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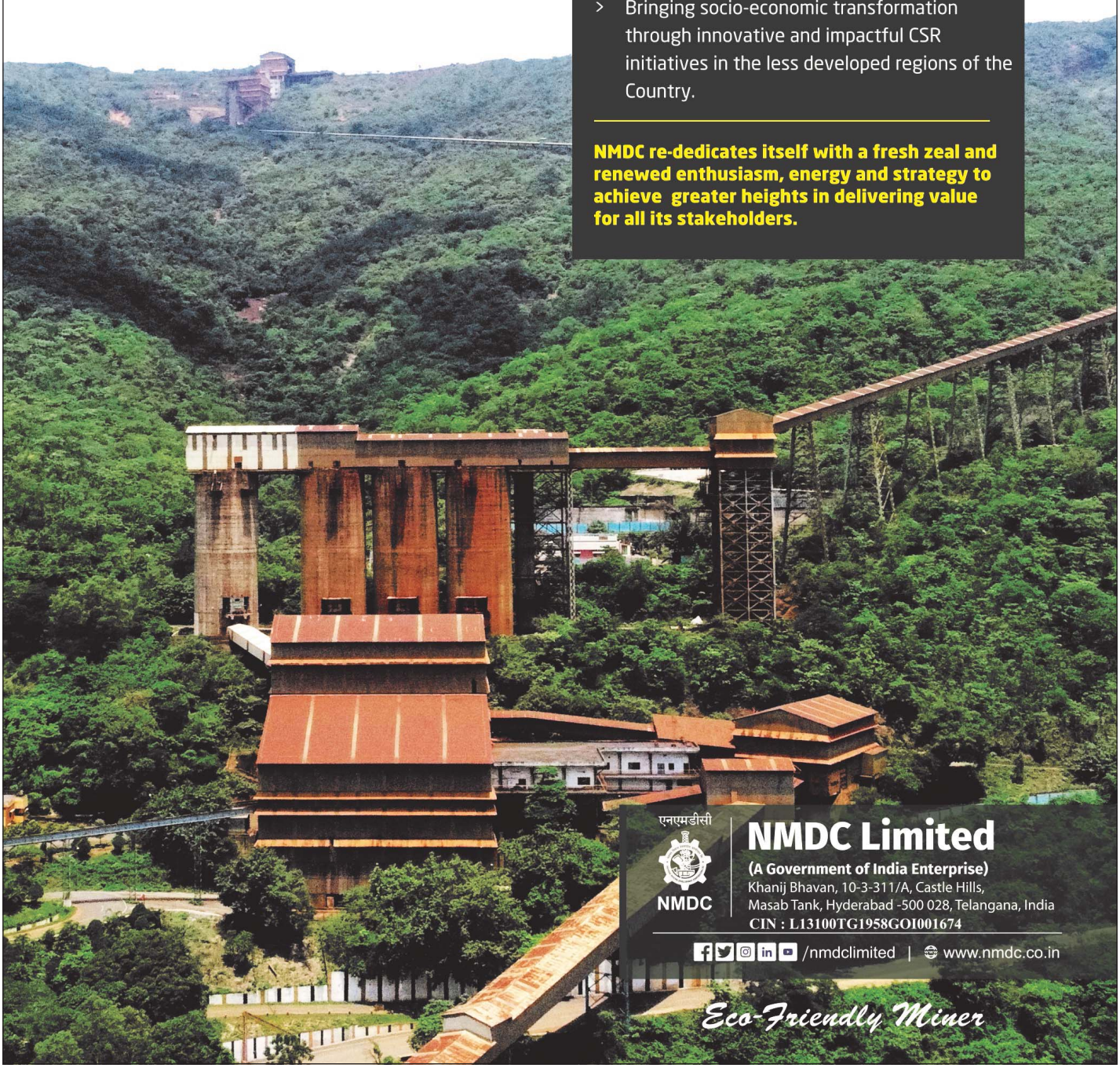

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this issue contains...

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President's Message.....

Dear Members,

Greetings…

I wish to put forth the activities undertaken by our Association in the preceding month.

Rajasthan Chapter- Jodhpur organised a Seminar series on "***Digitization of Mining Operations***" on 9th January in the department of Mining, MBM University in physical as well virtual mode.

Bhubaneswar Chapter Conducted Interactive Session with Dr. Chandrani Prasad Verma (India's First female Mining Engineer) on 11th January in Chrome Valley Club, Sukinda Chromite Mine, Tata Steel Mining Limited. It was arranged in hybrid mode.

The national flag hoisting program was done in view of 74th Republic day celebrations at our Mining Welfare Centre, Jaipur along with a presentation by Dr. Vivek Laul on "***Metallic Mineralisation across different geological setups in Africa and Middle East***" by our **Rajasthan Chapter - Jaipur**.

Bellary-Hospet Chapter took initiative to print a well compiled and informative Diaries and distributed them to all MEAI members of the Chapter as well as all our Council members. The national flag hoisting program was held at SUMS office, Hospet, in view of 74th Republic day celebrations

On 27th January 2023, Mr Sushanta Kumar Mishra Sr. GM (Mining) delivered a talk on "***Digitalization in Mine Operation***" in the MEAI TECH SERIES (MTS), an online program. The MTS program is an ongoing program, which is held every month. Request all the students, trainees, mineral industry professionals to avail this opportunity.

Auctioning of Mining blocks was accelerated in all the states viz: Karnataka, Odisha, MP, Goa and Rajasthan. This is a positive sign, which will accelerate the development of the domestic Mining Industry.

Major concerns that are being faced by the successful bidders are such as getting timely statutory clearances, especially with respect to Forest clearance, to operationalize the auctioned blocks. These issues were brought to the notice of the Government authorities through a representation from the MEAI. GoI has considered the above issues and is working towards resolving the same.

The election process for electing the new MEAI Council members for the term 2023-25 has been initiated as per the Association bye laws.

Regards,

K. MADHUSUDHANA
President

Mining Engineers' Association of India

Regd. Office : Rungta House, Barbil (Odisha)

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EDITOR'S DESK

Dr. P.V. Rao
Editor, MEJ

Geoscientists engaged in exploration, evaluation and extraction of minerals honestly appreciate the significance of cobalt to humanity in the context of producing clean energy. Nearly two decades ago I had a chance to work in the Democratic Republic Congo (DR Congo) as an Exploration Director of a large mining company that owned vast concessions comprising copper and cobalt, gold, diamond, tin mineral resources in its possession. The more than a century old copper-cobalt mine "Etoile", meaning the "Star of the Congo mine" was also operated by the same company. At that time, I had the opportunity to interact with the academicians and government officials, the mineral industry leaders and the artisanal miners of DR Congo to get an insight about artisanal miners.

According to Wikipedia "An artisanal miner" is a subsistence miner who is not officially employed by a mining company, but works independently, mining minerals using their own resources, usually by hand. Artisanal miners often undertake the activity of mining seasonally depending on the availability of time. However, they also frequently travel to mining areas and work year-round. Artisanal mining is an important socio-economic sector for the rural poor in many developing nations, many of whom have few other options for supporting their families. It is a way of life for people like any other ancient occupation and the mining companies may not necessarily compel the artisanal miners, contrary to the misconception that is regularly publicized to be, to work in extreme unsafe conditions.

One of the first pictures of the l'Etoile du Congo mine in 1910

Congo is responsible for nearly 70% of world cobalt production, and as much as 30% of which comes from so-called artisanal miners. Those miners often work in dangerous and unregulated conditions. Trafigura, a multinational commodity trading company headquartered in Singapore, remains committed to its commercial agreement with EGC (Congo's state-owned Entreprise Generale du Cobalt) and delivers on the pressing need to kick-start the large-scale formalization of the artisanal and small-scale mining cobalt industry.

Prospector, a wholly owned subsidiary of Analog Gold, a mining investment company, published the cobalt Resource Report 2022 recently and the essence of this report is worth perceiving. Prospector's team has identified a list of mining projects around the world with cobalt resources and reserves. They believe that the list of companies encompasses the majority of the world's projects within publicly traded companies that are listed on the TSX, TSX-V and ASX. Their current evaluation shows that:

70% of global cobalt resources and reserves are contained in primary nickel projects; 21% contained in primary copper projects, while less than 5% are attributed to primary cobalt projects. The remaining 3.75% may be attributed to other metals including primary iron, PGEs, zinc, silver, gold projects. This means that mining cobalt is heavily dependent on the economics of other metals (for example, copper and nickel prices). Considering less than 5% of the cobalt contained metal is attributed to primary cobalt projects, the economics of bringing on additional supply are in the hands of nickel and copper mines.

88% of global cobalt resources are within the measured, indicated, inferred categories. Only ~11% are within the Proven and Probable Reserve categories. While a majority (~51%) of the contained metal is classified as Inferred Resources, the remaining ~38% of the contained metal is classified as Measured & Indicated Resources.

Close to 90% of cobalt resources are in a relatively early stage, that is, the resources haven't been defined enough and confirmed to be classified as reserves, meaning a lot of work to be done by these companies.

The Republic of Nauru (Deep Sea Mining), Australia, Philippines, USA, and Kingdom of Tonga (Deep Sea Mining) have the largest cobalt resources and reserves. These five combined account for over 77% of the world's cobalt resources and reserves.

If Deep Sea Mining is excluded from the list, global resources and reserves drop by 33%. Under this scenario, the top 5 countries include: Australia (31.6%), Philippines (20.5%), USA (13.25%), Brazil (8.7%), Canada (8.4%).

- Editor

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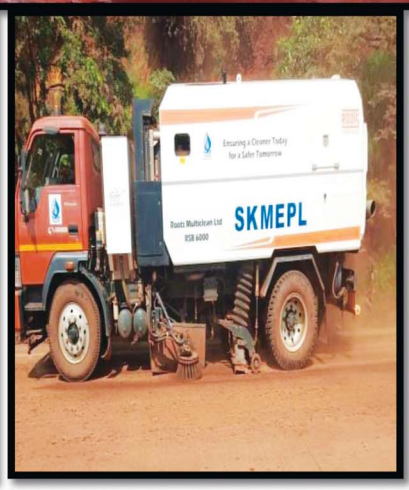

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NEWS FROM THE MINING WORLD

Bihar govt. initiates auction process for iron ore mines worth Rs 20,000 cr

Once the report is submitted, the state govt will initiate the process of granting permission to allow mining of glauconite and iron ore reserves worth Rs 20,000 cr, in Rohtas and Jamui districts

The Bihar government has initiated a process for auctioning of glauconite and iron ore reserves worth Rs 20,000 crore in Rohtas and Jamui districts and will engage SBI Capital Markets to prepare a report for the same, an official said on Saturday. The government held a meeting with several stakeholders recently to initiate the auction process, Additional Chief Secretary-cum-Mines Commissioner Harjot Kaur Bamhrah said.

The state government will shortly issue an order for engaging SBI Capital Markets as the transaction advisor and also to suggest terms and conditions based on which the auctions would be conducted, Bamhrah told PTI. The state government has asked SBI CAPS, the investment bank and project advisor, to submit a detailed report, she said.

Once the report is submitted, the state government will initiate the process of granting permission to allow mining of glauconite and iron ore reserves worth Rs 20,000 crore, in Rohtas and Jamui districts on a lease basis, the mines commissioner said. Glauconite, a common source of potassium in fertilisers, is useful in increasing soil fertility, while iron ore is the essential raw material for making steel.

Earlier, there was a perception that Bihar lost its mineral wealth following the creation of Jharkhand in 2000, she said. “In fact, Bihar has sufficient mineral resources to boost its economy,” Bamhrah said. This is for the first time since the creation of Jharkhand, the Bihar government has initiated a process of allowing mining activities for the state’s mineral reserves. Besides, the state government has also decided to amend its industrial promotion policy by including provisions to encourage private participation in the mining sector, she said.

The decision to make suitable changes in the Bihar Industrial Promotion Policy to encourage private participation in the mining sector, as it has been done by the Odisha, Chhattisgarh and Jharkhand governments, was taken in a recent meeting chaired by the state chief secretary, Bamhrah said.

The state government has earmarked two glauconite mines worth Rs 14,048 crore in Pipradih and Chutia-Nauhatta blocks of Rohtas district for auction. Besides, the Mines and Geology Department has decided to allow mining activities in iron ore deposits, worth Rs 6000 crore, in Jamui, she said.

The SBI CAPS will decide modalities of the mineral auction by way of demarcation and assessment of blocks, tender process, reserve price fixation and eligibility criteria among others, Bamhrah said. The state has seven blocks of rare minerals that are ready for the auction, she added.

Press Trust of India, Patna / January 14, 2023

India eyes overseas copper, lithium mines to meet domestic shortfall

“A team of experts has already studied the technical aspects of the one copper and two lithium mines in Argentina by visiting the sites”

India is exploring ways to secure supplies of metals such as copper and lithium from some of the world’s top producers by acquiring overseas mines, as part of efforts to meet rising domestic demand, government sources said.

To start with, India has identified one copper and two lithium mines in resource-rich Argentina to either acquire or secure long-term leases, the sources said. The sources, with direct knowledge of the matter, did not wish to be identified, citing official rules. “A team of experts has already studied the technical aspects of the one copper and two lithium mines in Argentina by visiting the sites,” said one of the sources.

