards the end. Discoveries on critical and strategic minerals and their beneficiation and recovery flow paths are crucial in the presently evolving technology regime. While appreciating your well-crafted editorial, it is our considered opinion that empowering all the geoscientists directly engaged in mineral exploration and optimizing mining and processing operations, for value addition, needs to be rewarded on a higher pedestal with far greater incentives. It was the primary intent behind instituting the National Mineral Award- meant entirely to incentivize the direct growth of the mineral and mining sector in the early nineties. Geoscientists in search of mineral resources and augmentation of national mineral reserves should be rewarded at the highest level for several reasons as elucidated below:

1. Critical Role: Geologists play a crucial role in discovering and developing mineral resources, which are essential for economic growth, technological advancements, and national security.

2. High-Risk Work: Geologists often work in challenging, remote, and hazardous environments, facing physical and mental risks to explore and extract mineral resources.

3. Innovation and Expertise: Geologists use cutting-edge techniques, technologies, and scientific knowledge to overcome complex geological challenges.

4. Economic Impact: Mineral discoveries and developments in the mineral-processing sector can generate significant revenue, create jobs, and stimulate local economies.

5. National Security: Access to critical minerals is essential for national security, as they are used in defence technologies, renewable energy systems, and other strategic applications.

6. Mineral Hegemony: Self-sufficient in such modern technology mineral commodities will enable international dominance, establish geopolitical pre-eminence in bartering trade, and aid in sustainable international relations.

7. Outcome-Oriented Contributions: A lifetime achievement award should also be awarded to well-known professional geoscientists who have made outstanding contributions for augmenting national mineral resources, either serving or having served in the National Surveys or Mineral and Mining-based organizations. '

Besides, rewarding such achievers would be recognizing and inspiring future generations to pursue careers in geology. By doing so, we can attract and retain top talent in the field, encourage innovation and exploration, ensure a sustained supply of critical minerals, and foster a culture of excellence and recognition, commitment to environmental stewardship and sustainability.

Subodh K. Sharma &
Sudesh K. Wadhawan
Former senior officers of the Geological Survey of India

OBITUARIES

Sri. P. Chandrakanth Sharma was a continuous learner and continued his learning journey even after retiring from active service. Here's the list of his academic qualifications and training: B.E. (Mining): Osmania University, 1965-1970 (Gold Medalist); M.Tech (Industrial Engineering & Operation Research): IIT Kharagpur, 1971-1973; Diploma in Labour Laws: Madras University, 1995; PG Diploma in Arbitration: NALSAR Hyderabad; LLB: Kakatiya University, 2012; Training in the UK: Systems & Methods by British Coal

**Shri. P. Chandra Kanth Sharma
(LM No. 3645) Singareni Chapter
(9.1.1950 To 2.8.2024)**

He spent a brief time working at Bharat Gold Mines and Tata Consulting Engineers and joined Singareni Collieries in 1975 where he enjoyed a long, fulfilling career of 34 years. A snapshot of his professional experience is given below:

- Trainee: Bharat Gold Mines (Kolar), 1971
- Assistant Engineer: Tata Consulting Engineers, Mumbai, 1973-1975
- Singareni Collieries Company Limited (AP): 1975-2009
  - ➤ Roles: Divisional Industrial Engineer, Dy. Chief Industrial Engineer, Additional Chief Industrial Engineer, General Manager (HRD), Chief General Manager (HRD)
  - ➤ Managed 12 training centers and a substantial HRD budget. Was responsible from design to delivery and evaluation of training programs covering around 1,800 executives and 72,000 employees per year

Sri. P. Chandrakanth Sharma continued to be active post-retirement, taking up several consulting and teaching roles with several organizations.
- Adjunct Faculty/Visiting Professor: National Institute of Technology (NIT) Warangal, Institute of Technology & Management Warangal
- Practicing Advocate: Warangal, Andhra Pradesh
- Visiting Faculty: Thapar University, Punjab
- Ex. HR Consultant: NCC Ltd.
- Convenor Consultancy Cell: Indian Institute of Industrial Engineers (IIIE), Mumbai

He took great interest and pride in imparting knowledge through several avenues such as publications (31 published papers), authoring books (Prosperity in India by 2007 from Dream to Reality in 1999) and monographs ("Progressive Trade Unionism" and "Legislation for Engineers"). He was a fellow of various prestigious institutions, including the Institution of Engineers, Hyderabad and the Indian Institution of Industrial Engineering. He also delivered lectures at numerous institutions and companies, including IIT, Kharagpur, Indian School of Mines, Dhanbad, NMDC, NTPC, and MIDHANI Hyderabad.

The members of the Association express their heartfelt condolences and pray for his soul to rest in peace.

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MEAI wishes to inform of the sad demise of Mr.BNCS Rao (LM-2865/BAN, enrolled with Bengaluru Chapter) on 24.08.2024 owing to age related issues. He was 86 years. Mr. Rao, during his distinguished career, had served the mining industry from 1956 for over fifty years, had worked for Mosaboni Group of Mines of ICC/HCL, SMIORE, Byrapur Chromite Mines of Mysore Minerals Ltd., Nandydrug Mines of BGML, and for various construction companies including Konkan Railways.

