वार्षिक प्रतिवेदन
ANNUAL REPORT
2024-25

सीएसआईआर - केन्द्रीय खनन एवं ईंधन अनुसंधान संस्थान

(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्)

CSIR - CENTRAL INSTITUTE OF MINING AND FUEL RESEARCH

(COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH)

मुख्यालय: बरवा रोड, धनबाद - 826015, धनबाद, झारखंड, भारत

HQ: BARWA ROAD, DHANBAD – 826015, DHANBAD, JHARKHAND, INDIA

Compiled and Designed by

Human Resource Development and Publication Section
CSIR-CIMFR, Dhanbad

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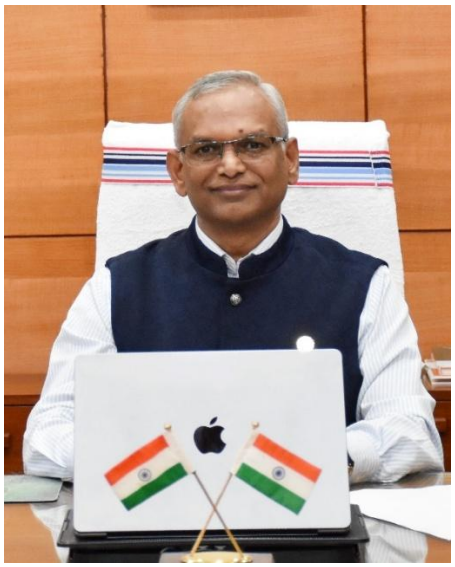
From Director's Desk



Greetings from CSIR- Central Institute of Mining and Fuel Research!

It is my pleasure to present the Annual Report of CSIR-Central Institute of Mining and Fuel Research (CSIR-CIMFR), Dhanbad for the year 2024-25. The report summarizes the R&D achievements, industry sponsored projects, consultancy services, testing services, new knowledge creations, and innovations done at the Institute during the preceding fiscal year.

It is a matter of pride that CSIR-CIMFR continued to make significant contributions towards R&D in mining and fuel sectors for the nation during the year 2024-25. The Institute has earned an external cash flow of Rs. 370.44 crores in this financial year. Around 89 numbers of technical papers have been published in different national and international journals, 84 numbers of technical papers were presented in national and international seminars, symposia, workshops, etc., 8 nos. of books/ chapter published. To safeguard the intellectual output of the institute, 18 numbers of patents have been filed, 6 patents have been granted, 2 copyrights and 3 designs were registered and 8 MoUs /Agreements were signed. Some of the technologies of the institute have been well recognized by the mining and fuel industries, which are reflected in earning of royalty of Rs. 10.32 lakhs from transfer of these technologies to the industries.

In order to increase interactions with the stakeholders including scientific community and industries, several colloquia were organized during 2024-25 at CSIR-CIMFR deliberated by eminent scientists, innovators, and thought leaders. In the fiscal year 2024-25, the institute conducted 6 skill/training programmes under CSIR Integrated Skill Initiative training more than 89 individuals and 112 interns. The institute also conducted different outreach activities under Jigyasa Programme at different schools of Dhanbad District. 5 workshops and 1 national seminar were also organised wherein more than 450 delegates from various institutes and industries participated.

I sincerely acknowledge the outstanding contributions made by our scientists, staff, and research scholars of CSIR-CIMFR responsible for the excellent achievements and progress of the Institute. I would also like to thank CSIR Headquarters, Research Council, and Management Council for their cooperation and constant support. I whole heartedly thank all the stakeholders and look forward for their supports and cooperation in our future endeavours.

[Arvind Kumar Mishra]

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Mission

To Develop And Deliver Sustainable Cutting Edge Technologies For Social Upliftment And Industrial Advancement.

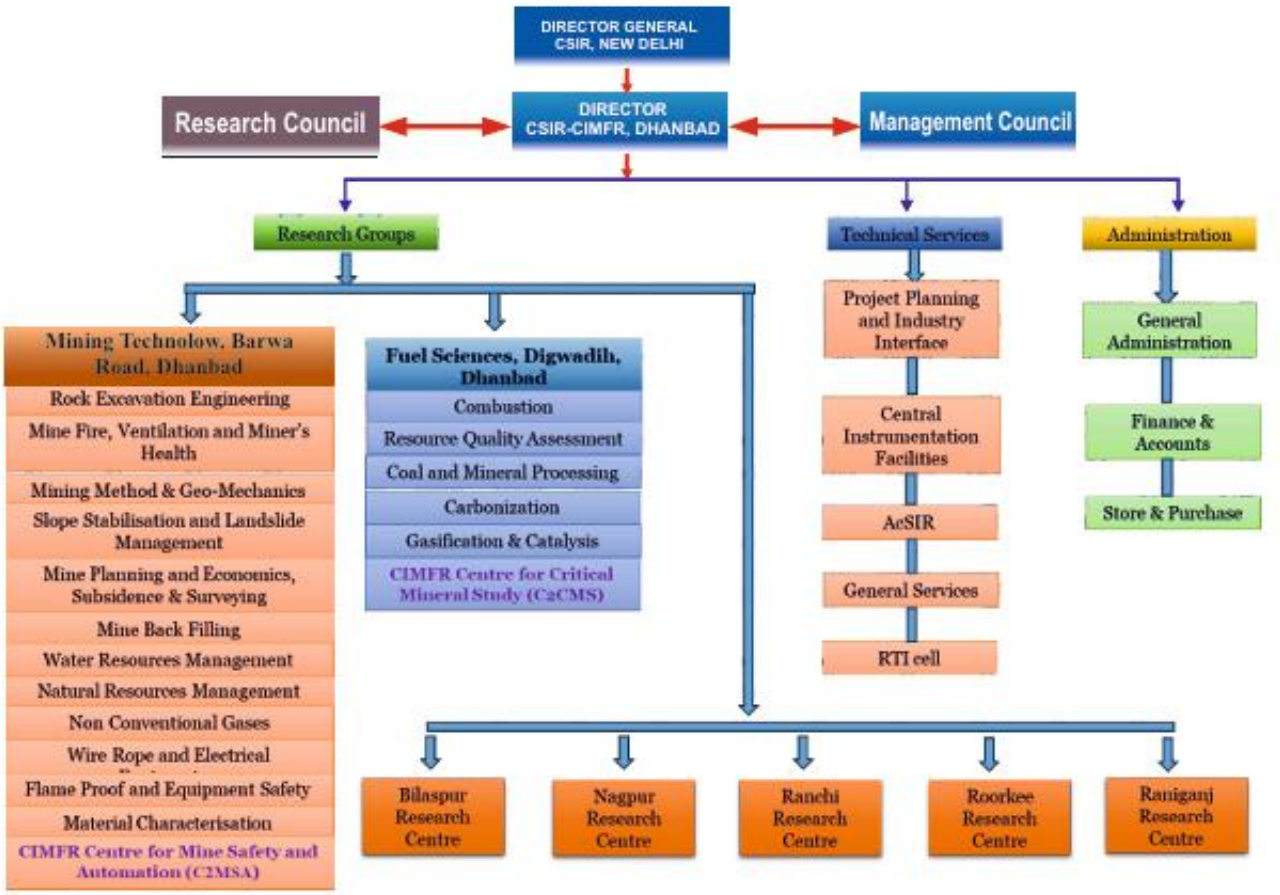
Vision

To Be An Internationally Acclaimed Mining And Fuel Research Organisation

Quality Policy

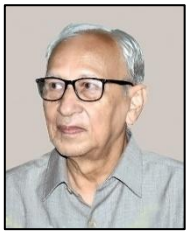
CSIR-Central Institute of Mining and Fuel Research is committed to provide globally competitive, productive, environmentally sustainable, safe and efficient technologies for mining and fuel industries with emphasis on optimal exploitation and utilization of mineral resources through continual improvement in quality management system, customer satisfaction, scientific sanctity and improved standards to foster sustainable growth is the prime objective of the institute.

ORGANIZATIONAL STRUCTURE OF CSIR- CIMFR



RESEARCH COUNCIL

Chairman



Prof. D. D. Misra
Former Director, CMRI, Dhanbad
Former Chairman, BoG, IIT(ISM) Dhanbad

Member

Prof. T.N. Singh
Director
Indian Institute of Technology, Patna

Dr. P.S. Mishra
Chairman-cum-Managing Director
SECL, Bilaspur

Shri Ravindra Kumar
Director (Operations)
NTPC Limited, New Delhi

Dr. B. Veera Reddy
Director (Technical)
Coal India Limited, Kolkata

Mr. Ujjwal Tah
Director General of Mines Safety
(DGMS) Dhanbad

Dr. Naresh Chandra Murmu
Director
CSIR-Central Mechanical Engineering
Research Institute, Durgapur

Prof. Arvind Kumar Mishra
Director
CSIR-Central Institute of Mining & Fuel
Research, Dhanbad

Dr . Rama Swami Bansal
Chief Scientist & Head
International Science & Technology
Directorate Affairs, CSIR, New Delhi

Member Secretary

Dr. Ranjan Kumar
Senior Principal Scientist
CSIR - Central Institute of Mining And
Fuel Research, Dhanbad

MANAGEMENT COUNCIL

Chairman

Prof. Arvind Kumar Mishra
Director
CSIR - CIMFR, Dhanbad

Member

Dr. Naresh Chandra Murmu
Director
CSIR-Central Mechanical Engineering Research Institute, Durgapur