“Now, we will start the commercial assessment, and that will take about a couple of months.” The effort is part of India’s wider push to secure critical metals and minerals from top world producers, the sources said. A spokesperson for the Ministry of Mines did not immediately respond to a request for comment. As part of its drive to explore overseas mineral assets, the Indian government has formed Khanij Bidesh India (KABIL) Ltd - a company set up by state firms National Aluminium Company Ltd, Hindustan Copper Ltd and unlisted Mineral Exploration Corp Ltd. KABIL is expected to set up its unit in Argentina to mine and process lithium, the sources said. Lithium is an important raw material used to make electric vehicle batteries. As part of a broader push by the government to meet its decarbonisation goals, India has introduced a clutch of measures to boost sales of electric vehicles (EVs).

India is set to become the world’s third-largest market for passenger and other light vehicles, displacing

Japan, according to a forecast by S&P Global Mobility. Other than lithium, copper consumption has jumped in India, even as the country produces only 10-15% of its total copper requirement. India was on track to be one of the world's fastest-growing copper markets in 2022, bucking the trend of softening demand expansion elsewhere, including top consumer China, amid a slowing global economy.

Reuters, New Delhi | January 12, 2023

Coal India subsidiary NCL to start M-Sand production, says ministry

State-owned Coal India's subsidiary NCL will soon start production of M-Sand, a material used for construction works

State-owned Coal India's subsidiary NCL will soon start production of M-Sand, a material used for construction works. Northern Coalfields Ltd (NCL) will start production of M-Sand or Manufactured Sand for its Amlohri project in Madhya Pradesh, according to a coal ministry statement on Tuesday.

M-Sand is artificial sand produced from crushing hard stones into small sand-sized angular shaped particles, washed and finely graded to be used as construction aggregate. It is an alternative to river sand for construction works. NCL is all set to start production of M-Sand and the move is aimed at maximising the utilisation of natural resources and minimising the adverse impact of mining.

Eyeing business diversification while focusing on the ecological balance, the company has set up a sand manufacturing plant using its over burden as a raw material. This pro-environment move of the company will help in conserving river bed erosion and preserve aquatic ecosystems, as per the statement.

Recently, NCL received the consent to operate which paves the path towards commercial production and auction of M-Sand which is likely to begin next month. A huge quantity of over burden is required to be removed to extract coal. The material above the coal seam is known as over burden. Annually, NCL produces more than 122 million tonnes of coal from its 10 open-pit mines.

Press Trust of India, New Delhi | January 10, 2023

Coal-based power generation rises 15% to 98,443 million units in Dec

Country's coal-fired power generation increased by 15.03 per cent to 98,443 million units (MU) in December, as per official data

Country's coal-fired power generation increased by 15.03 per cent to 98,443 million units (MU) in December, as per official data. Coal-based power generation -- which accounts for 76.59 per cent of the total power generation in the country -- stood at 85,579 MU in the corresponding month of the previous fiscal.

According to the monthly statistics (provisional) of December, 2022 of the coal ministry, both coal-based power generation and overall power generation has registered a year-on-year increase in December 2022. "Coal-based power generation has registered a growth of 15.03 per cent in December'22 as compared to December'21 and overall power generation in December'22 has been 13.65 per cent higher than the power generated in December'21," it said.

Similarly, total power generation advanced in December, last year to 1,28,536 MU from 1,18,029 MU in November, 2022 and registered a growth of 8.90 per cent. However, lignite-based power generation in the month of December dropped marginally to 2,227 million units, against 2,272 MT in the corresponding month of previous fiscal. The electricity generation through hydroelectric power last month increased by 5.94 per cent to 9,132 MU, over 8,620 MU in the year-ago period.

NTPC, which supplies one-fourth of the electricity in the country, had earlier said that coal-based electricity generation is the backbone of power supply in the country and it is going to stay this way for the next two-three decades. The company had said that instead of talking about phasing out coal-based thermal power plants, India needs to focus on dispatchable renewable energy. The PSU favoured having new efficient and environment-friendly coal-based thermal power plants rather than running old and inefficient ones.

Press Trust of India, New Delhi | January 8, 2023

India identifies copper and lithium mines in Argentina; to acquire soon

In November 2022, the Indian government sent a team of geologists to South America to "assess potential lithium deposits"

India has identified two lithium mines and one copper mine in Argentina, and it may acquire or lease them soon, a report by *BusinessLine (BL)* said. In November 2022, the Indian government sent a team of geologists to South America to "assess potential lithium deposits".

Representative Image

The report cited officials of the ministry of mines as saying that the ownership or leasing rights of the mines will be with Khanij Bidesh India Ltd (Kabil). It is a joint venture of the National Aluminium Company (Nalco), Hindustan Copper (HCL) and Mineral Exploration Corporation Ltd (MECL). It was formed in 2019 to ensure the supply of strategic minerals in India's market.

"Subsequent to preliminary assessment, Kabil expressed interest to partner with a state-owned organisation there in December for prospecting the identified areas and exploring the possibility of establishing projects for extraction of lithium in due course of time. Commercial evaluation of the same has begun at our end here," the official told *BL*.

Argentina is the fourth largest producer of lithium. It also has the third-largest reserve of the mineral in the world. Lithium is widely used in manufacturing batteries and other electronic products. Australia, US and China are the other major producers of the mineral.

In December, *PTI* reported that Kabil expressed interest in partnering with Argentina-based Camyen to prospect two areas for extracting lithium. The ministry, in October, said that Camyen shared information regarding two prospective lithium projects in la Aguada and El Indio in Catamarca through the Indian Embassy in Buenos Aires.

Kabil also signed three agreements with Argentina government-run companies JEMSE, Camyen and YPF between July and September 2020 to explore sourcing of lithium and other mineral assets in the South American country. Kabil is also reportedly in the process of hunting joint lithium mining projects in Chile.

In March, the JV under the mines ministry signed a memorandum of understanding with the Department of Industry, Science and Resources, Australia, for joint investment in lithium and cobalt assets in that country.

BS Web Team, New Delhi / January 5, 2023

Coal production rises 16% at 608 Mn tonnes during Apr-Dec period of FY23

Coal Ministry sources said that production has increased due to greater usage of mining capacities of captive coal blocks

Photo: Bloomberg

India's coal production went up by 16.39 per cent to 607.97 million tonnes during April-December period of the current fiscal as against 522.34 million tonnes produced during the corresponding period of last year. Coal India Limited (CIL) reported 15.82 per cent rise in production as 479.05 million tonnes of dry fuel production was recorded up to December in the current fiscal as against 413 million tonnes produced during the corresponding period of last year, official sources said.

Coal Ministry sources said that production has increased due to greater usage of mining capacities of captive coal blocks. The Ministry has also amended the Mineral Concession (Amendment) Rules, 1960 under MMDR (Amendment) Act, 2021 to allow lessee of captive mines to sell coal or lignite up to 50 per cent of the total excess production after meeting the requirement of the end-use plants.

IANS, New Delhi / January 3, 2023

India's coal production expected at 997 million tonnes in FY'24

Of the projected figure, state-owed CIL's output is likely to be 760 Mt, followed by Singareni Collieries Company

Ltd (SCCL) at 75 Mt, and captive and others at 162.14 Mt, according to government data

The country is expected to produce 997.14 million tonnes (Mt) of coal in the coming financial year. Of the projected figure, state-owed CIL's output is likely to be 760 Mt, followed by Singareni Collieries Company Ltd (SCCL) at 75 Mt, and captive and others at 162.14 Mt, according to government data.

During 2024-25, the country is expected to produce 1,111.60 Mt of coal, which includes 850 Mt by Coal India Ltd (CIL), 181.60 Mt by captive and others and 80 Mt by SCCL, as per the data. While in FY'26 India's production is expected at 1,288.39 Mt, in FY'27 the figure is likely to reach 1,342.80 Mt. Coal India accounts for over 80 per cent of domestic coal output.

The country is targeting a production of 911 Mt in the current fiscal. However, the total demand for coal in 2022-23 is estimated is 1,087 Mt. The demand for the dry fuel from the power sector is expected at 775 Mt, steel at 70 Mt and non-regulated sectors at 242 Mt.

The government has taken various steps to augment domestic coal production. These include single window clearance, amendment of the Mines and Minerals (Development and Regulation) Act, 1957 to allow captive mines to sell up to 50 per cent of their annual production after meeting the requirement of the end use plants, and production through mine developer and operator (MDO) model.

Other initiatives include increasing use of modern technologies, taking up new projects and expansion of existing coal mines, and auction of coal blocks to private companies and PSUs. Moreover, 100 per cent foreign direct investment is allowed for commercial mining.

Press Trust of India, New Delhi | January 1, 2023

Former gold mine to host largest underground caverns in history

The former Homestake mine, the biggest and deepest gold mine in North America until its closure in 2002, is set to become one of the largest underground caverns in history and house the largest physics experiment in the study of neutrinos.

The site, located under the Black Hills of South Dakota, is expected to host the Deep Underground Neutrino Experiment (DUNE) project being developed within the Sanford Underground Research Facility (SURF) by the US Department of Energy's Fermi National Accelerator Laboratory. "The DUNE caverns are mind-bogglingly big. There is no question about it," Joshua Willhite, one of the engineers leading the DUNE excavation and a graduate of the university South Dakota Mines, said in a media statement. According to Willhite, two of the main caverns are seven stories tall, one football field and a half long and 64 feet wide. A third utility cavern is three stories high, two football fields long and 64 feet wide.

One of the caverns at the Deep Underground Neutrino Experiment. (Image courtesy of South Dakota Mines)

Even though there are other caverns of similar or larger size on the planet, they are closer to the surface. This means that nothing the size of DUNE has ever been done at depths of 4,850 feet below ground.

Engineering challenges

Willhite noted that the engineering challenges of construction this far below the surface are formidable. "Every bit of air that is underground has to come down through one shaft and go back out another shaft, and this requires management of air movement," he said. At the 4,850-foot level of SURF, the natural temperature of the surrounding rock walls is 95 degrees, so ventilation for air conditioning is key.

Water, on the other hand, cannot be taken for granted in the DUNE construction. Installing a bathroom, for example, requires pumping water between the surface and the construction site which, in turn, would require almost 2,200 psi of pressure. Thus, engineers have broken down the plumbing that supplies water into a series of stepped segments to reduce the pressure needed by individual pumps.

Heavy equipment like excavators and front-end loaders and construction materials like long steel beams that are normally a part of any construction operation are also hard to come by at DUNE. "These massive caverns take huge equipment. But we are supplied by

mine shafts that are not that much bigger than a normal elevator, and there is no piece of excavation equipment that will fit in an elevator, so we have to disassemble the equipment at the surface and reassemble it at depth," Willhite said. On top of this, the rock being excavated from these large caverns must be placed back on conveyances and moved to the surface.

Neutrino experiment

Inside DUNE, the US Department of Energy is building a facility that will hold massive tanks of liquid argon that will detect the neutrinos coming in from a beam generated at Fermilab in Illinois. At least two of the tanks are the size of five-story buildings and each will hold 17,000 tons of -300ºF liquid argon."To maintain that temperature, we use a large nitrogen generator and refrigeration system to create liquid nitrogen at -320°F," Willhite said. The liquid nitrogen will be used to help cool the argon.

"Aside from the ridiculously cold temperature, when these liquids boil, they expand over 700 times their volume. There is nothing inherently hazardous about argon gas except it displaces any oxygen. We have to ensure that this expansion is minimized, controlled and ventilated properly for worker safety," he pointed out. For Willhite, the engineering challenges at DUNE are part of what makes it a fulfilling project.

Staff Writer, Mining.Com | January 15, 2023

Two minerals never seen on earth extracted from meteorite sample

Sample of the El Ali meteorite. (Image courtesy of the University of Alberta)

A team of researchers has discovered at least two minerals never before seen on earth in a 15-tonne meteorite found in Somalia – the ninth-largest meteorite ever found.

The two minerals, with a potential third mineral under consideration, came from a single 70-gram piece that was sent to the University of Alberta for classification.

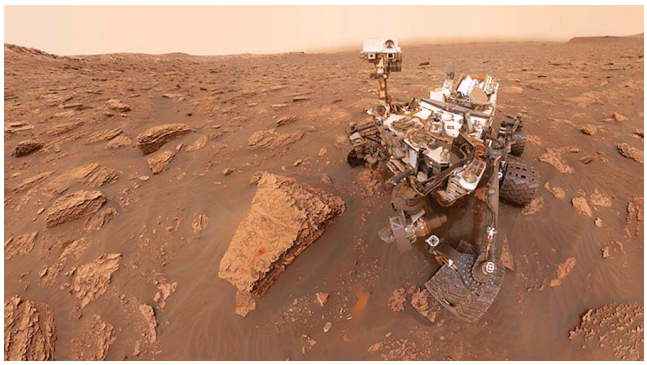
"Whenever you find a new mineral, it means that the geological conditions, the chemistry of the rock, was different than what's been found before," Chris Herd, curator of the University of Alberta's Meteorite Collection, said in a media statement. "That's what makes this exciting. In this particular meteorite, you have two officially described minerals that are new to science." The new minerals – named elaliite and elkinstantonite – were identified rapidly by Andrew Locock, head of the university's Electron Microprobe Laboratory, because each had been synthetically created before. Elaliite is named after the meteorite itself, dubbed the "El Ali" meteorite because it was found near El Ali, in Somalia. Herd named the second mineral after distinguished planetary scientist Lindy Elkins-Tanton, due to her work exploring how the cores of planets are formed.

The research, conducted in collaboration with UCLA and the California Institute of Technology, suggests that if the scientist can obtain more samples, even more minerals may be found. The problem is that the future of the meteorite is uncertain. Researchers say it appears to have been moved to China, so it remains to be seen whether additional samples will be available for scientific purposes.