Mr.Rao is survived by three sons and their families, and MEAI condoles his demise and send condolences to the bereaved family. May his soul rest in peace.

Shri. BN Chandra Sekhara Rao

CONFERENCES, SEMINARS, WORKSHOPS ETC.

INDIA

26-28 Nov 2024: Plate tectonics, sedimentation and metallogeny through time & Annual Convention of the Geological Society of India. Location: SDM Coollege of Engineering & Technology, Dharwad. Contact: Dr Venkatramana S Hegde, +91 9164718435, vshegde2024intesem@gmail.com

21-22 Dec 2024: National Seminar on Dynamics in Mineral Sector for Viksit Bharat 2047. Organised by the Society of Geoscientists and Allied Technologists (SGAT) at Bhubaneswar. For details contact: Mr T. Mohanta, General Secretary, SGAT at Tel: +91 674 2557516; Email: sgatodisha@gmail.com; Website: https://sgat.in

ABROAD

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

14-16 Oct 2024: CRIRSCO Annual General Meeting. Hotel Hyatt Regency, Vancouver, Canada. Contact: CRIRSCO EA, Gabriel Serrano at gpaivaserrano@gmail.com

16-19 Oct 2024: MRMR 2024 Conference: Innovation and integration. Jointly hosted by CRIRSCO and CIM, Canada. Hotel Hyatt Regency, Vancouver, Canada. Contact: CIM MRMR EA, Jennifer Breaux at jbreaux@cim.org

21-23 Oct 2024: Mill Operators Conference 2024. #MillOps2024, Perth, Australia. 24 PD Hours. Contact: AusIMM T: 1800 657 985 or +61 3 9658 6100 (if overseas). Po Box 660 Carlton, VIC 3053, Ground Floor, 204 Lygon St, Carlton VIC 3053.

29-30 Oct 2024: Mining, Metals, and the Circular Economy 2024. ICC Sydney, 14 Darling Dr, Sydney, NSW, 2000, Australia. Contact: enquiries@globalminingreview.com

29-31 Oct 2024: International Mining and Resources Conference (IMARC) 2024. Sydney, Australia. Contact: 1800 657 985 or +61 3 9658 6100 (if overseas)

03-05 Nov 2024: Resourcing Tomorrow 2024. Business Design Centre, 52 Upper Street, Islington, London , N1 0QH, United Kingdom. Contact: enquiries@globalminingreview.com

7-8 Nov 2024: International Conference on Geology and Geophysics ICGG. Istanbul, Turkey. Website URL: https://waset.org/geology-and-geophysics-conference-in-november-2024-in-istanbul. Program URL: https://waset.org/conferences-in-november-2024-in-istanbul/program. Contact URL: https://waset.org

7-8 Nov 2024: International Conference on Geological Engineering ICGE. Tokyo, Japan. Website URL: https://waset.org/geological-engineering-conference-in-november-2024-in-tokyo. Program URL: https://waset.org/conferences-in-november-2024-in-tokyo/program. Contact URL: https://waset.org

21-23 Nov 2024: International Professional Geology. Zaragoza, Spain. Website URL: http://www.icog.es. Program URL: http://www.icog.es. Contact URL: http://www.icog.es

18-19 Feb 2025: International Conference on Geology and Geophysics ICGG. Manila, Philippines. Website URL: https://waset.org/geology-and-geophysics-conference-in-february-2025-in-manila. Program URL: https://waset.org/conferences-in-february-2025-in-manila/program. Contact URL: https://waset.org

23-26 Feb 2025: MINEXCHANGE 2025 SME Annual Conference & Expo and CMA 127th National Western Mining Conference co-located with World Gold 2025. Colorado Convention Center, 700 14th St., Denver, CO 80202. Contact: cs@smenet.org

09-12 Mar 2025: EnviroTech Athens - 2025 - The Gateway to Green Cement. Greece. Contact: enquiries@globalminingreview.com

7 - 9 Apr 2025: Underground Operators Conference 2025. Adelaide Convention Centre, Adelaide, Australia. Contact: 1800 657 985 or +61 3 9658 6100 (if overseas)

8-9 Apr 2025: International Conference on Geological Engineering ICGE. Rome, Italy. Website URL: https://waset.org/geological-engineering-conference-in-april-2025-in-rome. Program URL: https://waset.org/conferences-in-april-2025-in-rome/program. Contact URL: https://waset.org

7-8 May 2025: Mineral Resource Estimation Conference 2025. Perth, Australia. Contact: 1800 657 985 or +61 3 9658 6100 (if overseas)

20-22 May 2025: Global Resources Innovation Expo 2025. Brisbane, Australia. Contact: 1800 657 985 or +61 3 9658 6100 (if overseas)

21-22 May 2025: AUSTMINE 2025. Brisbane Convention and Exhibition Centre. Contact: Jason Berman, Event Director, jberman@etf.com.au, +61 2 9556 7991

10 - 13 Aug 2025: Application of Computers & Operations Research in the Mining Industry. #APCOM2025. PCOM Conference 2025, Perth Convention and Exhibition Centre, Perth, Western Australia. AusIMM T: 1800 657 985 or +61 3 9658 6100 (if overseas). Po Box 660 Carlton, VIC 3053, Ground Floor, 204 Lygon St, Carlton VIC 3053.