Dr. Jai Krishna Pandey
Chief Scientist
CSIR - CIMFR, Dhanbad

Dr. C. Sawmliana
Chief Scientist
CSIR - CIMFR, Dhanbad

Dr. Manoj Kumar Saini
Senior Principal Scientist
CSIR - CIMFR, Dhanbad

Mrs. Seema A. Topno
Senior Principal Scientist
CSIR - CIMFR, Dhanbad

Dr. Arti Sahu
Scientist
CSIR - CIMFR, Dhanbad

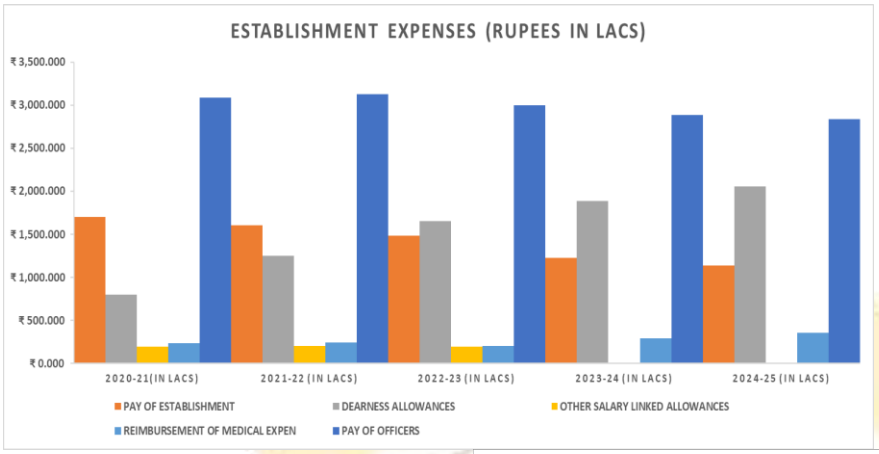
Mr. Sudipto Chatterjee
Controller of Finance And Account
CSIR - CIMFR, Dhanbad

Mr. Kalyan Das
Senior Technical Officer (3)
CSIR - CIMFR, Dhanbad

Ex-officio Member Secretary

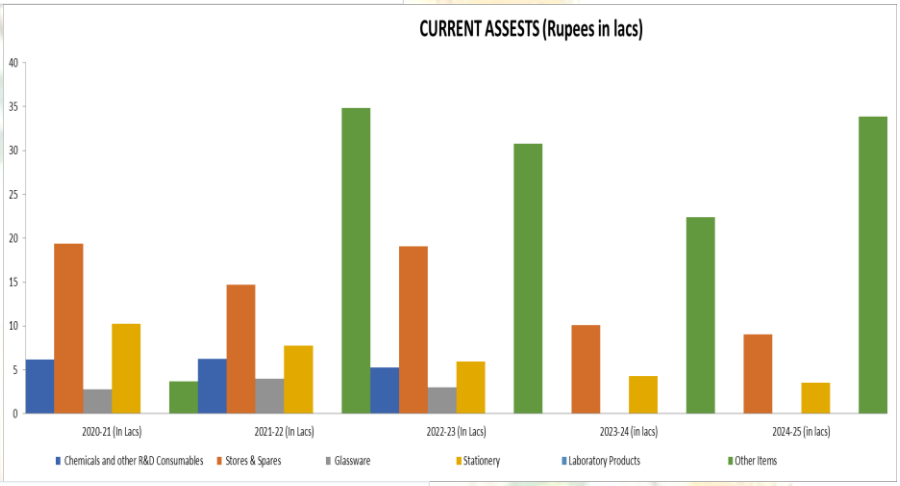
Mr. Alok Sharma
Controller of Administration
CSIR - CIMFR, Dhanbad

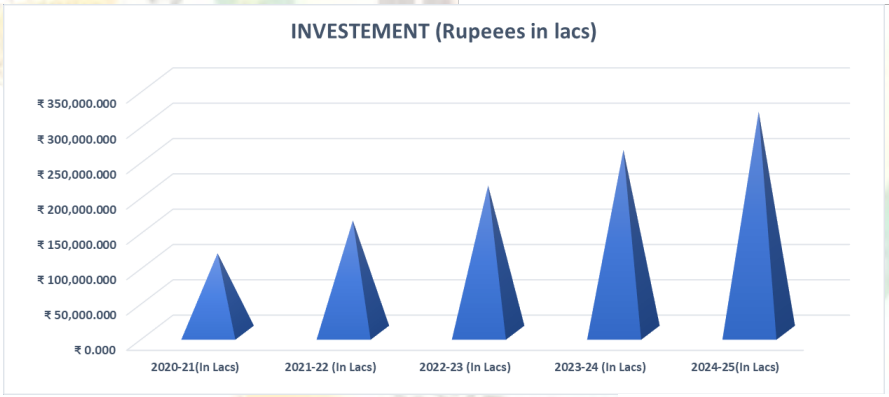
FINANCIAL STATEMENT OF THE INSTITUTE



ESTABLISHMENT EXPENSES

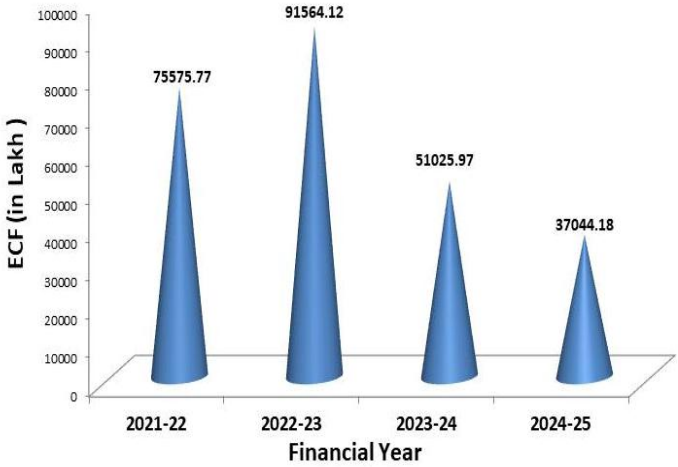
CURRENT ASSETS





INVESTMENT OF THE INSTITUTE

EXTERNAL CASH FLOW



DEPARTMENTAL PROJECT DETAILS

DEPARTMENTAL PROJECT DETAILS

ROCK EXCAVATION ENGINEERING (REE) RESEARCH GROUP

During the period of April 2024 to March 2025, the Rock Excavation Engineering (REE) Research Group had carried out a number of important projects in the field of rock excavation using drilling and blasting methods as well as evaluation of explosives and accessories. The various projects carried out by the Research Group during the reporting periods are given below: -

- The Research Group has successfully developed controlled blast design patterns for conducting safe and efficient blasting operations within the Danger Zone of 500 m from nearby villages in many opencast mines and underground mines viz. Mukutban Limestone and Dolomite Mine of M/s RCCPL Pvt. Ltd; Khatkurbahal (North) Limestone and Dolomite Mines of M/s Shiva Cement Limited (A Subsidiary of M/s JSW Cement Limited); Aditya Limestone Mine of M/s Ultratech Cement Limited; Bolani Ores Mines of M/s Steel Authority of India Limited (SAIL); Kerendari Coal Mines Project of M/s NTPC Limited; Gare Palma IV/2 & IV/3 Coal Mines of M/s Jindal Steel & Power Ltd.; Kalamang West, Joda East, Katamati, Khondbond, Noamundi Iron Ore Mine of M/s Tata Steel Limited; Quarry AB, Quarry SE West Bokaro of M/s Tata Steel Limited; Bacheli Complex of M/s NMDC Ltd.; Kotre-Basantpur & Pachmo Coal Mine of M/s KBP Mining Pvt. Ltd, Parsa East & Kanta Basan (PEKB) Mine of M/s Adani Enterprises Ltd.; Kayad, Sindesar Khurd Mine, Rajpura Dariba Mine of M/s Hindustan Zinc Limited.
- The Research Group also involved in many civil infrastructure projects Viz. Flattening of Ulwe Hill at the core area for construction of International Airport of M/s Navi Mumbai International Airport Pvt. Ltd., & Flattening of Southern portion of Ulwe Hill in non-core area of International Airport of M/s CIDCO Maharashtra Ltd., various road construction along Indo-China and Indo-Pak borders of BRO Projects as well as Pakaldul Hydroelectric Project in Jammu & Kashmir.
- Hard rock excavation using Plasma Rock fracturing technique (Non-Explosive) were successfully implemented by the Research Group for the construction of 9 MW Hydroelectric Power Plant at Garudeshwar, Gujarat.

Fig.1: Nimu-Padam-Darcha Road, Ladakh Border Road Organisation (BRO). Critical sites of road widening using controlled blasting

- The Research Group successfully implemented for the 1st time in an Indian opencast mine, Dozer-Push Method, a new mining technology of for controlling the vibration and fly rocks within the safe limit at Parsa East Kanta Basan (PEBK) Open cast mine, Chhatisgarh of M/s Adani Enterprises Ltd.