For the time being, the team continues to examine the minerals to determine what they can share about the conditions in the meteorite when it formed. Herd also noted that any new mineral discoveries could yield exciting new uses down the line. "Whenever there's a new material that's known, material scientists are interested too because of the potential uses in a wide range of things in society," he said.

Staff Writer, Mining.Com | December 29, 2022

Extraterrestrial manganese turns out to be oxygen-free



Curiosity's dusty selfie. (Image by JPL/NASA)

Researchers at Washington University in St. Louis have turned on its head a theory related to the presence of

manganese oxides on Mars. Through an experimental study, the scientists discovered that under Mars-like conditions, manganese oxides can be readily formed without atmospheric oxygen. Using kinetic modelling, they also showed that manganese oxidation is not possible in the carbon dioxide-rich atmosphere expected on ancient Mars.

Prior to this discovery, it was believed that the manganese oxides recovered from rocks in Mars' Gale and Endeavor craters in 2014 were formed because the red planet might have once had more oxygen in its atmosphere billions of years ago. Back then it was suggested that the minerals probably required abundant water and strongly oxidizing conditions to form. Using lessons learned from earth's geologic record, it was concluded that the presence of manganese oxides indicated that Mars had experienced periodic increases in atmospheric oxygen in its past—before declining to today's low levels. But the UW researchers think otherwise.

"The link between manganese oxides and oxygen suffers from an array of fundamental geochemical problems," Jeffrey Catalano, corresponding author of the paper presenting the new findings, said in a media statement. Catalano explained that Mars is a planet rich in the halogen elements chlorine and bromine compared to earth. Halogens occur on Mars in forms different from those on the earth, and in much larger amounts. Thus, he and his team considered that they would be important to the fate of manganese.

Together with co-author Kaushik Mitra, Catalano conducted laboratory experiments using chlorate and bromate—dominant forms of these elements on Mars—to oxidize manganese in water samples that they made to replicate fluids on Mars's surface in the ancient past. "We were inspired by reactions seen during chlorination of drinking water," Catalano said. "Understanding other planets sometimes requires us to apply knowledge gained from seemingly unrelated fields of science and engineering."

The scientists found that halogens converted manganese dissolved in water into manganese oxide minerals thousands to millions of times faster than oxygen. Further, under the weakly acidic conditions that scientists believe were found on the surface of early Mars, bromate produces manganese oxide minerals more quickly than any other available oxidant. Under many of these conditions, oxygen is altogether incapable of forming manganese oxides.

"Oxidation does not necessitate the involvement of oxygen by definition," Mitra said. "Earlier, we proposed viable oxidants on Mars, other than oxygen or via UV photooxidation, that helped explain why the red planet is red. In the case of manganese, we just did not have a viable alternative to oxygen that could explain manganese oxides until now."

What about habitability?

The new results alter foundational interpretations of the habitability of early Mars, which is an important driver of ongoing research by NASA and the European Space Agency. However, the researchers noted that just because there was likely no atmospheric oxygen in the past, there's no particular reason to believe that there was no life.

"There are several life forms even on earth that do not require oxygen to survive," Mitra said. "I don't think of it as a 'setback' to habitability—only that there was probably no oxygen-based lifeforms." He pointed out that extremophile organisms that can survive in a halogen-rich environment—like the salt-loving single-celled organisms and bacteria that thrive in the Great Salt Lake and the Dead Sea on earth—might also do well on Mars.

Staff Writer, Mining.Com | December 27, 2022

And the winner for most volatile commodity this decade goes to…lithium

Salar de Uyuni, Bolivia. Stock image

Commodity prices are always volatile, but in 2022 metal and mining markets reached new levels of turbulence, as the pandemic played out in China, inflation plagued the developed world and the Ukraine war upended global energy. US Global Investors, every year publishes what the San Antonio, Texas investment firm calls The Periodic Table of Commodities Returns.

2022 was the second year in a row lithium was the best performing among the 15 commodities tracked by US Global Investors. The battery metal gained another 72.5% in 2022 following a stunning 442.8% jump the prior year. Investors in the sector over the last decade

(Continued on Page 26)

SKILL DEVELOPMENT IN THE INDIAN MINING INDUSTRY

Niladri Bhattacharjee*, Navneet Kumar, Sanjay Sharma***, Pankaj Satija******

Abstract

For an evolved Skill Development Ecosystem to supply as per the requirement there is a need for proper and specific training as well as skilling of people starting from the school/college level. Analysis suggests that a significant gap exists between the skill level of the current workforce and the skill level requirement in the mining sector. This can cause hindrance in our efforts towards embracing the Industry 4.0 norms. Although there are several challenges, the Govt. of India, PSUs, and Private Companies are working to bridge this gap and strengthen the skilling ecosystem in the country.

***Keywords**: Skill, Mining, Challenges, Training, Ecosystem*

1.0 INTRODUCTION

India is one of the largest minerals producing countries in the world and our country has a rich resource of many metallic and non-metallic minerals. India currently produces nearly 95 minerals under different groups such as fuel minerals, metallic minerals, non-metallic minerals, atomic minerals and minor minerals (Ministry of Mines, Govt. of India). Further, mining has been one of the essential sectors that drives the growth of our economy and also fuels the growth of other essential industries such as power, steel, cement and many more, thereby being vital for the overall progress of the economy of India.

"Mines are the source of wealth; from wealth comes the power of the State"
(Arthashastra, 2.12.37; 7.14.25)

With sustainability taking the centre stage in every business, mining is also grooming up to the challenge. For sustainable mining practices to thrive, skilled manpower is an imperative. Skill development not only improves productivity and safety of the mining process but also prepares the manpower to familiarize themselves with the new technologies introduced in the mining industry. The Indian mining industry is currently in a transition phase from being labour-intensive to technology intensive. It also faces the brunt of being low on productivity at 150 – 2,650 TPA per worker, which is much lower when compared to that of Australia at 12,000 TPA (FICCI-McKinsey study). However, considering the technical skill requirements for Industry 4.0 implementation, the sector is facing scarcity of skilled workforce.

Thus, to improve productivity, the requirement of skilled and certified human resources for the mining sector is very important and long-term human resource planning in association with national and international institutions and agencies is the way going forward.

2.0 NEED TO ENHANCE PRODUCTION AND PRODUCTIVITY

In India, per unit labour productivity in the mining industry is very low compared to other mineral-rich countries. According to a PwC report, the average productivity of coal in the U.S.A is 36,700 tonnes per employee per year (Peabody Energy). In China, the productivity of coal is 12,700 (Shenhua Energy) tonnes per employee per year. In stark contrast to the USA and China, the productivity of coal in India is only 1,497 (Coal India Ltd.) tonnes per employee per year. There is a positive relationship between per unit labour productivity and total productivity and competitiveness of the product. In order to increase the total production or growth of the mining sector, it is necessary to increase the per-unit mining labour productivity in India.

3.0 INDIA: EMPLOYMENT POTENTIAL IN MINING

The mining industry is driving the employment sector by creating jobs directly and indirectly. But, the indirect employment growth will depend upon the productive growth of that specific company/industry in that region. Companies always try to hire the local population as employees to empower the displaced and the affected ones. Hiring these fresh people and then skilling them according to the requirements takes time and dedicated effort. So, skilling and certification of the interested and competent candidates, who wish to join the mining sector, at school, college level, or through vocational education (like Short Term Training, B.Voc/D.Voc) should be preferred. Skilling in the core sector and also in soft skills, professionalism, behaviour skills,

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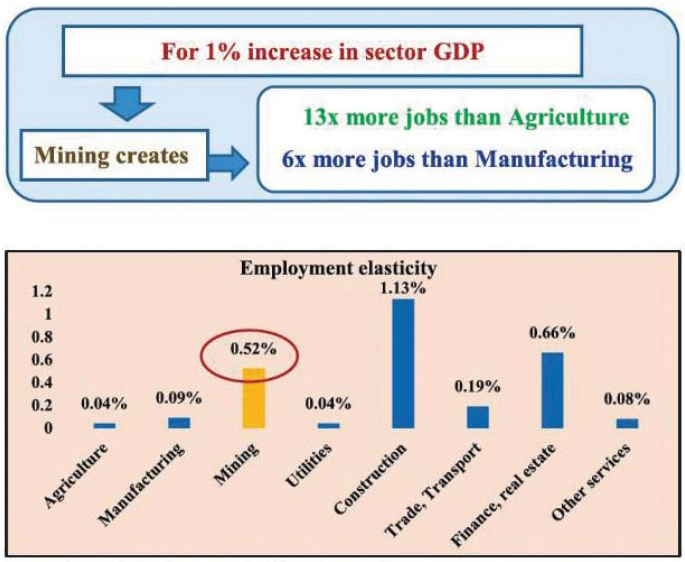
digital literacy, entrepreneurship, etc. will create a positive impact on the thinking of the manpower, will increase competitiveness, and also make people ambitious about their personal growth in career and life.



Source: FIMI publication "Employment in Mining: A case of missed opportunities – prospects for future", 2019

Source: FIMI publication "Employment in Mining: A case of missed opportunities – prospects for future", 2019

Fig 1: Employment Potential in Mining

4.0 SKILLING VISION OF THE PRIME MINISTER OF INDIA

It is generally recognized that India has a vast demographic surplus. By 2026, nearly 65% of our population will be between 15-64 years (with 35% being below 35). Given that, the country is poised to become the world's single destination for skilled human resources. However, many reports suggest that only 25% of India's graduates are employable. These are alarming figures, and the government is working efficiently to achieve the Skill India and Atmanirbhar Bharat dream.

A few major suggested changes are placed below.

- Good, fast, and efficient decision-making are desirable at the zonal, state, industry, or organizational (Private or Public sector) levels.
- The training part is to be taken more seriously at the organizational level and innovative and futuristic curriculums should be designed as per the latest technological demands.
- Many government schemes and guidelines are yet to be enforced or accepted at the ground levels.
- Employability Skills modules have been made compulsory to be included in any STT programs. This will increase professionalism and the learning curve of the workmen. The same should also become an integral part of the school, college, and technical education system.
- There is a clear focus to optimize, reskill and employ the 75% AGNIVEERs who will be de-rostered after 4 years of defence services. Thus, India will get the most disciplined and skilled manpower across many sectors.

5.0 UNLOCKING INDIA'S SKILL RESOURCES BY OVERCOMING CHALLENGES

The mining industry is currently divided into 4 sub-divisions. They are as follows:

a) Exploration and Resource Management,
b) Extraction and Mining operations,
c) Support services – engineering and electrical and
d) Beneficiation.

A Price Waterhouse Coopers (PWC) Study for Skill Council for Mining Sector (SCMS) study has categorised employment in the mining industry into 3 sub-categories:

a) Core Employment: People employed in the above 4 sub-divisions of mining.

b) Employment in Ancillary Activities: People that provide energy, service, material, equipment, machinery and infrastructure to the mining industry and also people who perform service in the vicinity of the mines.

c) Induced Employment: Employment created due to income spending of mining workforces in the vicinity of mines.

In core employment, close to 2.3 million in FY'19, mining operations account for employing 86.9% of the workforce

and 9.9% workforce in engineering and support services and only 3.2% is in exploration and beneficiation (India KLEMS database 2016).

Employment created by ancillary activities is close to 5 million in FY'19 and Induced employment is at 4.4 million, thereby estimating the total employment of the mining industry 11.7 million in FY'19.

Table 1: Incremental Human Resources Demand by Mining Sub-Sector (in '000) (2019-25) (Source: India KLEMS database 2016, NSSO 68th round of Employment & Unemployment Situation in India, PLFS Annual Report, FY'18

S.N	Sub-Sector	Total Employment (FY'19)	Incremental Human Resource Demand			% share incremental demand (2019–25)
			2019-21	2022-25	2019-25	
1	Prospecting, Exploration & Mine Planning	58.6	2.0	4.8	6.8	2.5%
2	Mining Operations	2038.2	70.2	165.2	235.4	86.9%
3	Engineering Services	231.2	8.0	18.7	26.7	9.9%
4	Mineral Beneficiation	16.7	0.6	1.4	1.9	0.7%
Total (Core Mining)		2344.8	80.7	190.0	270.8	100%

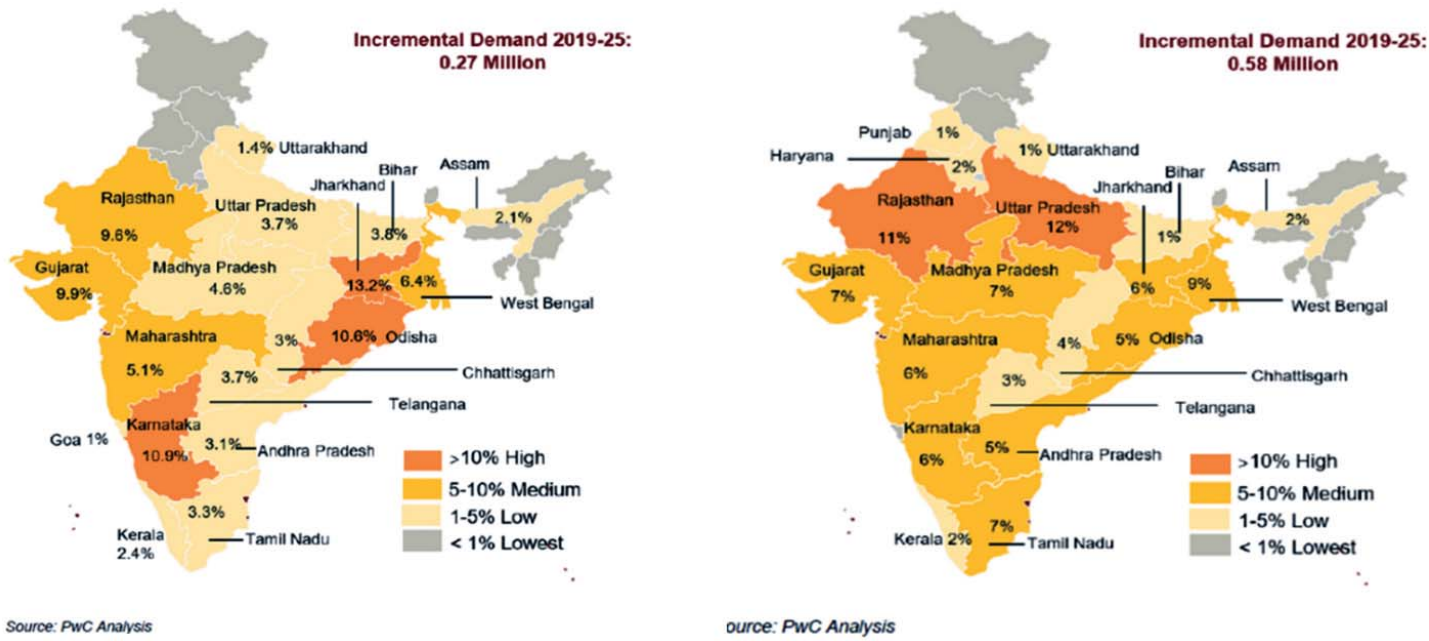


Fig 2: State-wise distribution of incremental demand of Core & Ancillary Activities (2019-25)