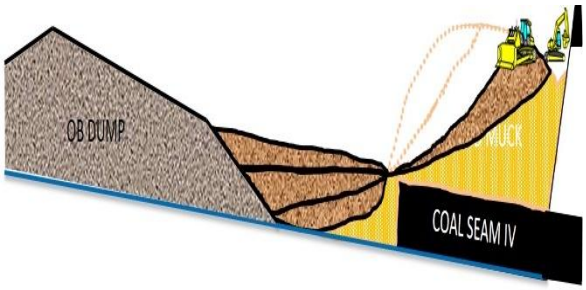


Fig.2: A schematic of dozer-push mining operation

Fig.3: View of casting of rock from dozer-push operation

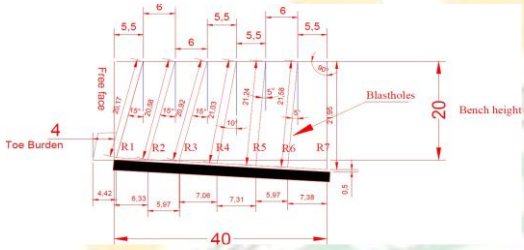


Fig.5: Drill design using inclined holes

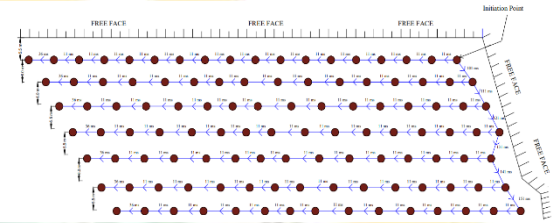


Fig.6: Firing pattern for blasting at dozer-push mining site

- The trapped Tunnel Boring Machine (TBM) in Head Race Tunnel (HRT) at Pakaldul Hydroelectric Project, J&K was successfully retrieved using cautious blasting along the tunnel boring head portions.

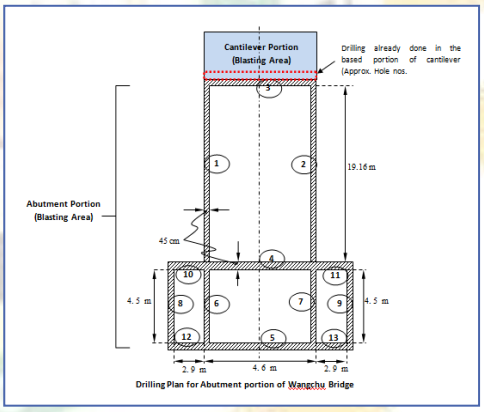


Fig.7: Recovery/release of trapped Tunnel Boring Machine (TBM) in Head Race Tunnel (HRT) at Pakaldul Hydroelectric Project, J&K.

- The Research Group visited Bhutan for planning and design of safe demolition of the remaining portion of the collapsed Wangchu Bridge, 204 m span PSC Cantilever Bridge located at Km 1.275 on Damchu-Haa Link Road under Project Dantak, 19 Border Roads Task Force (BRTF), Bhutan. The bridge had collapsed on 9th February, 2021 where nine people lost their lives and the remaining portions of the collapsed bridge became an eye-sore for the Indian Government and required complete dismantling using controlled blasting.


Fig.8: Wangchu Bridge, 204 m span PSC Cantilever Bridge, Project Dantak, 19 Border Roads Task Force (BRTF), Bhutan which had collapsed on 9th February, 2021 where nine people died

- The scientific studies on ground vibrations generated by seismic explosives and determination of influence zones were carried out at Seismic Exploration Site in Rajasthan, Bikaner of M/s Oil India Limited for safe seismic survey operations without affecting and endangering the nearby dwellings under Mission Anveshan Project, Rajasthan Region.


Fig.9: Mission Anveshan, Seismic Exploration Site in Rajasthan, Bikaner of M/s Oil India Limited

- In accordance with the Government notification to phase out all electric detonators and prohibiting/banning their uses, possession, sale and import by April 1, 2025 in India; the Research Group successfully evaluated permitted electronic detonators and e-Exploders of three different explosive companies for safe applications in underground coal mines.

MINE FIRE, VENTILATION, MINERS HEALTH RESEARCH GROUP

Industry sponsored projects related with planning and design of underground ventilation system, including recommendation for fan specification, duct design, estimation of air quantity requirement for three upcoming coal and metal mines, viz. Gondbahera Ujheni Coal Block, Singrauli Coalfield, Dahegaon Gowari coal block of Ambuja Cements Ltd.and Kheratarla Underground Mine of Wolkem Industries Limited, Udaipur; determination of incubation period of coal seams and coal stack underground mines, viz. Bhelatand – A Colliery, Tata Steel, Keredari OCP, NTPC, Hazaribagh; dust and noise monitoring of four mines of NMDC, viz. BIOM, Kirandul Complex, Bacheli complex, DIOM, Donimalai Complex, DMP, Panna are undertaken by the research group.

The department has also undertaken various assignments, viz. mine air sample analysis, air borne respirable dust study & free silica determination, performance evaluation of self-rescuers and breathing apparatus, calibration of gas analysers used in mines, testing of safety equipment, flame safety lamp and testing & certification of PPEs aiming to create a healthier workplace environment and ensure occupational safety for the miners through research activities and providing consultancy services to industry to achieve the same.

Calibration of Mechanical Anemometer, Digital Anemometer have also been carried out as a routine job. Details of the work undertaken during the year 2024-25 are as follows:

(A) Industry Sponsored Project

1. A scientific study on ventilation planning and design of Gondbahera Ujheni coal block, Singrauli Coalfield, District Singrauli, Madhya Pradesh was taken up. The project involves estimation of required air quantity for the highly mechanized underground coal mines planned with multiple continuous miner panels. CSIR-CIMFR, Dhanbad, provided the desirable ventilation system along with fan capacity, duct details, and ventilation system design for the safe drivage. The objectives of the study are design of ventilation system, ventilation network development, determination of fan capacity/specification, fan installation recommendations. The project has been completed, and the final report has already been submitted.

2. A scientific study on ventilation planning and design of Dahegaon Gowari coal block of Ambuja Cements Ltd. was undertaken. Key parameters are the estimation of air quantity requirement for the mechanized underground coal mine with multiple continuous miner panels along with SDL and LHD. CSIR-CIMFR, Dhanbad, provided the desirable ventilation system along with fan capacity, duct details, and ventilation system design for the safe drivage along with fan installation recommendations. The project is ongoing.

3. A scientific study has been undertaken for the ventilation planning and design of an underground Wollastonite mine, Kheratarla Underground Mine of Wolkem Industries Limited, Udaipur. CSIR-CIMFR has carried out the ventilation planning of the Mine using an indigenously developed SINET software. The objectives of the study are design of ventilation system, ventilation network development, determination of fan capacity/specification, fan installation recommendations. The project is completed and final report is to be submitted.

4. To create a healthier workplace environment and to ensure occupational safety for the miners an industry sponsored project was undertaken from BIOM Kirandul Complex, NMDC; Bacheli complex, NMDC, DIOM, Donimalai Complex, NMDC, DMP, Panna, NMDC, Chasnalla Colliery, SAIL for a duration of three years. The objective covers static and personal sampling of mine dusts, determination of dust concentrations, the analysis of percentage of silica in mine dusts, personal noise monitoring, area noise monitoring on quarterly basis. The study can help in adopting suitable control technologies and developing specific techniques in order to reduce dust concentration, silica content. Direct-on-Filter method using Fourier Transform Infra-red (FTIR) Spectroscopy determined free silica content in respirable dust. The project is in progress.

5. Occupational Health and Safety Study is being undertaken at AEL Suliyari Coal Mine Site for M/s Adani Enterprises Limited at Suliyari, Singrauli, Madhya Pradesh. As part of the project assignment, a **field visit has been successfully completed**, and **all required secondary data have been collected and analyzed.** The findings are being integrated for the preparation of the comprehensive project report. The project is in progress.

6. A study was undertaken to investigate propensity towards spontaneous heating and assessment of incubation period of X seam of Bhelatand – A Colliery, Tata Steel and JK Cement Pvt Ltd. Coal characteristics study in the laboratory as well as site specific geo-mining parameters were considered for this assignment. Further, similar task was entrusted to CSIR-CIMFR, Dhanbad by Keredari OCP, NTPC, Hazaribagh to study the incubation period of coal seam as well as coal stack.

(B) Testing

A glimpse of the major testing services offered to industry are mentioned below:

- **Performance Evaluation of Various Safety & Rescue Equipment Used in Mines:**

  Self-Contained Self Rescuer (SCSR) and Breathing Apparatus are the major life support equipment during disaster in coal mines. To ensure their performance during emergency, their periodical evaluation as per

Indian Standard is required. A total of 242 SCSR samples of different make and model from various manufacturing industries and coal mines have been evaluated using artificial breathing simulator machine and other associated setup in laboratory condition as per IS 15803:2008 and DGMS (Tech.) Circular No. 08A of 2008 in year 2024-25.

- **Testing of Miner's Safety Equipments**

  Mining operations around the world pose a great risk to worker's health and safety. Thus it becomes inevitable that the PPEs which are going to be donned by the workers are quality tested and meet all the standards. The department has a wide range of state-of -the-art facilities to test the quality of the PPEs which include: Safety Helmets, Safety Boots, Safety Flame Lamp, LED Caplamp, brattice cloth, semi-rigid and flexible ventilation ducting and calibration of other major underground instruments, viz. methanometer, toximeter, multigas detector, anemometer, magnehelic pressure gauge etc. For the year 2024-25, a total of 06 anemometers, 25 methanometers, 11 toximeters, 11 multigas detector and 05 oximeters from different user industry were calibrated. For the testing of safety equipment, two batches of flame safety lamp were tested at our laboratory.

- **Respirable Dust Analysis**

  Occupational exposures to silica are associated with the development of silicosis, lung cancer, pulmonary tuberculosis, and respiratory diseases. Mining is one of the sectors more impacted by the exposure to silica. Hence, determination of per cent of silica in mine dusts is statutory requirement. It also helps in adopting suitable control technologies. Accordingly, a state-of-the-art lab facility has been developed to analyse of air borne respirable dust samples collected on filter paper for free silica analysis, respirable dust concentration and maximum exposure limit using Direct-on-filter method of FTIR Spectroscopy conforming to DGMS (Tech)(S&T) Circular No.1,2010. For the year 2024-25, 09 dust samples of Chasnalla Colliery, SAIL, Jindal Power and Coal India Ltd. were analysed for silica determination.

- **Mine air sample Analysis**

  Mine air sample analysis and their interpretation with respect to fire ratios, viz. Graham's ratio, Oxides of carbon ratio, Young's ratio plays a pivotal role in understanding the status of fire in sealed off area of a mine. Mine air sample were analysed with respect to carbon monoxide per cent, carbon dioxide per cent, methane percent, hydrogen per cent and oxygen per cent. A total of 45 samples were analyzed in the year 2024-25. These samples were regularly received from Chasnalla Colliery, SAIL and Bhurkunda Colliery, CCL for their analysis.

During this period, services of the research group reached out to different organizations and companies, viz. Eastern Coalfields Ltd. (ECL), Bharat Coking Coal Ltd (BCCL), Central Coalfields Ltd. (CCL), South Eastern Coalfields Ltd. (SECL, Mahanadi Coalfields Ltd. (MCL), Western Coalfields Ltd., NMDC, Hyderabad, Tata Steel Ltd., ISP, SAIL, Suparna Chemicals Ltd. (Mumbai), J K Dey and Sons, Kolkata, JSW Steel, Hindustan Zinc Ltd. (HZL), AGG Life Sciences, Drager Safety India Pvt. Ltd., CDET Explosives Industries Pvt. Ltd. etc.

MINING METHODS & GEOMECHANICS RESEARCH GROUP

UNDERGROUND MINING METHODS SECTION

PROJECT REPORT:

The section provides solutions on numerical modeling challenges in underground coal and metalliferous mining particularly in areas like ground control, rock mechanics, and design of mining methods etc. During the period April 2024 to March 2025, the section has been actively involved in one CSIR-sponsored FBR/NCP project, one CIL R&D Board project, one SERB project, one DST-JSPS funded project, one in-house project, as well as several other R&D and industry-sponsored projects. Additionally, projects from the previous year were successfully completed in collaboration with the Geomechanics and Numerical Simulation Section. The

client's portfolio of this section includes companies such as HZL, HCL, SMS, GCPL, TATA Steel Limited, ECL, SECL, MCL, etc.

Apart from the project-related activities, the section imparted training to students from various engineering colleges across India and actively participated in several scientific exhibitions under the HRD banner of CSIR-CIMFR. The scientists and technical staff also contributed as project leaders and team members in projects undertaken by other sections of CSIR-CIMFR.

A brief overview of some of the prominent ongoing projects/R&D achievements is as follows:

1. **Development of AI/ML-based Geotechnical Instrumentation and Ground Monitoring Analytics (GIGMA) portal for safe excavations in underground mines (CSIR FTT Project no. MLP/159/2022-23). Implementing Agencies: CSIR-CIMFR**

The Geotechnical Instrumentation and Ground Monitoring Analytics (GIGMA) web portal is a role-based access management system to provide secured, restricted access to different stakeholders/persons concerned, like administrators, mine managers, scientists, statutory bodies, etc. The project aims to develop (a) AI/ML-based ground monitoring analytics for predicting geotechnical precursors of ground instability from online and offline data under varying geomining conditions and (b) cloud-based software to optimise the instrumentation plan, analyse multi-scale ground monitoring data, and suggest ground control measures. It is designed to monitor key operations in mining, aiming to improve productivity while prioritising safety.

- Identification and characterisation of key parameters of ground instability
- Formulation of Machine Learning method for cloud-based GIGMA applications.
- Formulation of a pre-processing scheme for input sensors (Stress, dilation, convergence) data and output data of rock fall event and margin time of extracted panels and development of a prediction model of rock fall occurrence and margin time. Figure 1 shows the Schematic diagram of the GIGMA web portal.

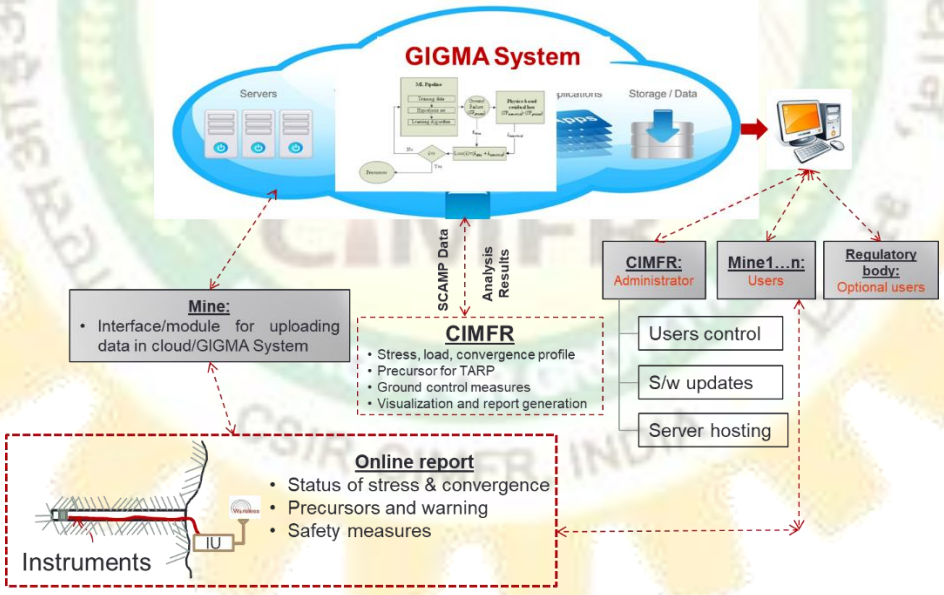


Fig. 1: Schematic diagram of the GIGMA portal

2. **Development of AI-based computational method for predicting Remaining Useful Life (RUL) of repairable systems (Project No.-GAP/DST/126/2022-23). Implementing Agencies: CSIR-CIMFR, Dhanbad and Kyoto University, Japan.**

This project has been approved and funded by the Department of Science and Technology (DST) under the India-Japan Cooperative Science Programme in 2022. The objectives of the project are to develop an AI-based computational method using a combined Artificial Neural Network and Hierarchical Genetic Algorithms for predicting RUL of complex machinery at the system level and minimising uncertainties in RUL prediction. The major works done are as follows:

The ANN models of Input Data (Kurtosis, RMS, Skewness) and Output Data (Breakdown) were created with feedforward model, Levenberg-Marquardt training algorithm. The performance parameter taken into account is Mean Square Error. The generated model is shown in Figure 2.

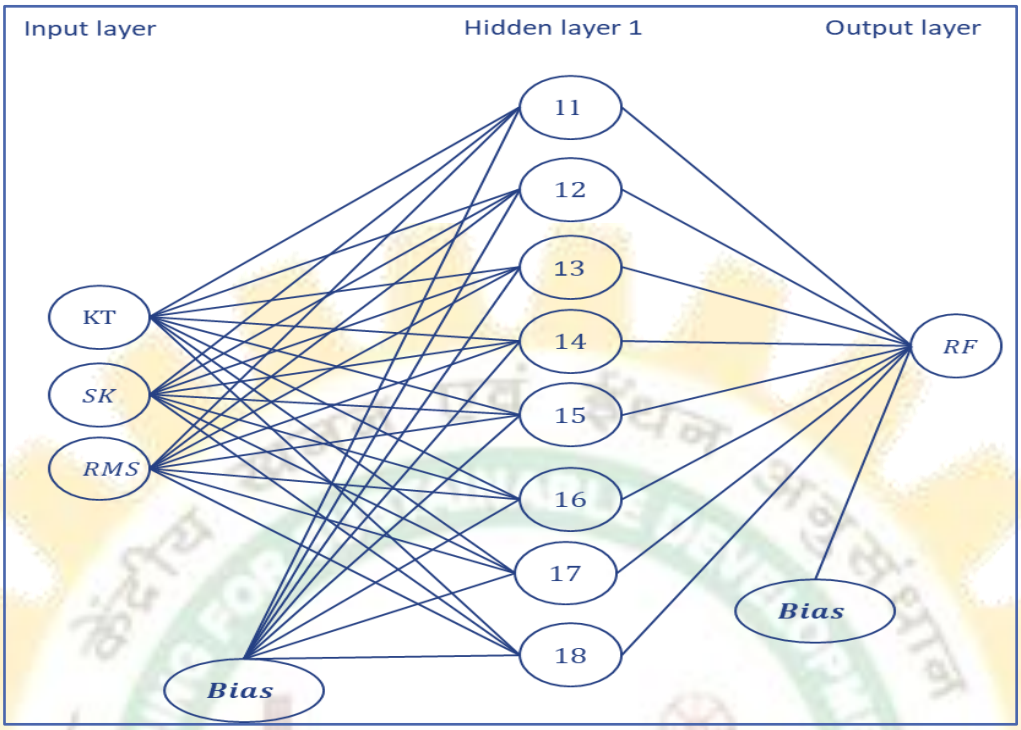


Fig.2: The selected architecture of the feed forward back propagation network

The developed ANN structure, as shown in a scheme in Figure 3, was optimised using Genetic Algorithm (GA) and the following results were generated.