The Skill Ecosystem in the Indian Mining Sector, as per Skill Council for Mining Sector, can be divided into the following stakeholders:

a) **Key Bodies:** Ministry of Skill Development and Entrepreneurship, Ministry of Mines, Ministry of Coal, Ministry of Steel, Ministry of Rural Development, Ministry of Labour and Employment, Directorate General of Mines Safety.

b) **Enablers:** State Skill Development Mission (SSDM), National Skill Development Corporation (NSDC), National Council of Vocational Education and Training (NCVET), State Department of Mines & Geology (DGMs), Skill Council for Mining Sector (SCMS), MMDR Act, Mines Vocational Training Rules (MVTR).

c) **Implementing Bodies:** Industrial Training Institutes, Training Providers, Training by Employers, Schools, Universities, Public sector undertakings (PSUs), Geological Survey of India (GSI), Mineral Exploration Corporation Ltd. (MECL), Indian Bureau of Mines (IBM), Private Companies.

d) **Beneficiaries:** Marginalized societies, Unemployed youth, Low-income Groups, School and College Students, Existing workforce, Local communities.

The National Skill Development Policy 2015 was launched by the Govt. of India to standardize the norms of skilling and create an ecosystem of agile way of skill enhancement, promote innovation-based entrepreneurship and generate livelihood for the general public.

Hon'ble Prime Minister of India while launching the National Skill Development Policy 2015 commented that "*Skilling is building a better India. If we have to move India towards development, then skill development should be our mission*."

Presently, it is a fact that the future workforce in a mine that runs based on Industry 4.0 technologies will require diverse, higher refined skills sets and due to an increase in automation, the number of jobs will also be specialized and lower in number than that is in the current scenario.

Due to the requirement for Green Mining and the start of the digital era, several factors are making it necessary for skill upgradation in the mining industry. They are placed below.

a) Innovation and Technology,
b) Increasing growth of Mining output,
c) Increasing productivity,
d) Diversified Talent, and
e) Age of current workforce

For an evolved Skill Development Ecosystem to supply as per the requirement of the Mining Sector, following points can strengthen the education, training and Skill Development Ecosystem.

- **School Education:** Vocationalisation of schools with a choice to children for selecting topics with basics of mining and geology is required.
- **College Education:** There is a lack of interest among students in opting for Mining Engineering, as there are limited placement opportunities. There is also a lack of quality practical training to raise interest among students. Although female participation in mining-related courses is rising it will take a long time for India to catch up with major mining countries of the world.
- **Short Term Training:** The cost of short-term courses by experts and training infrastructure is high. In addition to the lack of experienced trainers, there is low interest among students in the mining discipline due to posting at remote locations and working in difficult conditions.
- **Vocational Institutes:** There is a lack of mining related courses at ITIs and a lack of collaboration of the mining industry with ITIs. Technological advancements in the mining industry are not adopted and mentorship for guidance is lacking.
- **Apprenticeships:** This apprenticeship mode of skilling and training has been getting some special focus and push from the MSDE, NSDC, and SCMS, especially in the last few years. Apprenticeship is an important medium for the youth to get requisite handholding, guidance, learning space, knowledge, field experience, etc. which makes them skilled for entry-level jobs in the industry and also increases their employability and core skills. The MSDE has been making sincere efforts to bring reforms and initiatives to align the Act as per the current requirement of the youth, industry, and the labour market demand, as well as it is trying to incorporate the best practices from around the globe. The International Labour Organization has been playing a very important role at the global level in promoting quality apprenticeships. Apprenticeships may also prove to be the right answer for reskilling and upskilling in this continuously changing/upgrading technological world.

To enable proper training of the future workforce, the Ministry of Labour and Employment, Ministry of Skill Development and Ministry of Mines have framed several policies governing the skill development agenda of the Government. They are as below.

a) Mines Vocational Training Rules, 1966
b) National Mineral Policy, 2008
c) National Skill Qualification Framework (NSQF)
d) National Policy for Skill Development,2015
e) District Mineral Foundation
f) Star Rating of Mines

The Ministry of Mines has thus prepared a Skill Development Plan to upgrade the skilling ecosystem for the next generation workforce to adapt to the changing technology. The objective of the skill plan for mining sector spells:

"The objective is to focus on an outcome-based approach towards quality vocational training skills for both youth and employers to increase employability and better livelihood for individuals. The aim is to increase the capacity and quality of training infrastructure and trainers to address human resource needs by aligning the supply of skilled workers and promote commitment and ownership of all the stakeholders towards skill development and create an effective coordination mechanism".

Aligned with the objective, the following activities have been planned by the Ministry of Mines under the skill plan:

a) Identification of the number of job roles lacking supply mechanism: Identifying and projecting the workforce requirement and skill requirement based on the current scenario and future projection.
b) Enhancing the training capacity: Coordination with PSUs and the Ministry of Mines for allocation of budget

for creating enhanced training facilities and Skill Development Centres and mining locations.

c) Coordination of skilling efforts: Reduce duplication of roles of many Govt. bodies running separate skill development programs.

d) Engaging the private sector: Although big mining companies have their own skill development centres, small players mining minor minerals are lacking in the same. Thus, there is a requirement for private players to create proper skill upgradation programs.

e) Engaging initiatives by the States: State-level skill development program to cater workforce engaged in the mining of minor minerals.

f) Quality of training: Most of the training is mine safety related. There is a requirement for operational training.

g) Promoting Apprenticeship: Introduction of on-the-job apprentice training by PSUs and private miners to enhance their full potential.

h) Recognition to Prior Learning (RPL): Recognition of skills developed by workers in the workplace to enhance the vertical and horizontal movement of the workforce.

6.0 ENHANCE PARTICIPATION OF THE FEMALE COMMUNITY IN MINING INDUSTRIES

As per PEC report on Human Resource and Skill Requirement in the Mining Sector in India 2019-2025, women are employed in a lower share in the sector (around 4%) as compared to their employment in other sectors such as agriculture and allied (57%), manufacturing (12.5%), education (6%), and construction (5%). Thus, they can be incentivized to join the sector in popular job roles such as HEMM Operators, Geologists, Specialist Operations, Data Entry Operators, Skilled Helper, etc. through targeted skill development, gender-friendly infrastructure, and benefits such as transportation facilities to and from mining clusters, women's restrooms and changing rooms in mining clusters, paid maternity leave, creche, etc.

Further, a study on workers in mining and related sectors should be undertaken with a gender focus to understand the challenges faced by women and devise appropriate policy solutions. Awareness programs need to be conducted on the employment potential of women in mining. However, possibilities for inclusive career progression must be highlighted to ensure the continued participation of women. In recent times it has been seen that Mining majors like NMDC, CIL, Tata Steel, Vedanta, etc. are encouraging women to join the mainstream to lead and drive the change through skilling and mentorship programs. Of late, Govt. has also been realized to offer equal opportunity to diversity and accordingly many noteworthy changes are made in the mining act allowing female employees to work in underground operations with some check points.

Prime Minister Kaushal Vikas Yojana (PMKVY) will focus on the inclusion of women in the workforce with the upcoming launch of PMKVY 4.0. Specialized training projects have been planned to cater to marginalized communities also.

Also, Tata Steel is the initiator of creating a gender-neutral workforce by onboarding 14 transgender HEMM Operators in 2021, which has later been extended across all of their mining locations. This initiative should be replicated by other big players in the industry, both private and public, by amending the recruitment rules and creating basic infrastructure to cater to such a new workforce.

7.0 SKILL ECOSYSTEMS IN OTHER COUNTRIES

As per the National Policy for Skill Development and Entrepreneurship (2015), by Govt. of India, India faces a big challenge ahead as it is estimated that only 4.69% of the total workforce in India has undergone formal skill training as compared to 68% in the UK, 75% in Germany, 52% in the USA, 80% in Japan and 96% in South Korea.

Here, examples of some of the best initiatives taken by a few countries to improve the skill ecosystem in mining and in general are provided below:

7.1 Switzerland

The Swiss system of vocational education and training (VET) is famous for its effectiveness in bringing young people into the labour market and its permeability between levels and types of education and training. Switzerland enjoys low youth unemployment, which is especially valuable after the economic crisis that still leaves many European countries with alarmingly high rates of youth joblessness. Switzerland is also top in global competitiveness and innovation.

The Swiss VET system makes it possible for people of every age, from any Canton in Switzerland, and from all public and private institutions to achieve high-quality education that gives them access to the labour market and further education and training options throughout the country. The system is under constant improvement, and every occupational curriculum is updated regularly in an employer-led process that keeps qualifications up to date with changing labour market needs. *(Katie Caves, based on Egg and Renold (2014)).*

7.2 Australia

Australia has a very well-developed Vocational Education and Training (VET) system, which has a data-driven structured training system and good engagement from people for competency development. The National Resources Workforce Strategy was built by Australia to provide education reforms, skills packages, and job support. Australia, as a new initiative, is investing A$50.6m to establish state of art industry training hubs across the country to improve opportunities for young people in regions

with high youth unemployment, targeting Year 11 and Year 12 students. The Australian Government industry growth centre for Mining Equipment, Technology, and Services (METS) has also established the METS Career Pathway Programme to link students with the mining industry. Three new mining skills project hubs were announced, which will provide training on digital transformation, apprenticeships and attraction and retention – as part of the industry-led Mining Skills Organisation Pilot (MSOP) being delivered by the Mineral Council of Australia (MCA).

7.3 Canada

The Mining Industry Human Resources Council (MiHR) looks after the hiring and workforce requirements. The Canadian mining industry is undergoing a technological transformation. The Future Skills Centre (VET equivalent for Canada) is investing $1.86 million to expand following a successful investment of $1.3 million in the first phase and combines e-learning, virtual reality (VR) and simulations on mining equipment with in-field, hands-on competency evaluation in a unique way. The training process has started on hundreds of workers through simulation technology, VR learning, and hands-on learning at its unique operating mine. A new program called Gearing Up was introduced by the Government of Canada to create new work-integrated learning opportunities in the mining industry by encouraging mining companies to hire more students as interns so that a connection is created in early stages. The Mining Association of Canada (MAC) is also developing a framework to train Indigenous populations. Further, the Canadian mining industry has worked with the Assembly of First Nations, the Métis National Council and the Inuit Tapiriit Kanatami to develop the Mining Essentials skills training program to help Indigenous people to be trained and enter the mining workforce.

7.4 Germany

The dual system of vocational education and training (VET) in Germany is a specific training system that aims at systematically combining the advantages of training in a company and education in a vocational school. Germany's dual system supports a successful transition of young people from school to work and to guarantee a skilled workforce as a prerequisite for a successful economy. In addition, it plays a role in educating young people. The central goal of VET in the dual system is to help students attain and develop competence in action so that they can meet current and future professional challenges and participate in defining their vocational lives.

7.5 South Korea

The Korean vocational education and training (VET) system is indicated as one of the key influences contributing to the country's economic growth. In South Korea students spend 4000 hours on vocational education. Korea takes a demand driven and market-oriented method to its VET thereby integrating market requirements and competition while making its curriculum.