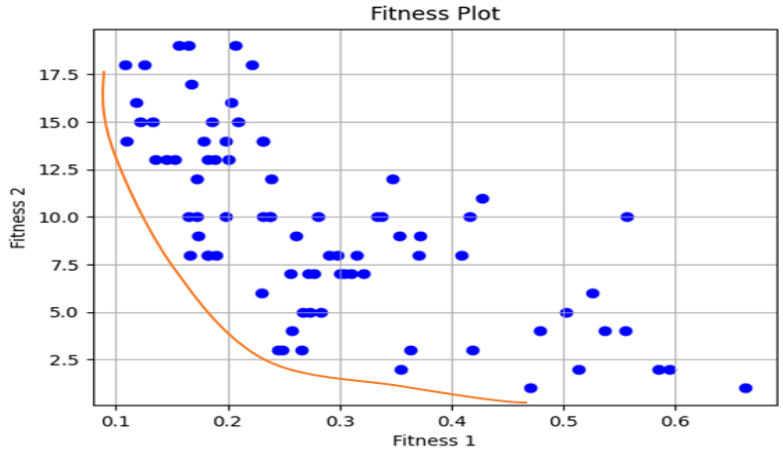


Fig.3: Fitness plot of non-dominated pareto front of optimum ANN structures

3. **Design of underground coal pillars by stochastic approach considering randomness and spatial variation of rock mass strength (GAP/SERB/DST/129/2022-23) sponsored by Science and Engineering Research Board (SERB), Department of Science & Technology, Government of India.**

The safety of underground working places mainly depends on the stability of pillars, which take the load of overlying rock strata. Design of inadequate-sized pillars or incorrect prediction of their stability may expose the workers to risk due to the chances of failure of pillars vis-à-vis overlying strata. In the present pillar design methodology, the average value of the UCS is taken into account for stability analysis without considering the variability in the UCS of coal. It results in the same size of pillars irrespective of the variation in the UCS of coal. Some literature expounds that the stability of the pillars, analysed through a deterministic approach, is

not predicted correctly due to the limitations of the present methodology in considering the variability of UCS. Due to these limitations, sometimes a pillar having inadequate size is declared as a stable pillar. These limitations can be eliminated if pillars are designed by a stochastic approach, which is able to consider variability in the UCS of coal. This approach will be useful when pillars are to be designed to protect the surface structures or to prevent any surface subsidence. A more accurate/precise design is required under these conditions. In these cases, generally, the pillars are designed to have an FOS value of more than 2.0. If the deterministic approach is used, the probability of FOS>2 for the designed pillars may be less in case of more variability in the UCS of coal. Therefore, the stochastic approach to pillar design would be helpful to determine the adequate size of pillars with a higher confidence level by considering the variability in the UCS of coal. In this project, the design criteria of coal pillars will be developed based on randomness and spatial variability in the UCS of coal by a stochastic approach.

4. **Strata monitoring of Stopes, Strata condition and Rock mechanics study in Banwas block of Khetri mines of Hindustan Copper Limited of Banwas project of SMS Limited.**

At the Banwas block of Khetri mine, the ore body is extracted from transverse and longitudinal stopes. The mineral is extracted from transverse and longitudinal stopes by the 'Blast Hole Open Stoping' method based on the shape and size of the ore body. This section was involved in instrumentation and monitoring during development and stoping operation. Suitable geotechnical instruments were selected, and an instrumentation plan was provided for safe operation. Different geotechnical instruments, e.g. Stress cell, MPBX, Rotary Tell-Tale and Load cell were suggested and installed in the field.

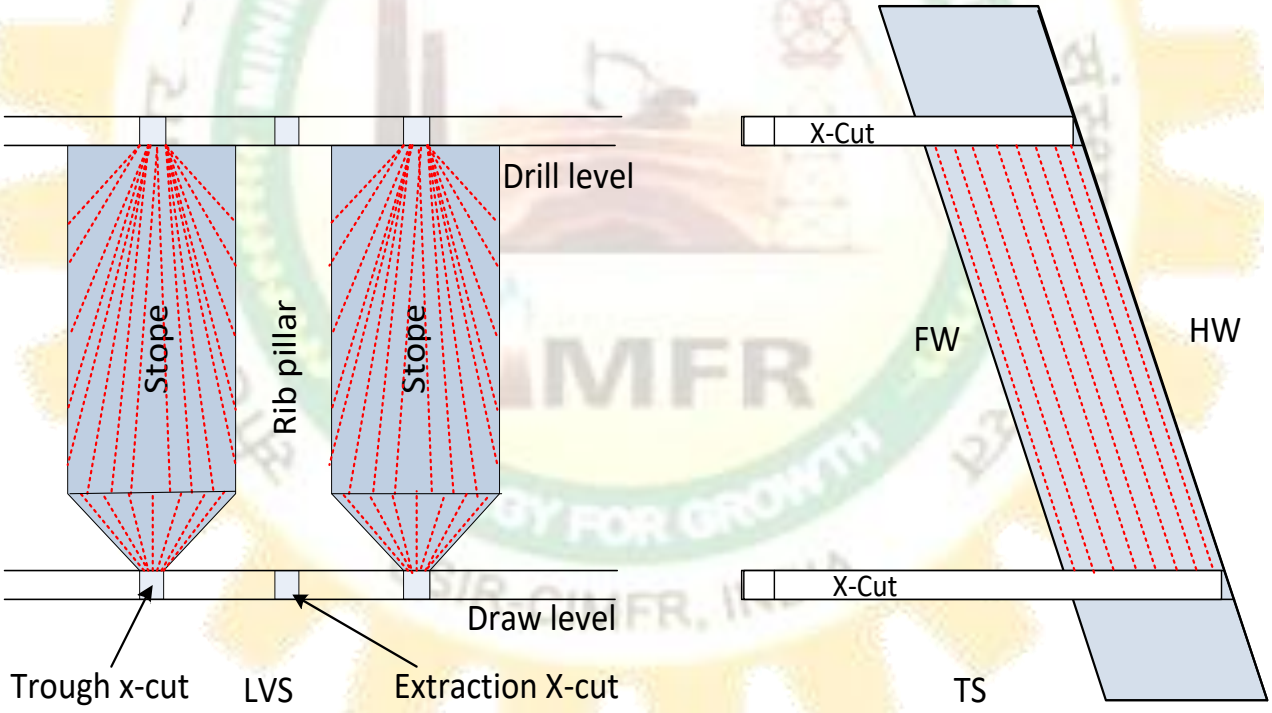


Fig. 5: Method of transverse stoping operation

Fig. 6: Multipoint Borehole Extenso Meter installed in the crown pillar of the already extracted 12-15 stope at 174mRL.

Fig.7: Anchorage testing of installed bolts conducted at the 16-17 VR development face at 174mRL.

Fig.8: Roof condition near 14-16 VR at 120mRL.

5. Instrumentation and Strata Monitoring during Stoping operation at Rampura Agucha Underground Mine, HZL.

The Rampura Agucha mine, owned by Hindustan Zinc Limited, contains a high-grade zinc and lead deposit with a NE-SW strike length of 1550 meters and an average width of 58 meters. Since 2013, mining has transitioned from open-pit to underground stoping methods, specifically Long Hole Open Stoping (LHOS) with paste fill, after the open pit reached a depth of 400m. Current underground operations occur below the exhausted open pit, separated by a 60m crown pillar. A CSIR-CIMFR study from November 2023 to February 2024 involved geotechnical monitoring of these operations. Key findings include the use of both underhand and overhand LHOS methods, the division of stoping panels into primary and secondary stopes, and the categorisation of the rock mass into three geotechnical domains. The mine employs a Ground Control Management Plan with various support systems, and stability is assessed using instruments like stress cells and extensometers. The paste fill's strength increases with binder content, and regular monitoring ensures safe mining conditions. Rock bolt testing showed minimal failures, with prompt corrective actions. Additionally, CMS scans of some stopes showed no major changes post-blasting, indicating stability. The study suggests improvements in record-keeping and emphasises the importance of comprehensive ground support and monitoring as mining operations reach greater depths.

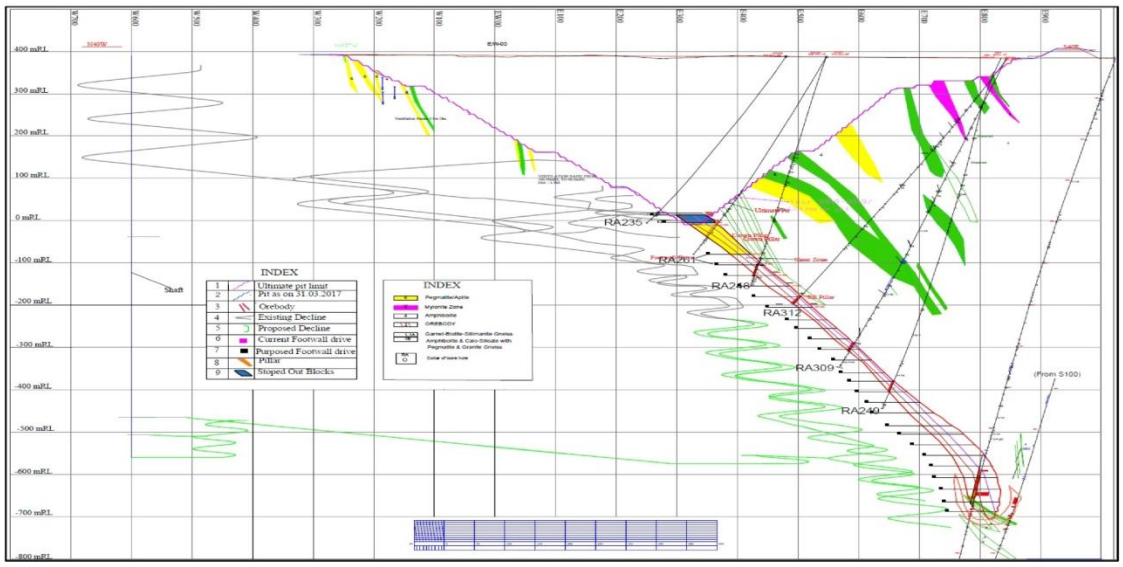


Fig.9: Transverse section of the geological plan showing the orebody, and different types of rocks.

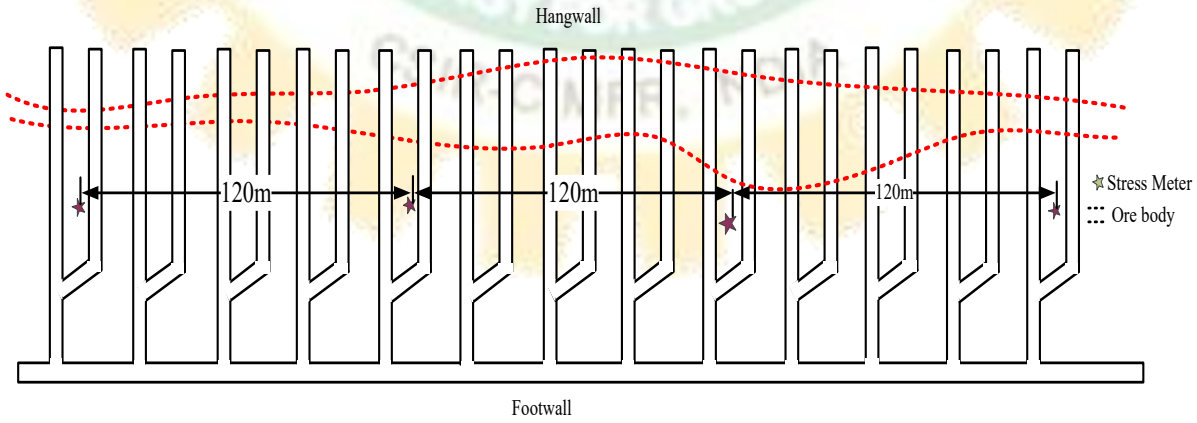


Fig.10: Instrumentation plan for stress meters.

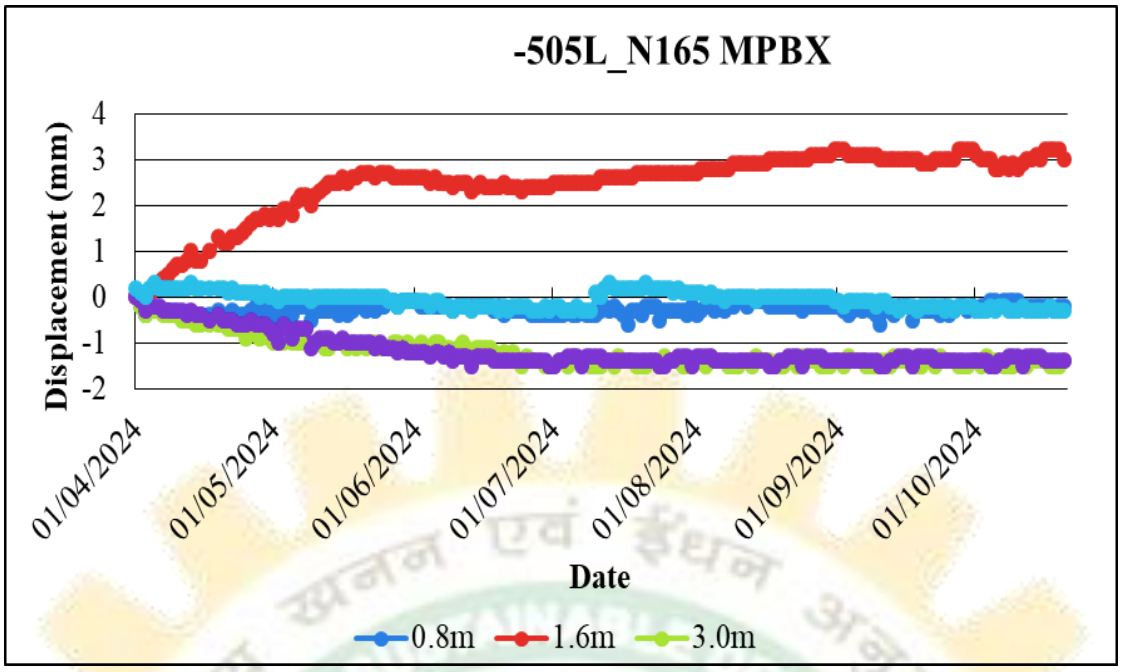


Fig.11: Cumulative displacement measured by MPBX at -505mRL N165.

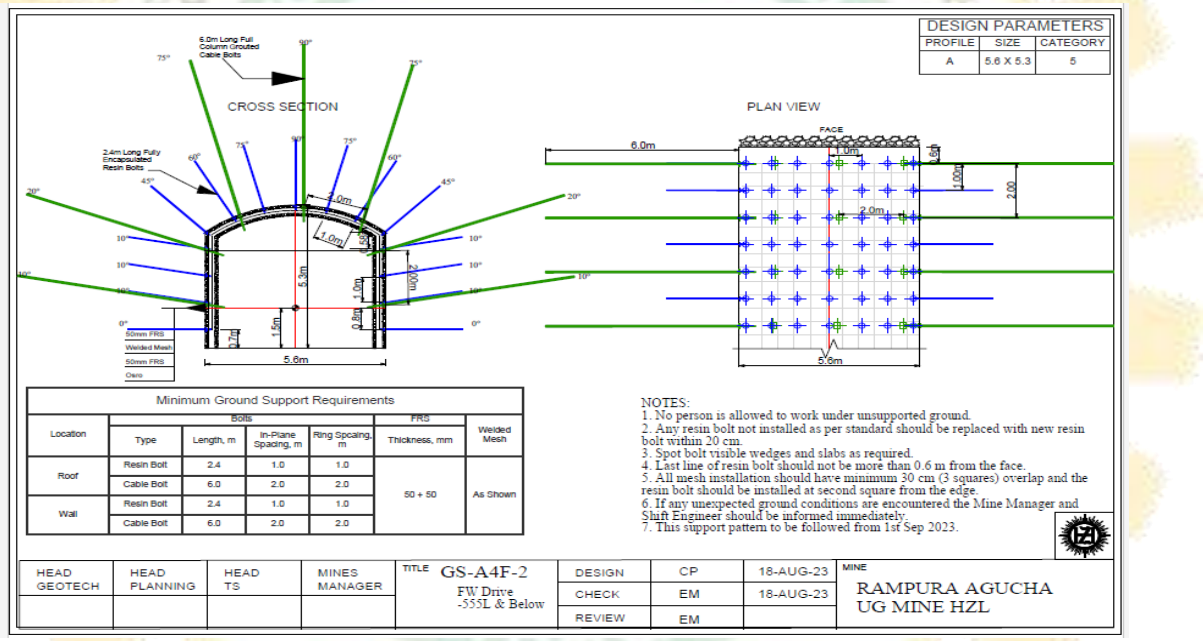


Fig.12: Minimum ground support requirements for footwall drive -555L and below.

6. **Development of tandem approach for paste fill technology and extraction methodology by continuous miner (CM) deployment for Shampur B Colliery of Mugma Area, ECL (GAP/CIL/128/2022-23) sponsored by CIL R&D Board.**

Though there are many cases of paste filling in underground metal mining, but application of paste backfilling in underground coal mines is yet to be done in India. Presently, continuous miner-based mass production technology is providing good production and productivity with low investment. So, it is high time to develop a suitable paste fill technology for the continuous miner (CM) panel in Indian geo-mining conditions. This would help to achieve effective utilisation of coal ash, maximum production from underground mines, increased safety and minimise surface and sub-surface subsidence. The main objective of the project is to design and develop paste backfill and a method of work with CM such that a high rate of backfilling is achieved for fast-paced extraction by CM, and the numerical modelling to obtain the strength of the paste-filled coal rib.