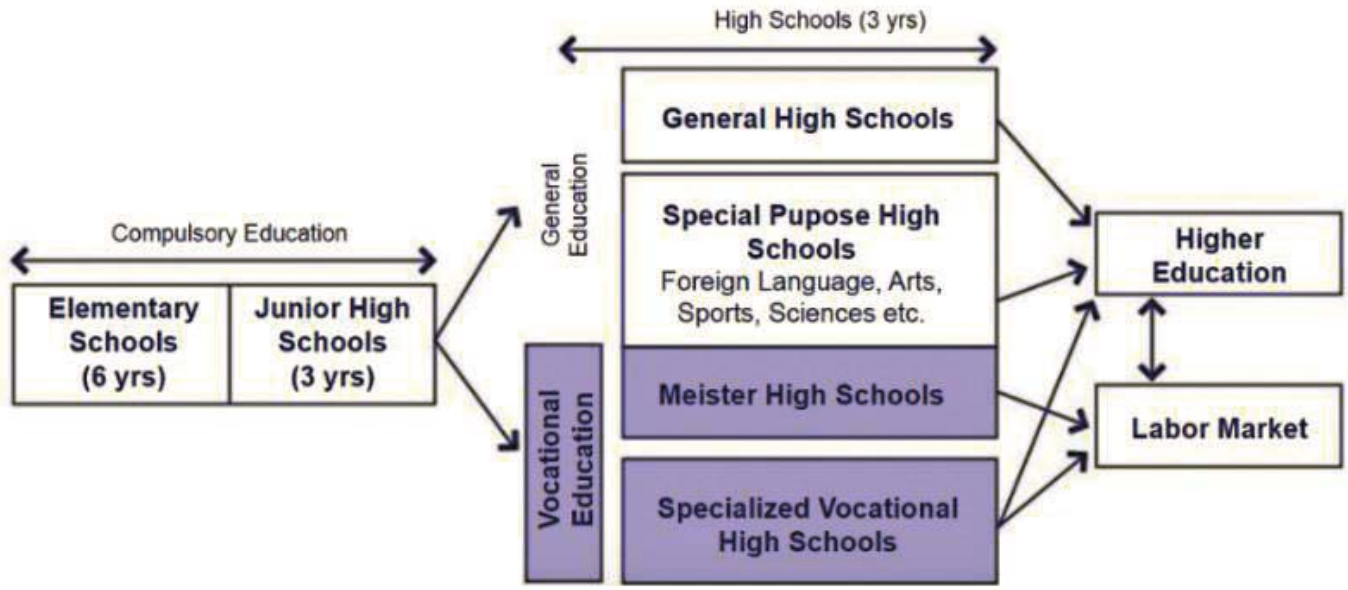


Fig 3: Vocational High school system in Korea

8.0 PARTNERSHIP WITH OTHER COUNTRIES: SYNERGY TO BRIDGE TECHNOLOGY & SKILL GAP

India can engage more with countries like Australia, Canada, Sweden, and other countries with enhanced skills and productivity in mining to help us in setting up training centres to improve productivity and minimize accidents.

This collaboration can include the building of training centres in collaboration with institutions like the Indian School of Mines and other IITs/NITs/mining institutions and virtual mining training which include subjects of labour safety, mine planning, and operations at mining locations.

In this regard, we are on the right path such as the establishment of the Australia–India Mining Partnership at the Indian School of Mines, which is an important initiative that will utilize Australia's technological innovation and its expertise in mining governance and environmental management for the skill development of the Indian workforce. Training centres in collaboration with Australian Vocational Education & Training (VET) are presently required at all large mining states and at major Universities like IIT-ISM Dhanbad. This will help the workers in these states to ramp up their skills and fully benefit from the fruits of development.

Similarly, based on the relationship between India and Canada, Canada may provide both investment avenues for Indian companies as well as technological know-how to Indian companies in the mining sector.

Also, the India-Sweden Mining Platform which was launched on 26th May 2022, where both countries decided to learn from each other by sharing best practices, and solutions, especially in areas of digitization, sustainability and automation.

9.0 WAY FORWARD TO AN INDUSTRY 4.0 READY INDIAN MINING INDUSTRY

As the mining industry gears towards embracing 'Green-Mining' and 'digitalization, A.I. & Internet-of-Things', the existing gap between available and required skills will broaden exponentially in the coming times. A collaborative effort is required by the Mining Sector for skill upgradation of the current workforce and bridging the human resource gap in the industry, ensuring that the next generation of workers are ready for mining's brave new digital world.

Taking a leaf out of the VET system of other countries, the Ministry of Mines jointly with the HRD Ministry can strengthen the VET system of India by introducing mining related topics in schools and colleges. Seats may also be increased for Short-term mining-related courses delivered through ITIs in the major mining states of India. The benefits of introducing green and automated mining technologies in mining can only be harnessed when there will be equal attention on the humans that will be operating the system.

Further, as India improves its employability quotient (EQ), we must also work on improving the physical quotient (PQ), also known as the physical intelligence of students and future workers as it is an important aspect of personal effectiveness and needs improvement. This will in turn help students to be more accustomed to the physical and specialized work that they will be required to do as the workforce.

Thus, we need to develop a robust skill development platform, coupled with higher education specific to the mining background, which is agile and operative to the dynamic and technology-intensive working atmosphere in the mining industry of the future.

DISCLAIMER

The article is an amalgamation of data collected from various sources and the author's own views and thoughts and not necessarily of the organisations/institutions they are associated with.

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MEAI SENIOR CITIZENS' WELFARE SCHEME

"Mining Engineers' Association of India (MEAI)" is a society established under the Societies Registration Act, 1860 and is functioning since 1957, inter-alia achieving the following objects:

- To protect the interests of mining engineers, geologists and allied professionals connected with mining and mineral industries in India and to improve their social and intellectual position / status in their profession.
- To raise and collect funds for general purposes or any specified objectives and to invest and disburse the same in a manner conducive to the attainment of objectives referred to in the objects of the Association or for which the fund was specially created.
- To accept any request, gift, donation, endowment or subscription or to accumulate and provide any fund or endowment to invest the same and apply the income arising there from or to resort to the capital thereof for any of the objectives of the Association.

Eligibility

MEAI Life members / Fellow members / Honorary members who are of the age of above 65 years and not in active employment / service and are living in total neglect and in penury are eligible to opt for the Scheme. The beneficiaries of the 'Scheme' should have been Life members / Fellow members / Honorary members for a minimum period of 10 (ten years) to become eligible for the 'Scheme'. The President & the Committee shall from time to time may modify the eligibility criteria depending on the situation prevailing at a given time.

For other details please visit our website meai.org in which complete bylaws governing the scheme is posted.

OBITUARY

Shri GPS Kapoor
(LM - 631)
Veraval-Porbandar Chapter

Shri GURUDARSHAN PAL SINGH KAPOOR known as GPS Kapoor, passed away on 26.11.2022 at Jaipur due to heart failure.

He was an eminent Geologist belonging to Rajasthan. He obtained his Master in Technology in Applied Geology in 1970 from the University of Sagar (MP). He was a student of Prof WD West. He was 72 years old.

He worked at M/S RSMML for rock phosphate in Rajasthan, for limestone in Bhutan and Saurashtra, Gujarat as well as a very famous mine administrator in Saurashtra, Gujarat for SAUKEM for more than three decades. He is survived by his wife and two daughters. He was a founder life member of Veraval-Porbandar Chapter.

He loved geology very much and even developed a good rock and fossils collection in his home. Several of his Hindi poems were published in various souvenirs of Mines Environment & Mineral Conservation Week Celebration of Saurashtra. He was a good singer and loves cooking. He made significant contributions to Saurashtra Mineral based industries and the VP Chapter.

The members of the Mining Engineers Association of India mourn the passing away of Shri GPS Kapoor and pray for his soul to rest in peace. Heartfelt condolences to the bereaved family and friends.

IMPORTANCE OF SLOPE STABILITY ANALYSIS FOR OPTIMUM EXTRACTION OF MINERAL DEPOSITS

Dr. Ram Chandar Karra

Abstract

Extraction of natural minerals is essential for the survival of mankind. As the mineral deposits are depleting in nature, so its essential to extract them to the maximum possible extent without compromising on the safety. As major production comes from surface mines, design and stability analysis of slopes and highwall is very important. An attempt is made through this lecture to discuss the importance of stability of slopes for optimum extraction of deposits, keeping in view the latest technological advancements and legal /regulatory aspects

Keywords: *Slope, highwall, factor of safety, stability, modeling*

1. Introduction

An open cast mining project is usually susceptible to slope stability problems due to inhomogeneous rock mass consisting of anisotropic layers. Slope failure occurs specifically in the weaker region of rock mass (along the joints or bedding planes) with large amount of deformation or movement caused due to unbalanced stresses (Hoek and Bray, 1981). The design of such slopes requires an in-depth understanding of the failure mechanism in order to choose the right slope stability analysis method. There are a number of slope stability analysis techniques, with each one having its own role to play in the stability assessment. Some of the important techniques are:

- Conventional / analytical methods
- Physical modeling
- Numerical modeling

Conventional methods are used when the previous data/ experiences in similar case studies are available. Wright et al. (1973) summarized the characteristics of most of the analytical methods which includes the method of slices (Fellenius, 1936), Bishops modified method (Bishop, 1955), force equilibrium method (Lowe and Karafaith, 1960), Janbu's method of slices (Janbu, 1957), Morgenstern and Price method (1965) and Spencer's methods (1967). Few other techniques like tension crack technique and slip circle technique have also been developed to determine the surface along which the failure of the slope may occur.

A physical model is created with simulated field conditions correlating the rock properties, and the model is subjected to loading as per the operating conditions. However, it is a time consuming and costly process. The numerical modeling is inexpensive and a number of variables can be incorporated to achieve higher level of accuracy. There are number of commercial limit equilibrium software packages like Slide, Swedge, Galena etc., which are useful to analyze the stability of slopes under different modes of failure. On the other hand, various numerical modeling based softwares like FLAC, NISA, UDEC, 3DEC etc., are used to understand the stress-strain conditions in the slope under different conditions. The paper presents a few case studies of slope stability analysis under different conditions.

2. Case Study-1

The first case study is takenup in an iron ore mine in the state of Karnataka. The bench height is varying 7 to 10m, bench width is 7 to 10m and the slope angle is between 70° and 80°. A detailed field inspection was made in order to assess the stability of benches. The lithology consists of Phyllite, Banded Hematite Quartzite (BHQ), Iron Ore, Ferruginous Shale, Banded Magnetite Quartzite (B.M.Q), MetaGabbro, Banded Ferruginous Quartzite (B.F.Q), Quartz Chlorite Schist and Amphibolite.

Laboratory Investigations: Different samples collected from the Project site were brought to the laboratory of Mining Engineering Department of NITK, Surathkal. Samples were prepared as per ISRM suggested methods to determine density, cohesive strength and angle of internal friction.

Modelling Studies: In order to assess the stability of slopes of the entire mine, the existing benches stability is analyzed keeping the bench height 10m, width 10m with 75degree slope angle on east and west directions. The same is repeated for 15 benches keeping in view the future workings.

Each of the case is analyzed using circular failure, and plane failure with 5 and 10 degrees less than the slope face angle. Another case of analysis is carried out using overall

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failure plane angle. Some of the typical outputs of analysis is shown in Fig. 1. The overall analysis has revealed that working benches can be 10m height, 10m width but under highwall condition, the bench width can be reduced to 5m in order to exploit the deposit to the maximum possible extent.

Case Study-2

The second case study is taken up in a limestone mine in the state of Karnataka. The area is covered by black cotton soil. The soil is grey to dark grey highly impervious and loamy and thickness of the soil varies from 0.5 to 3m. The area comprising nearly horizontal beds of sandstone, shale and limestone well exposed. The limestone of this area is horizontally bedded. The limestone is not subjected to any structural deformation and shows low dip angle of 3° to 5° towards east. The limestone is grey to dark grey, a pale brown in colour and some places it is purple, it is hard & compact.

Top bench is having varying joint spacing and subsequent benches appeared to have uniform spacing of multiple joints. As explained in the previous case study, in this case study also number of samples were collected and tested. In addition to the laboratory experiments described in the previous case study, some more tests were conducted like uni-axial compressive strength, oblique shear test, Brazilian test etc.

In general bench height is 9m, width 7m and slope angle is 85degrees. Field bench configuration is incorporated and modelling studies were carried out using Slide software with Bishop and Janbu's methods. The joint pattern was incorporated into RS2 software and in each case the factor of safety values are obtained. Such analysis is carried on north, east, west and south side of the benches. Some of the cases typical outputs are given in Fig. 2. All the cases have given a very satisfactory FOS values. It was concluded that under highwall condition, the bench width can be reduced to 3m in order to exploit the deposit to a maximum extent.

Case Study- 3

The third case study consists of a coal mine in South India. The average gradient of seams is 1 in 4 and faults were noticed with throw ranging from 0 to 85 m in the project area.

As per CMR 2017, 106 (2): Before starting a mechanised opencast working, the owner and agent of the mine shall ensure that the mine, including its method of working, ultimate pit slope, dump slope and monitoring of slope stability, has been planned, designed and worked as determined by a scientific study and a copy of the report of such study has been kept available in the office of the mine: Provided that in case of mines where such a study has not been made, it shall be the responsibility of the owner and agent to get the said study made within one year from the date of coming into force of these regulations.

To fulfill the above clause, the study is carried out. After going through the project profile, bench configuration etc., it has been decided to assess the stability of benches of 1st, 5th, 10th, 15th/final year configuration.

In this case, as the borehole data is available for different depths, the required shear parameters were predicted using borehole data. Further to ascertain the reliability of borehole data, some of the samples were collected and tested in the laboratory.

In general, bench configuration is 10m height, 10m width with a slope angle of 70 degrees. In the final year section, it can be seen that the lowest FOS zone consist of many benches and FOS value is 1.35 (Fig. 3), which was enough before implementing the CMR-2017 and DGMS Circular No. 3 of 2020. As per DGMS Circular No. 3 of 2020, as the minimum FOS required in case of permanent benches is 1.5, then the highwall bench configuration is modified inorder to bring the FOS value to a minimum of 1.5. Good amount of coal will be lost under the highwall and life of the mine will come down by one year. In another case, along the fault plane the FOS was found to be less than 1 (Fig. 4), infact it has failed before starting the study, and an attempt was made to stabilize it. If such scientific study is taken up in advance, such failure can be predicted in advance.