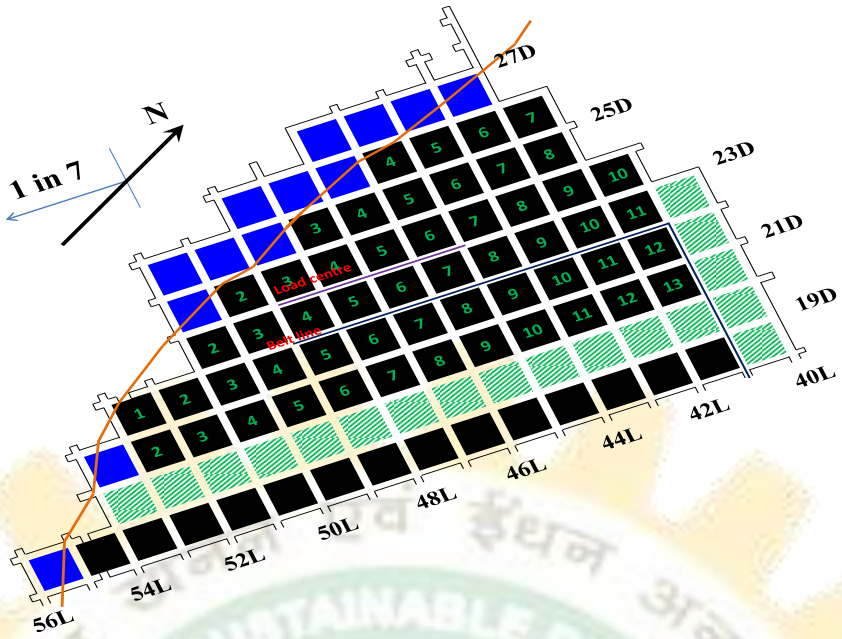


Fig.13: Schematic view of the proposed sequence of diagonal line of pillar extraction by LHCM technology with paste fills.

7. **Shale roof characterisation and control strategies for underground coal mines. (MLP/162/2022-23). CSIR-CIMFR In-house Project.**

The main objective of the study is to characterise the shale roof and to frame control strategies during the underground extraction of coal. The objective results in the following deliverables:

- Study of physico-mechanical properties, clay mineralogy and microstructures of shale.
- Development of empirical relationship with physico-mechanical properties, clay mineralogy and microstructure parameters.
- Study on the change of microstructures due to the absorption of moisture/water.
- Characterisation of different types of shale roofs.
- Control strategy of shale roof for Indian underground coal mines.

GEOMECHANICS & NUMERICAL SIMULATION SECTION

PROJECT REPORT:

The GNS section focuses on solving numerical modelling challenges in underground coal and metalliferous mining, particularly in areas like ground control, rock mechanics, and design of mining methods etc. During the period April 2024 to March 2025, the section has been actively involved in one CSIR-sponsored FBR/NCP project, one CIL R&D Board project, one SERB project, one DST-JSPS funded project, one in-house project, as well as several other R&D and industry-sponsored projects. Additionally, projects from the previous year were successfully completed in collaboration with the Underground Mining Method Section. The clients of this section include companies such as HZL, HCL, SMS, GCPL, TATA Steel Limited, ECL, SECL, MCL, and others.

In addition to project-related activities, the section provided training to students from various engineering colleges across India and actively participated in several scientific exhibitions under the HRD banner of CSIR-CIMFR. The scientists and technical staff also contributed as project leaders and team members in projects undertaken by other sections of CSIR-CIMFR.

A brief overview of some of the prominent ongoing projects/R&D achievements is as follows:

1. **Development of tandem approach for paste fill technology and extraction methodology by continuous miner (CM) deployment for Shampur B Colliery of Mugma Area, ECL (GAP/CIL/128/2022-23) sponsored by CIL R&D Board.**

Although paste filling has been widely implemented in underground metal mining but its application in underground coal mines in India is yet to be realised. Currently, the continuous miner-based mass production technology is delivering high production and productivity with relatively low investment. Therefore, it is imperative to develop a suitable paste fill technology for the CM panels in Indian geo-mining conditions. This advancement would help to achieve effective utilisation of coal ash, enhance production from underground mines, improve safety, and significantly reduce both surface and sub-surface subsidence. The main objective of the project is to design and develop a paste fill technology system and extraction methodology by CM, which will enable a high rate of backfilling to support rapid coal extraction. Fig. 1 shows pillar cutting and supporting sequence C9, C10, C11 and C12; Paste filling operation in C5, C7, C6, C8 and their adjacent galleries are shown in green colour.

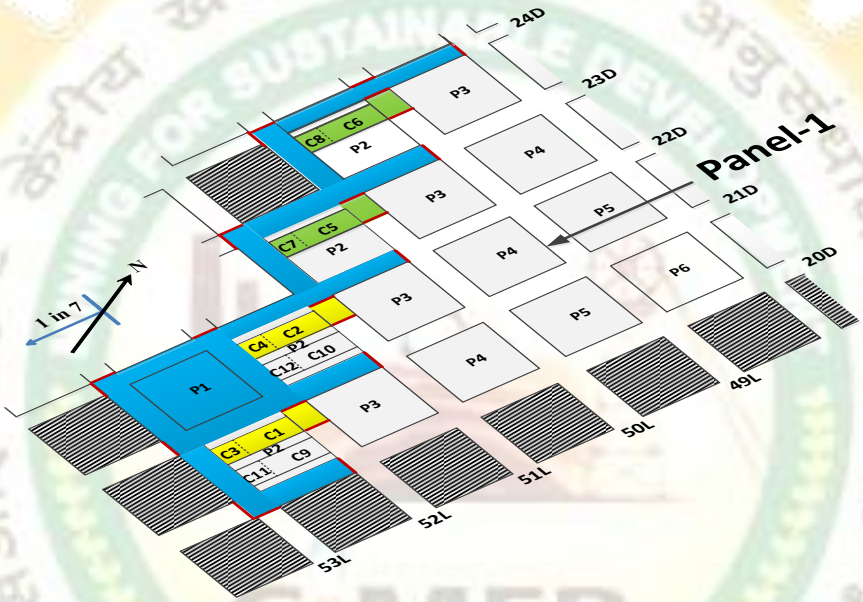


Fig. 1: Pillar cutting and supporting sequence C9, C10, C11 and C12; Paste filling operation in C5, C7, C6, C8 and their adjacent galleries shown in green colour

2. **Design of underground coal pillars by stochastic approach considering randomness and spatial variation of rock mass strength (GAP/SERB/DST/129/2022-23) sponsored by Science and Engineering Research Board (SERB), Department of Science & Technology, Government of India.**

The safety of underground working places largely depends on the stability of coal pillars, which support the load of the overlying rock strata. Improper pillar sizing or inaccurate assessment of their stability can significantly increase the risk of pillar and strata failure, posing serious hazards to workers. Currently, the pillar design methodology typically relies on the average uniaxial compressive strength (UCS) of coal for stability analysis. This approach does not account for the inherent variability in UCS, leading to uniform pillar sizes regardless of actual strength fluctuations in the coal seam. For pillars intended to remain stable over a long period, a factor of safety (FOS) greater than 2.0 is generally considered. However, when a deterministic approach is used, the probability of achieving FOS > 2.0 may decrease in cases where UCS variability is high. To address this limitation, a stochastic approach to pillar design is proposed, which incorporates the randomness and spatial variability of coal strength. This method enables the determination of more reliable pillar dimensions with a higher confidence level. In this project, pillar design criteria will be developed using a stochastic framework that considers the variability in coal UCS. Fig. 2 shows the required effective pillar width to achieve an FOS > 1.5 at different probabilities of occurrence. Fig. 3 shows that as the variability in coal UCS increases or as the required probability of achieving the target FOS increases, the effective pillar

width must also increase. Based on Monte Carlo simulations, an easy-to-use formula has been derived to obtain the effective pillar width needed to achieve a desired FOS, considering both the designed probability and the coefficient of variation in UCS.

$$w_e = \left(w'_e\right)_{at\ \overline{\sigma_c}} \times \left(2^{COV} \times e^{\frac{0.063COV}{1-p}} \right)$$

Where, w'e = Effective width at mean UCS of coal for required safety factor, COV = Coefficient of variation, p = Probability of required safety factor.

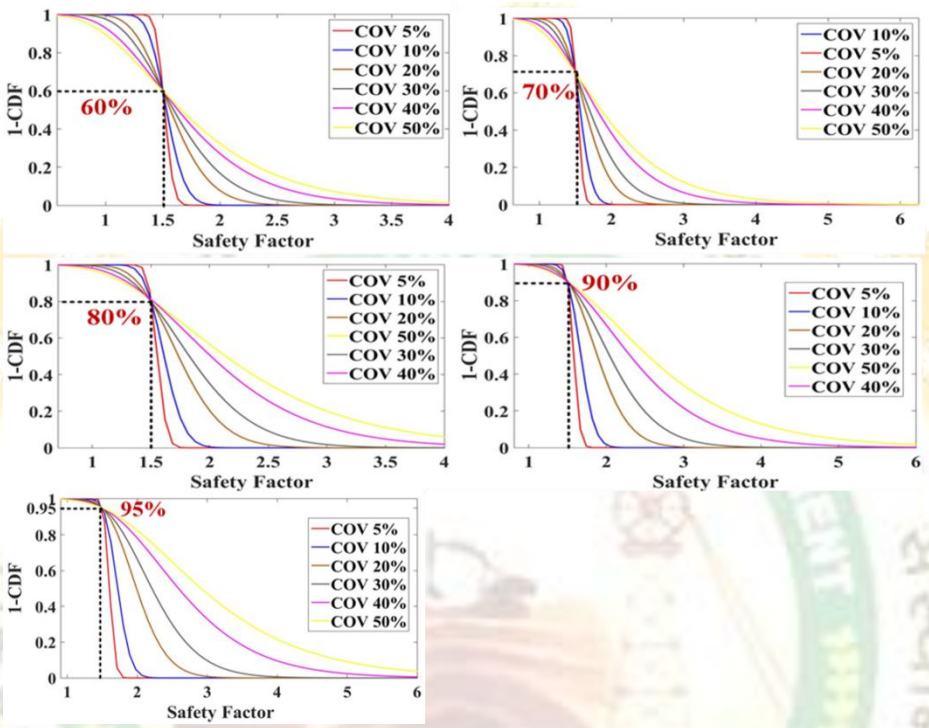


Fig. 2: Probability of occurance of the safety factor for different coefficient of variation.