Conclusions

- As many new surface mining projects are being planned and existing projects are under expansion, so it is essential to carry out slope stability studies for safer workings.
- Slope stability study to be carried out systematically by determining the required rock properties and optimizing the bench geometry.
- Sophisticated laboratory equipment to be used in determination of rock properties and latest software tools to be used in detailed analysis of slopes.
- Wherever the slopes are critical or the FOS values are marginal, multiple approaches to be adopted in analysis in order to optimize the slope geometry to keep the FOS above the required value and at the same time the natural deposit to be extracted to a maximum possible extent.
- Such studies requires, a through research background with deep understanding of rock mass characteristics along with field knowledge.
- Existing mines operating with a FoS of 1.3, if to be increased to 1.5 then the production, life of the mine and economics of the mine may change considerably.

Acknowledgements

- The author is grateful to the managements of various coal and non coal mines who have awarded the scientific studies and provided required data and samples
- Thankful to Sri. K. Madhusudhana – President- MEAI & Sri. Deepak Vidyarthi- Chairman- TDPC- MEAI for initiating the monthly lecture series of under MEAI-MTS and for giving me an opportunity to deliver the first lecture.

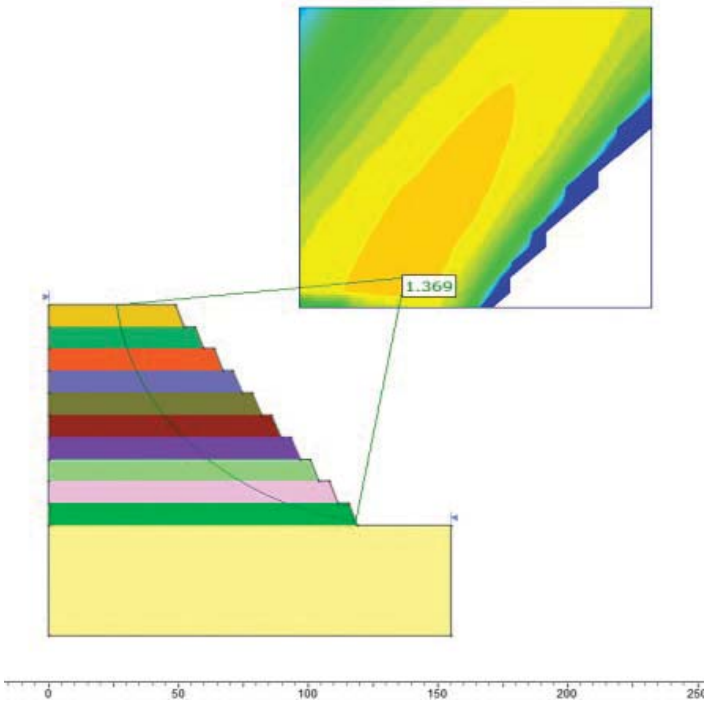


FIG. 1 (a) FOS OF A TYPICAL BENCH CONFIGURATION UNDER CIRCULAR FAILURE

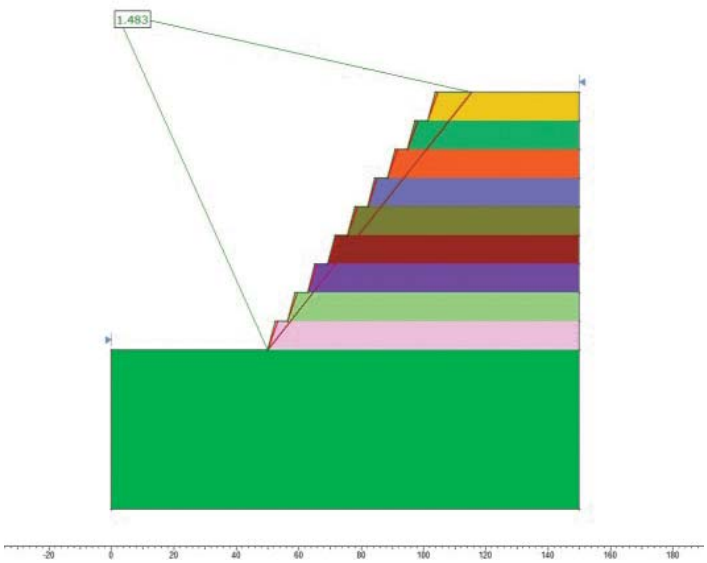


FIG. 1 (b) FOS OF A TYPICAL BENCH CONFIGURATION UNDER PLANE FAILURE

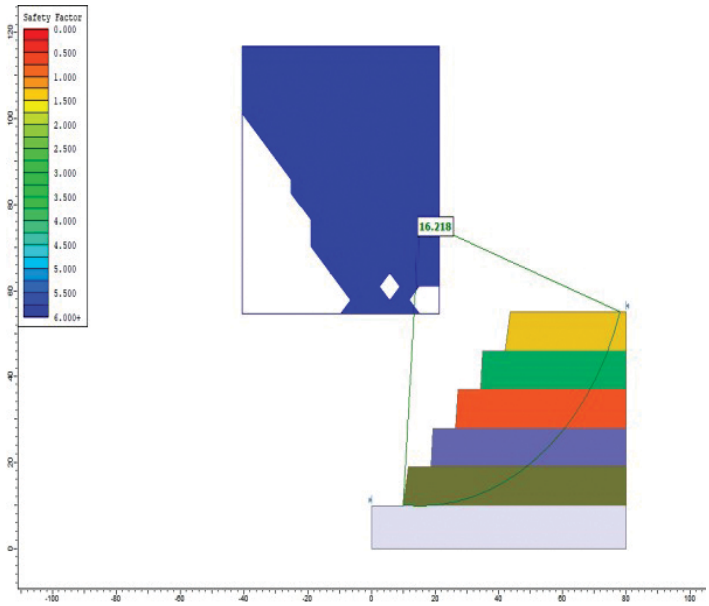


FIG. 2 (a). FOS OF A MODEL UNDER CIRCULAR FAILURE

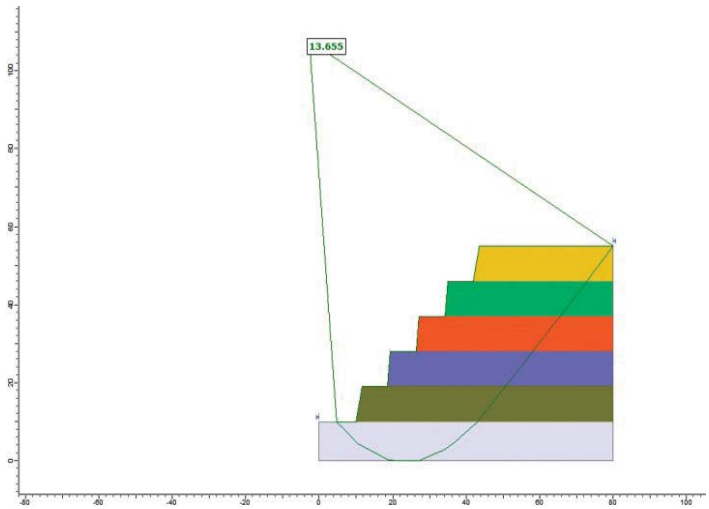


FIG. 2 (b). FOS OF A MODEL UNDER NON-CIRCULAR FAILURE

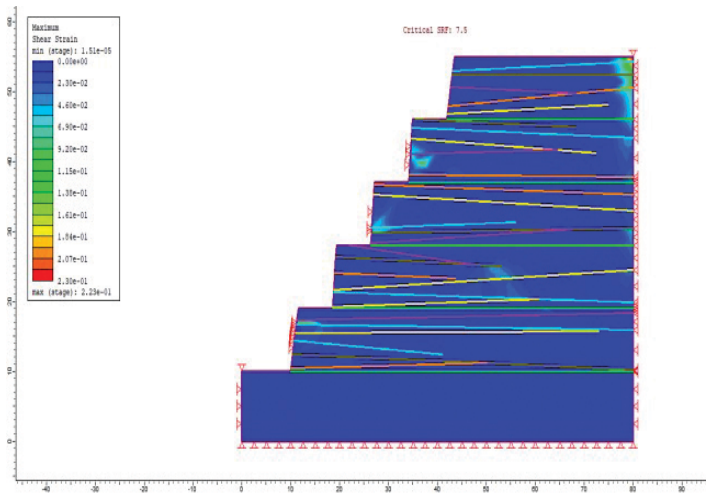


FIG. 2 (c). FOS OF BENCHES WITH JOINTS

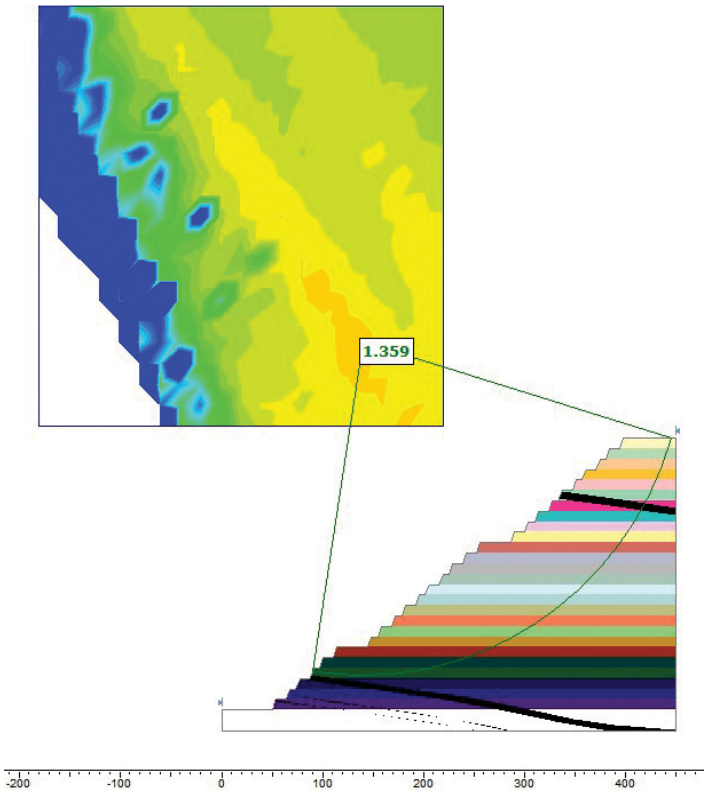
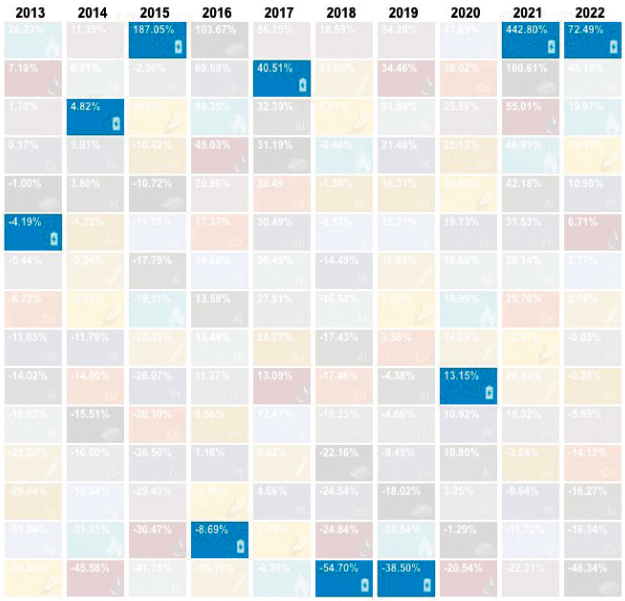


FIG. 3. FOS OF FINAL YEAR MULTIPLE BENCHES

(Continued from Page 14)

can be forgiven for feeling whiplashed. Surging demand from the electric vehicle and energy storage market accounts for lithium's spectacular rise, but much of the volatility is also due to the size of the market.

THE RISE AND FALL AND RISE OF LITHIUM



Source: The Periodic Table of Commodities Returns 2022 – US Global Investors

Despite breakneck growth lithium mine production is expected to reach just 915,000 tonnes, according to data from top producer Australia. That compares to iron ore, where the seaborne trade alone is more than 1.3 billion tonnes.

The table shows gold has been the least volatile commodity since 2012, a testament to the depth and liquidity in the market for the precious metal. But even gold is not an easy investment to call – last year the gap between the high and low for the year was over $400 an ounce.

US Global Investors CEO and chief investment officer Frank Holmes points to a December report by Goldman Sachs where the investment bank's analysts write that the setup for most commodities this year "is more bullish than at any point since [they] first highlighted the supercycle in October 2020."

"Goldman forecasts that commodities, as measured by the S&P GSCI, will return 43% in 2023. That would mark the third straight year of gains, something the asset class hasn't achieved since the period from 2002 to 2005."

Frik Els, Mining.Com I January 12, 2023

MEJ RIDDLES

Dear Readers of MEJ,

In order to increase the readership of MEJ, which has been felt essential in the interest of our ardent members, the mineral industry professionals as well as the mining sector, the Editorial Board of MEJ has decided to hold a monthly QUIZ. The monthly QUIZ will be designed and printed in MEJ based on the content published in the previous month's MEJ. The MEJ readers will be given five objective questions with multiple choices to choose; and expect them to respond with their correct answer by email to the Editor at **editormejmeai@gmail.com** by 20th of the current month. If more than three members responded with the correct answers, then the three winners will be decided by draw. Each winner will be issued a certificate of merit and a nominal cash prize of Rs 500.

Encourage the EMJ readers to participate in the QUIZ in large numbers and benefit from the enhanced knowledge by reading the Journal from the first to last page.

Questions based on MEJ January 2023 issue

1. Which Indian company promotes "Every child has a right to tomorrow"

(a) Tata Steel (b) Vedanta
(c) NMDC Ltd (d) OMC Ltd

2. Who stressed on the importance of knowledge sharing sessions at individual and industry level in Bhubaneswar Chapter?

(a) Mr Naveen Shrivastava (b) Mr Sudip Chakrawarty
(c) Mr Pankaj Satija (d) Mr Sushil kumar

3. In which auction a single Kashmir sapphire was sold for USD 1.5 Million in 2004?

(a) Johannesburg (b) Paris
(c) Geneva (d) New Delhi

4. Who wrote the book 'Blasting principles for open pit mining, vol-1, Chapter-5?

(a) Kanchibotla SS (b) Hustrulid W
(c) Katsabanis PD (d) Onederra I

5. Who was the speaker in the MEAI Tech Series held on 17th December 2022?

(a) Mr Deepak Vidyarthi (b) Dr DS Subrahmanyam
(c) Mr Suresh Nair (d) Mr TR Rajasekar

WINNERS OF RIDDLES PUBLISHED IN THE MEJ JANUARY 2023 ISSUE

Congratulations to proud winners

Mr Sanjeev Soni
ACC Limited, Lakheri Cement Works, Lakheri
E-mail: sanjeevkumar.soni@acclimited.com

Mr Satish Kumar Agrawal
Mining Engineer
E-mail: satish.ag47@gmail.com

Dr. D. S. Rao, Chief Scientist
Professor & Dean Physical Sciences AcSIR, Bhubaneswar- 751013, ODISHA
Email: drdandasrinivasrao@gmail.com

To receive the cash prize of Rs 500, the winners may please contact the Secretary General, MEAI on email at **meai1957@gmail.com** or Mob. 9177045204.

NOMINATIONS FOR MEAI AWARDS 2023

The Mining Engineers' Association of India presents awards sponsored by the Industry/individuals during Annual General Meeting in July - August every year. Nominations for the following Awards are invited in the prescribed form, so as to reach the Secretary General by **30th of April 2023**. Nomination can be made by one member for one award only.

1. MEAI - Sitaram Rungta Memorial Award for the best paper on Mining related issues during the year 2022.

AWARD Bylaws:

a. The award is known as MEAI – Sitaram Rungta Memorial Award, instituted by M/s Rungta Group of Mines.

b. The award is presented to a Mining Engineer/ Geologist or any other qualified person involved with Mining Industry, who presented a paper on mining related issues during the previous calendar year/ financial year.

c. The papers presented in any of the paper meetings, seminars or workshops organized by the Association/ Chapter during the calendar year are eligible for the award, provided

   i. The paper was not published in any journal/ magazine in India or abroad

   ii. The author did not deliver lecture/ talk related to this paper on any other forum.

2. MEAI NMDC Award for significant contribution to Iron Ore Industry during the year 2022.

AWARD Bylaws:

a. The award is known as MEAI-NMDC Award instituted by M/s NMDC Ltd.

b. The award is presented to a Mining Engineer/ Geologist or a qualified person involved in Mining Industry for the meritorious services rendered by him/ her to the Iron ore Industry.

3. MEAI Simminds Award for significant contribution to limestone industry during the year 2022.

AWARD Bylaws:

a. The award is known as MEAI – SIMMINDS award instituted by M/s SOUTH INDIAN MINES AND MINERALS INDUSTRIES Ltd.,

b. The award is presented to a Mining Engineer/ Geologist or a qualified person involved in Mining Industry for his/ her significant services rendered to the Limestone industry.

4. MEAI Smt. Bala Tandon Memorial Award in recognition of contribution to Mining Industry for improving ecology, environment and a forestation during the year 2022.

AWARD Bylaws:

a. The award is known as MEAI - Smt. Bala Tandon Memorial Award instituted by Padmabhushan G.L. Tandon in memory of his late wife.

b. The award is presented to a Mining Engineer/ Geologist or a qualified person associated with the Mining Industry, in recognition of his/ her meritorious services for improving ecology, environment and afforestation in mining and mineral industries.

5. MEAI Abheraj Baldota Memorial Gold Medal Award (Mining Engineer of the year 2022) in recognition of significant contribution to Mining Industry by a Mining Engineer with 20 years of experience in the Industry.

AWARD Bylaws:

a. The award is known as MEAI – Abheraj Baldota Memorial Gold Medal Award (Mining Engineer of the year) instituted by M/s MSPL Ltd., in memory of its founder late Abheraj Baldota.

b. The award is presented to a Mining Engineer with a Degree or Diploma in Mining Engineering and Mine Manager's Certificate of Competency with 20 years of experience in mining and allied disciplines as on the date the nomination is forwarded and the nominee should have completed 45 years of age and contributed substantially to the mining and mineral industries in the areas of management performance, production, mining technology, human resource development, protection of environment, mineral conservation, beneficiation etc.

6. MEAI Abheraj Baldota Memorial Gold Medal Award (Young Mining Engineer of the year 2022) in recognition of significant service to Mining Industry by an Young Mining Engineer who has not completed 35 years of age as on 2021.

AWARD Bylaws:

a. The award is known as MEAI – Abheraj Baldota Memorial Gold Medal Award (Young Mining Engineer of the year) instituted by M/s MSPL Ltd., in memory of its founder late Abheraj Baldota.

b. The award is presented to an Young Mining Engineer with a Degree or Diploma in Mining Engineering or a Manger's Certificate of Competency with five years' experience in mining industry and the nominee should not have completed 35 years of age as on the date of filing his nomination for the award.

7. MEAI-SRG Informational Technology Award for the year 2022, In recognition of significant contribution to Mining Industry adopting Information Technology during the year 2022.

AWARD Bylaws:

a. The award is known as S.R.G. Award for Information Technology, instituted by M/s S.R.G. Consulting Mining Engineers (P) Ltd. in memory of late Sriram Srinivasan and late Pradeep Kumar Bhattacharya both founder directors who lost their lives in Train (Rajdhani Express) accident in the year 2002.

b. The award is presented to a qualified Mining Engineer/ Geologist/ a qualified person for his significant contribution in Information Technology to Mining and Mineral Industries and the nominee should be a Life Member of the MEAI.

8. MEAI-Smt. Gullapalli Saraladevi Memorial Award (Lifetime Achievement by a Mining Engineer) during the year 2022.

AWARD Bylaws:

a. The award is known as MEAI – Smt. Gullapalli Sarala Devi Memorial Award for Life time achievement by a Mining Engineer, instituted by Shri G. Jagdeesh in memory of his late wife.

b. The award is presented to a Mining Engineer with a Degree or Diploma in Mining Engineering or a Manger's certificate of competency with at least 30 years' experience in mining industry.

c. The award is presented for the Life Time Achievement of the mining engineer in the areas of production, quality control, processing/ beneficiation and trading besides overall management of mines, mining projects related to Public and Private Sectors during his service period.

9. MEAI Master Tanay Chadha Memorial Geologist Award for the year 2022 in recognition of significant contribution by a geologist in the field of Mineral Exploration, quality control and production, mine planning etc. during the year.

Award Bylaws:

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

10. MEAI- Smt Veena Roonwal Memorial Award for the year 2022 to a Mining Engineer/Geologist/a qualified person involved with Mining Industry with 10 years' experience for presenting a paper during the year in a seminar/ symposium workshop organized by MEAI on "Water Management in and around a working mine" or "Implementation of New/Latest Technology in Mining and allied subjects.

AWARD Bylaws:

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

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

AWARD Bylaws:

a. The award is known as MEAI - Smt. Kiran Devi Singhal Memorial Award instituted by Dr. Suresh C. Singhal in memory of his late mother.

b. The award is presented to a person (MEAI member or non-member and he need not necessarily be from mining discipline) for his/ her out-standing contribution in the field of "Development and Conservation of Minerals and Environment in and around metalliferous mines (mines excluding those of Coal and Oil).

c. The award consists of a Medal and a Certificate.

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

AWARD Bylaws:

a. *The Award will be known as Eco-friendly Mining Award.*
b. *The Award will be for the financial year.*
c. *The Award will be given to a person for contributing the best paper on Eco-friendly Mining in Mining Engineers' Journal published by MEAI.*
d. *The Awardee may be member of MEAI or non-member.*
e. *The paper should not have been published in any of the journals in Magazines India/ Abroad.*
f. *Whoever contributes paper in MEJ on Eco-friendly Mining should become eligible to be considered for the award.*

13. MEAI-SCCL Coal Award for the year 2022 to a Mining Engineer, a Geologist, a Mechanical Engineer and a Foreman/Over man for meritorious contribution to the Coal Industry.

AWARD Bylaws:

a. *The awards are known as MEAI- SCCL Coal Awards instituted by M/s SCCL Ltd.*
b. *The awards are presented to a Mining Engineer, Geologist, Mechanical Engineer, Overman/ Foreman or a qualified person involved in Mining Industry for the meritorious services rendered by him/ her to the coal industry.*

❖ For detailed guide lines please visit website **www.meai.org** and memorandum of association and rules and regulations (as on 01.03.2018)

Applications and Guide Lines

Application must be supported by at least two council members and shall be sent to MEAI NHQ in Prescribed Format (Copy Enclosed) at Hyderabad before 30th April 2023. (MEAI NHQ Address: Mining Engineers' Association of India, F-608&609, VI Floor, Raghava Ratna Towers 'A' Block, Chirag Ali Lane, Abids, Hyderabad – 500001. Mob – 7780117320).

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

MEAI Awards 2023
to email: meai1957@gmail.com

MEAI Award Format

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

Date:

Certified that I know Mr/ Ms._____ personally and his/ her application is forwarded for consideration.

Chairman, MEAI Chapter_____ (or) Council Member, MEAI Enclosed copies of documents on experience and achievements.

i.
ii.
iii.

4th IN-PERSON PROFESSIONAL TRAINING PROGRAM ON IMIC

24-28 April 2023

MEAI HQs, Hyderabad

Mining Engineers' Association of India (MEAI), the trusted voice of the Indian mineral industry, is the leading Professional Organisation (PO) recognised by the National Committee for Reporting Mineral Resources and Reserves in India (NACRI). MEAI accepts the obligation of offering professional development programs to its members, registering Competent Persons (CP) and supervising their ethical conduct. NACRI is the National Reporting Organisation (NRO) of India recognised by the Committee for Mineral Reserves International Reporting Standards (CRIRSCO).

The earlier three on-line training programs on IMIC were successfully concluded by NACRI in January 2021, April 2021, and April 2022 with the participation of over 25 professionals in each program, representing the mining companies, consulting companies and individuals from across the country and overseas. Most of the participants have successfully completed the training program and more than a third of them have registered as Competent Persons (RCP) with MEAI.

Prerequisites for registration of CP

RCP has been defined under Clause #9 of IMIC 2019 as follows:

RCP is a mineral industry professional who is a member of a professional organisation headquartered in India and approved by NACRI or a member of a 'Recognised Professional Organisation' (RPO), as included in a list of similar bodies headquartered outside India available on the NACRI website. These organisations have enforceable disciplinary processes including the powers to suspend or expel a member. An RCP must have a minimum of ten years professional experience, which includes five years relevant experience in the style of mineralisation or type of deposit under consideration, and in the activity which that person is undertaking.

In addition to the above minimum professional experience required by the MEAI members for registration as RCP, the NACRI, vide Article 2.2.ii, further specifies that the potential RCP shall obtain at least 40 hours of mandatory professional development credits before making an application for registration and for certificate renewal every year the RCP should obtain at least 8-hour credits through participation in seminars, conferences, workshops, training programs or webinars, recognised by NACRI.

Accordingly, those eligible mineral industry professionals in India interested in registering as Competent Person under IMIC should be a Life Member of MEAI, attained at least 10 years of professional experience and acquired 40 hours of mandatory professional development credits on IMIC from the NACRI organised training program, at the time of making application to MEAI.

RCP certification shall be valid for a period of one year from the date of issue of the certificate and the same may be renewed thereafter. The annual CP registration as well as the renewal fee has been fixed at Rs 5,000 (Rupees five thousand only + GST @18%) and payable to MEAI.

Professional Development Program on IMIC

The fee to attend the mandatory IMIC training program may be paid online. The fee chargeable for the 5-day in-person non-residential training program is Rs. 25,000 (Rupees twenty five thousand only) plus applicable GST @18%) and payable to:

Account Name:	**MEAI-National Core Committee Fund**
Bank Name & Address:	**UCO Bank**, Abid circle, Hyderabad
S/B Account No:	**14410110037089**
IFSC:	**UCBA0001441**

NACRI has formulated a 40-hour (5-day) IMIC in-person non-residential training program, which every prospective RCP must undergo before applying for an RCP certificate. This IMIC training course conducted by domain experts includes sharing of basic knowledge on all relevant aspects of IMIC and Code of ethics, mineral industry Best Practices, and general guidance to the prospective RCP. Key topics articulated in the IMIC training program are:

- Introduction to CRIRSCO/ MEAI/ NACRI Charter/ IMIC/ Code of Ethics
- Scope of IMIC
- Competence and Responsibility
- Reporting Terminology and Standard Definitions
- Reporting of Exploration Results and Exploration Targets
- Classification and Reporting of Mineral Resources
- Classification and Reporting of Mineral Reserves
- Reporting of Coal Exploration Results, Resources and Reserves
- Scoping, Pre-feasibility and Feasibility studies
- Emerging topics covered in CRIRSCO 2019 Template and PERC
- Table 1 (If Not why Not Table) and QA/QC
- Industry Best Practices

Every RCP should have successfully accomplished a 40-hour mandatory training program on IMIC prior to making an application for renewal of RCP. Subsequently, the RCP may renew the certificate by obtaining a minimum of 8-hour professional development credits every year by attending NACRI accredited seminars/ workshops/ conferences/ training programs/ webinars and paying the renewal fee. The MEAI Headquarters shall maintain the records of each trainee/ RCP and provide the same to the MEAI RCP Registration committee.

Professional development program schedule

The NACRI Core group shall conduct the 40-hour in-person IMIC non-residential training program under the direction of Dr A. Srikant / Mr T.R. Rajasekar, the founder members of NACRI. **The 4th IMIC in-person non-residential training program will be held during 24-28 April 2023 in the state-of-the art Conference facilities available at MEAI Headquarters, Hyderabad**. Working lunch, tea & snacks twice a day and cocktail dinner on the inaugural day are included in the course fee.

Contact details

Interested mineral industry professionals may please contact the Secretary General, MEAI at **meai1957@gmail.com** / Phone no. 040-66339625/ 040-23200510 or **Dr. A. Srikant** at **mgsrikant@gmail.com** / **Mr. T.R. Rajasekar** at **shekar.thotapalli1952@gmail.com** for more details on this training program.

Dr PV Rao
Co-Chair NACRI, **editor.mej.meai@gmail.com**

MEAI NEWS

AHMEDABAD CHAPTER

Kutch Local Centre had organized a knowledge sharing session on 23th Dec 2022 on **Mine Closure & Sustainability**. The session was organized at Lignite Project Panandhro, Gujarat Mineral Development Corporation Ltd. (GMDC), Kutch, Gujarat.

Shri A.B. Dani, Secretary Kutch Local Centre presented the welcome address. Shri N.N. Mupkalwar, I/c General Manager (P) Umarsar, Shri H.G.Dave I/c General Manager(P), Panandhro and Shri Amit Raj, SCW,UTCL were welcomed on Dias. Shri. N.N. Mupkalwar presented his address and inaugurated the session. Around 30 Delegates from various projects of Gujarat Mineral Development Corporation ltd. attended the session.

Welcome Speech by Shri A.B. Dani

Welcoming of Guests, Shri N.N. Mupkalwar & Shri Amit Raj

Inaugural speech by Shri N.N. Mupkalwar

Audience for the session

The following officials presented four papers in the session:

1. Shri S.J. Matariya, A.M Mines, CB Project Gadhsisa
2. Shri Abhilash Dixit, Lignite Mine, Matanomadh
3. Shri H.G.Dave , I/C General Manager (P) & Sh. P. Goswami, Surveyor Panandhro Lignite Mine
4. Shri S.K.Chaudhari, Manager Environment, Umarsar Lignite Mine

Shri SJ Matariya spoke on the concept of Mine Closure & its Components, Star-rating scheme for Closure Plan along with the potential uses of the Mines site after closure. He also highlighted the sustainability practices adapted at Gadhsisa Bauxite Mine to manage the impacts of Mining.

Presentation by Shri S.J. Matariya

Presentation by Shri Abhilash Dixit

Shri Abhilash Dixit shared his views on Progressive & Final Mine Closure and the guidelines for preparation of MCP. He also shared a snapshot of major clauses of various regulations governing Mine Closure. The presentation was concluded by highlighting the best environment practices of Mata-Na-Madh mines of GMDC for top soil conservation, reclamation, water harvesting, Mine Pit water treatment by ETP, etc.

Paper Presentation by Shri H.G. Dave

Shri S.K. Chaudhari presenting paper

In the presentation made by Shri Dave, he highlighted the history of the laws and various amendments governing the Mine Closure. He emphasized on the fact that if Mine closure activity is done properly, it has the potential of becoming a source of untouched opportunity for coal mine operators and society. He also highlighted the vision of the Ministry of Coal for repurposing of Closed Mine Sites with focus on Socio-Economic Aspects and the implementation of Mine Closure Frame Work in two Phases.

Shri S.K Chaudhary presented the summary of legal provisions for Mine Closure. He also narrated the objectives behind Mine Closure. He also highlighted the key Environmental issues with mining and the challenges for Mine Closure. He shared the Progressive Mine closure activities of Umarsar Lignite mine, GMDC Ltd.

The session ended with vote of thanks presented by Shri S C Jhgrawat, DGM Mines, Umarsar Lignite Mine, GMDC Ltd and memento presentation to the speakers.

Vote of thanks by Shri S.C. Jhgrawat

Participants in the Session

RAJASTHAN CHAPTER - UDAIPUR

Executive Committee Meeting

It was held on 24th December, 2022 at 6:00 PM at MEAI, Office, Indraprasth Complex, Delhi Gate-Shastri Circle, Udaipur

The Third Executive Committee Meeting of MEAI Rajasthan Chapter, Udaipur was held under the Chairmanship of Shri

MS Paliwal. The following Executive Committee and Life members were present.

1.	Shri MS Paliwal	--	In Chair
2.	Shri RP Gupta	--	Former President, MEAI
3.	Shri Praveen Sharma	--	Vice-Chairman
4.	Dr SS Rathore	--	Council Member
5.	Shri YC Gupta	--	Ex-Chairman
6.	Dr SK Vashisth	--	Council Member & Joint Secretary
7.	Shri Asif M Ansari	--	Secretary
8.	Shri MK Mehta	--	Treasurer
9.	Shri RC Purohit	--	Executive Member
10.	Shri SN Mali	--	Executive Member
11.	Shri Hitanshu Kaushal	--	Executive Member
12.	Shri SL Sukhwal	--	Member
13.	Shri SM Ahmed	--	Member
14.	Dr Neeraj Shrivastava	--	Member
15.	Shri ML Paliwal	--	Member
16.	Shri KS Dangi	--	Member

At the outset, Shri MS Paliwal welcomed all the executive members.

1. Minutes of the last meeting (12.10.2022) & action taken report were readout by Secretary and confirmed by the house.
2. Indian mining day on 1st Nov. 2022 was successfully celebrated at Jhamar Kotra Mines of M/S RSMML with the theme of "Sustainability & Circular Economy". House appreciated the arrangements made by the team.
3. Regarding the plantation program for Large Mines & Small Mines, it was decided to hold a programme in the Monsoon period, preferably in July 2023.
4. A detailed discussion was held on the technical talk and it was decided that HZL will arrange a Technical talk at Mining College for the students of third year. Shri Praveen Sharma will coordinate and decide.
5. To provide training on First Aid for the candidates of Mining Mate and blaster, MEAI delegate will approach Shri TR Mandekar, Dy. DGMS NWZ Udaipur and Shri B Dayasagar, Director Mines safety Udaipur and decision shall be taken accordingly. Shri Praveen Sharma informed that HZL is also arranging First aid Training at their campus and providing Certificates.
6. Shri MS Paliwal informed the house that Advertisement in newsletter to be increased. For this, each individual should make efforts and provide printing material and suggestions for better publication of the newsletter.
7. ASDC Golcha has given consent to pay Rs15000 for advertisement in the newsletter.
8. Year 2023 being the Silver Jubilee Year of the Chapter, it shall be celebrated on 5th July with great Joy and enthusiasm. 25 years journey of Rajasthan chapter - Udaipur shall be highlighted, All the former Chairmen and Secretaries of the Chapter shall be honoured, Photographs of past activity shall be displayed, Members above 85 years age shall be honoured. Apart from AGM and cultural programme, gifts for members shall be arranged.
9. Shri YC Gupta, former Chairman informed that the MEAI Desktop under his charge has become old and of no use. The book value is Rs. 65 only. Hence, it was decided by the house that this Desktop may be written off from the records of MEAI and Rs 100 may be deposited as book value.
10. Shri Hitanshu Kaushal informed that MEAI website formalities have been completed and only Rs1500 is to be deposited.

The meeting ended with the vote of thanks by Shri Praveen Sharma, Vice-Chairman.

Members present at Executive Committee Meeting

CONFERENCES, SEMINARS, WORKSHOPS ETC.

INDIA

14-16 Apr 2023: **4th Conference on ADVANCED TECHNOLOGY IN EXPLORATION AND EXPLOITATION OF MINERALS**. Location: Jodhpur. For details, Contact: Mr A.K. Jaiswal on Mob: +91 9414163343, E-mail - ashjais.64@gmail.com, meai_jodhpur@yahoo.co.in

24-28 Apr 2023: **MEAI-IMIC Training program (in person) by NACRI. A Mandatory training program for registration of Competent Person under IMIC**. Location: MEAI Headquarters Auditorium, Hyderabad. For more details, please contact: Secretary General, MEAI. Mob: 9177045204/ 7382087618. Email: meai1957@gmail.com

14-15 Jul 2023: **International Seminar on Food and Energy Security through Minerals**. Location: Jaipur. For details, Contact – Mr Anil Mathur on Mob 9414119227, E-mail: chairman.jaipur@meai.org & meaijpr2010@gmail.com

25-27 Aug 2023: **International Seminar on Vision – Mining 2047**. Location: Ahmedabad. For details, contact Email - meaiahmedabad@gmail.com

6-9 Nov 2023: **International Mining, Equipment & Minerals Exhibition (IME 2023)**. Eco Park, Rajarhat, Kolkata, India. Organised by The Mining, Geological & Metallurgical Institute of India (MGMI). Contact Email ID: miningexpo@tafcon.in

ABROAD

18-19 Feb 2023: **International Conference on Bauxite Mining and Alumina Refining ICBMAR**. Jeddah, Saudi Arabia. Website URL: https://waset.org/bauxite-mining-and-alumina-refining-conference-in-february-2023-in-jeddah

6-9 Feb 2023: **Investing in African Mining Indaba 2023**. Succeeding for over 28 years, Mining Indaba has a unique and widening perspective of the African mining industry, bringing together visionaries and innovators from across the spectrum. CTICC, Cape Town, South Africa

26 Feb - 1 Mar 2023: **MINEXCHANGE 2023 SME Annual Conference & Expo**. Join industry professionals focused on ESG, new safety strategies, exciting advances in AI, and important initiatives for a sustainable future. Colorado Convention Center, 700 14th St., Denver, Colorado, 80202, United States

4-5 Mar 2023: **International Conference on Mining and Refining of Metals ICMRM**. Rome, Italy. Website URL: https://waset.org/mining-and-refining-of-metals-conference-in-march-2023-in-rome

4-5 Mar 2023: **International Conference on Mining Intelligence (ICMI 2023)**. Rio de Janeiro, Brazil. Website URL: https://waset.org/mining-intelligence-conference-in-march-2023-in-rio-de-janeiro; Contact URL: https://waset.org

5-8 Mar 2023: **PDAC 2023.** The annual PDAC 2023 Convention – the world's premier mineral exploration and mining convention. Metro Toronto Convention Centre, 222 Bremner Blvd., Toronto, Ontario, M5V 3M9, Canada

22-23 Apr 2023: **International Conference on Recent Developments in Mining Technologies ICRDMT**. London, United Kingdom. Website URL: https://waset.org/recent-developments-in-mining-technologies-conference-in-april-2023-in-london

22-23 Apr 2023: **International Conference on Mining and Mineral Technologies (ICMMT 2023)**, Tokyo, Japan. Website URL:https://waset.org/mining-and-mineral-technologies-conference-in-april-2023-in-tokyo; Contact URL: https://waset.org

3-4 May 2023: **International Conference on Mining Technologies and Sustainable Systems ICMTSS**. Rome, Italy. Website URL: https://waset.org/mining-technologies-and-sustainable-systems-conference-in-may-2023-in-rome

4-5 May 2023: **17 International Conference on Mining Technology and Exploration (ICMTE 2023)**. Amsterdam, Netherlands. Web: https://waset.org/mining-technology-and-exploration-conference

29-31 May 2023: **MetPlant Conference 2023**. Perth, Australia and online. Contact AusIMM. T: 1800 657 985 or +61 3 9658 6100 (if overseas)

15-16 Jun 2023: **International Conference on Mining and Metallurgical Technologies (ICMMT 2023)**. Toronto, Canada. Website URL: https://waset.org/mining-and-metallurgical-technologies-conference-in-june-2023-in-toronto; Contact URL: https://waset.org

26-29 Jun 2023: **26th World Mining Congress**. Resourcing Tomorrow-Creating Value for Society. Brisbane, Queensland, Australia. Contact: Kristina Liska, Event and Registration Coordinator at registration@wmc2023.org

16-17 Aug 2023: **International Conference on Mine Mechanization and Mining Policies (ICMMMP 2023)**. Tokyo, Japan. Website URL: https://waset.org/mine-mechanization-and-mining-policies-conference-in-august-2023-in-tokyo; Contact URL: https://waset.org

25 - 28 Oct 2023: **China Coal & Mining Expo 2023**. China's 20th International Technology Exchange & Equipment Exhibition on coal and mining is the largest international coal and mining exhibition in Asia. New China International Exhibition Center (NCIEC), 88 Yuxiang Road, Tianzhu Airport Industrial Zone, Shun Yi District, Beijing, China

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ESG-READY SINCE 1961

Our founder Abheraj Baldota's core operating principle was 'I am not the owner of wealth, but a privileged trustee to serve the community with it'. Thus it is no surprise that ESG practices are ingrained in our corporate ethos, business strategy and operations since our birth in 1961.

We were the first Indian unlisted company to publish a GRI compliant sustainability report way back in 2006. We are a large producer of renewable power in India. We were also the first mining company in India to get certified for OHSAS 18001:1999 and ISO 14001:2004. Across the years, we have invested more than ₹820 Crore in ESG. From building blood banks to adopting villages and combating climate change, we have been practicing ESG long before it became a buzzword.

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