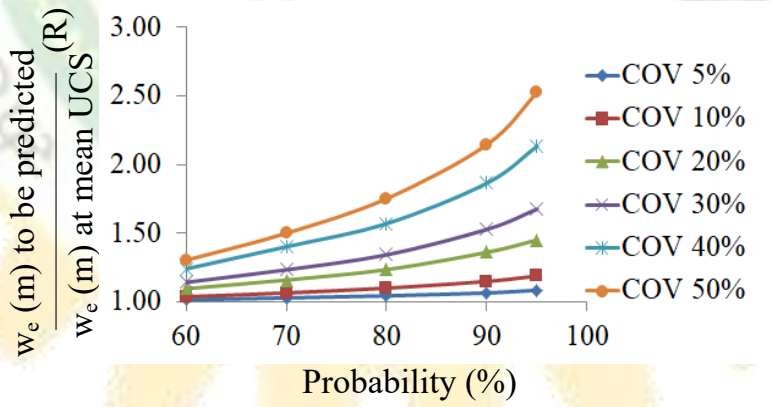


Fig. 3: Effective width of coal pillars having FOS> 1.5 for different probability of occurance and coeeficient of variations.

3. Shale roof characterisation and control strategies for underground coal mines. (MLP/162/2022-23). CSIR-CIMFR In-house Project

The main objective of the study is to characterize the shale roof and to frame control strategies during the underground extraction of coal. Managing multi-layered laminated shale roof strata during underground excavation of coal seams is a complex issue primarily due to the presence of numerous bedding planes and their sensitivity to moisture. Thus, the mechanical characteristics of this type of roof strata need to be assessed to avoid failure. In this study, the behaviour of multi-layered laminated shale roof strata is evaluated

by analytical models, laboratory experiments and elasto-plastic numerical simulations. In analytical models, the load-deflection behaviour of multi-layered laminated shale roof strata is evaluated by deriving the formula of equivalent flexural rigidity, which is capable of considering the impact of multiple laminated layers with different Young's modulus. The models indicate that bed separation is more likely to occur in the layers below the neutral axis, as these layers experience tensile stress. Fig. 4 shows the yield zones of the roof strata at different locations during the depillaring stage. The study also establishes the spatial dependency of deflection and longitudinal stress on layer positioning within the strata. Laboratory experiments show the strength degradation is not uniform in all types of shale rock, ranging from 86% and 4.2%. From the numerical simulation, the coal pillars and remnants pillars are designed with safety factors of more than 2.0 and 1.0 respectively. Field observations and study results confirm that pre-tensioned support systems are more effective in preventing shale roof failure, as the pre-tension increases friction among the bedding planes, improving overall stability. This study provides a practical engineering application for the control of laminated shale roof strata in underground coal mines, contributing to improved extraction methodologies and support system design.

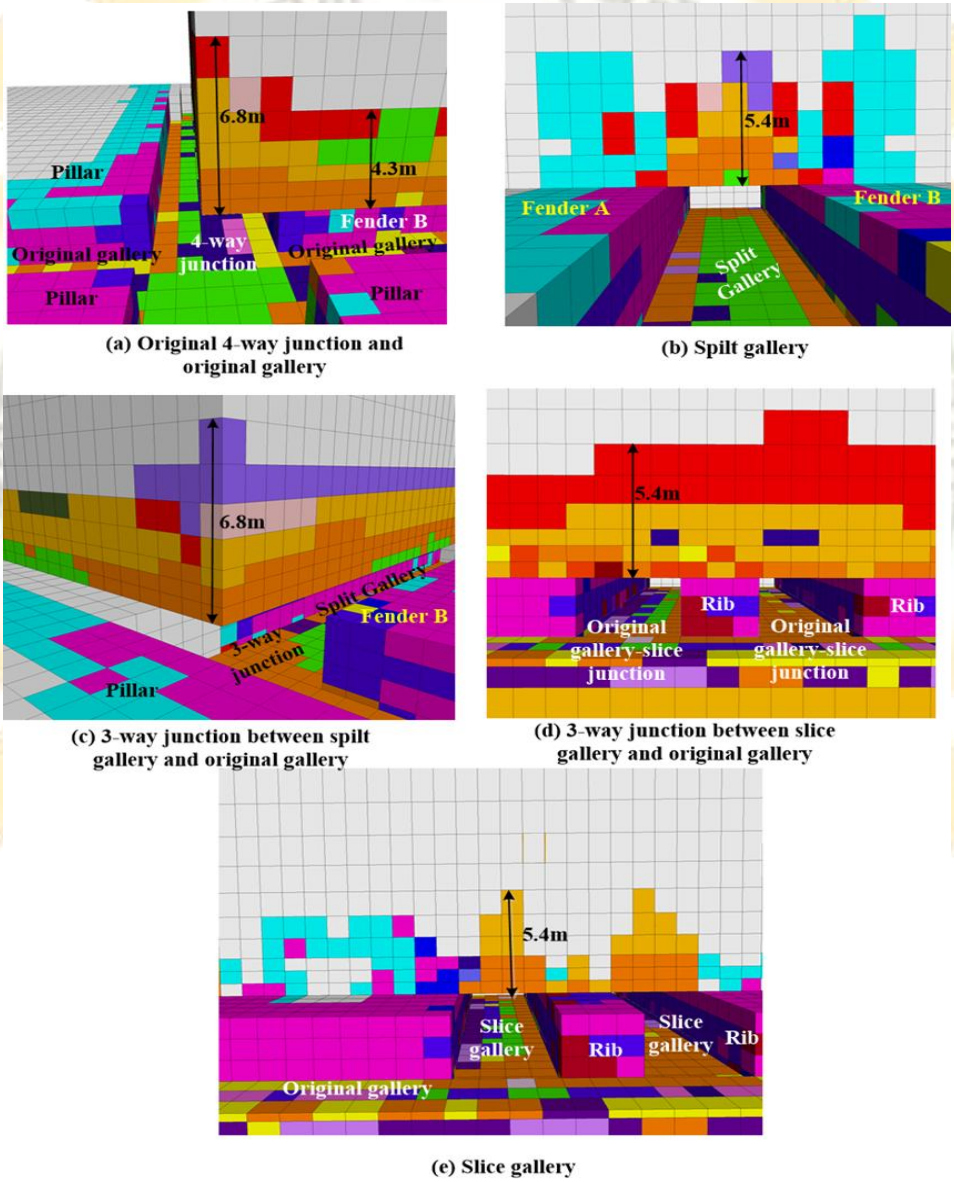


Fig. 4: Yield zones of the roof strata at different locations during the depillaring stage.

4. Strata monitoring of Stopes, Strata condition and Rock mechanics study in Banwas block of Khetri mines of Hindustan Copper Limited of Banwas project of SMS Limited

Banwas block of Khetri mine is being operated by M/s SMS Limited. The ore body is extracted from transverse and longitudinal stopes by the 'Blast Hole Open Stoping' method based on the shape and size of the ore body. The team members of the section were involved in instrumentation and monitoring during development and stoping operation. Suitable geotechnical instruments were selected for monitoring of stress, convergence/deformation of roof and sidewall, and an instrumentation plan was provided for safe operation. Different locations were identified for geotechnical instruments, e.g. Stress cell, MPBX, Rotary Tell-Tale and Load cell were suggested and installed in the field. Figs. 5-8 show the photographs of field investigations and readings taken from installed instruments.

Fig. 5: Wedge failure observed at 89mRL decline drive.

Fig. 6: Rotary telltale installed at the S-V-B-14-16 stopes drill junction at 174mRL.

Fig. 7: Reading taken from Vibrating wire type stress meter installed in the crown Pillar of already extracted stopes P-V-B-12-14A/12-15 at 174mRL.

Fig. 8: Reading taken from Multipoint Borehole Extensometer installed in the crown pillar of already extracted 12-15 stope at 174mRL.

5. Instrumentation and Strata Monitoring during Stoping operation at Rampura Agucha Underground Mine, HZL

Rampura Agucha mine, belonging to Hindustan Zinc Limited, has a stratiform, sediment-hosted, high-grade zinc and lead deposit. The ore body is massive and lens-shaped with a NE-SW strike length of about 1550m and an average width of 58m. The dip of the ore zone varies from 50° to 80°. The underground stoping operations have been carried out since June 2013. The underground mining is being carried out by Long Hole Open Stoping (LHOS) with the paste fill method. Initially, the production from the underground was started by the overhand LHOS method with paste fill. After obtaining permission from the Directorate General of Mines Safety (DGMS), the orebody is extracted by the underhand (Top-down) LHOS method with paste fills also. CSIR-CIMFR team visited the site and were involved in geotechnical monitoring of these operations from July 2024 to October 2024. Key findings include the use of the underhand LHOS method, the division of stoping panels into primary and secondary stopes, and the categorization of the rock mass into three geotechnical domains. The mine employs a Ground Control Management Plan with various support systems, and stability is assessed using instruments like stress cells, extensometers, etc. Fig. 9 shows the instrumentation plan. The paste fill's strength increases with binder content, and regular monitoring ensures safe mining conditions. Rock bolt testing showed minimal failures, with prompt corrective actions.

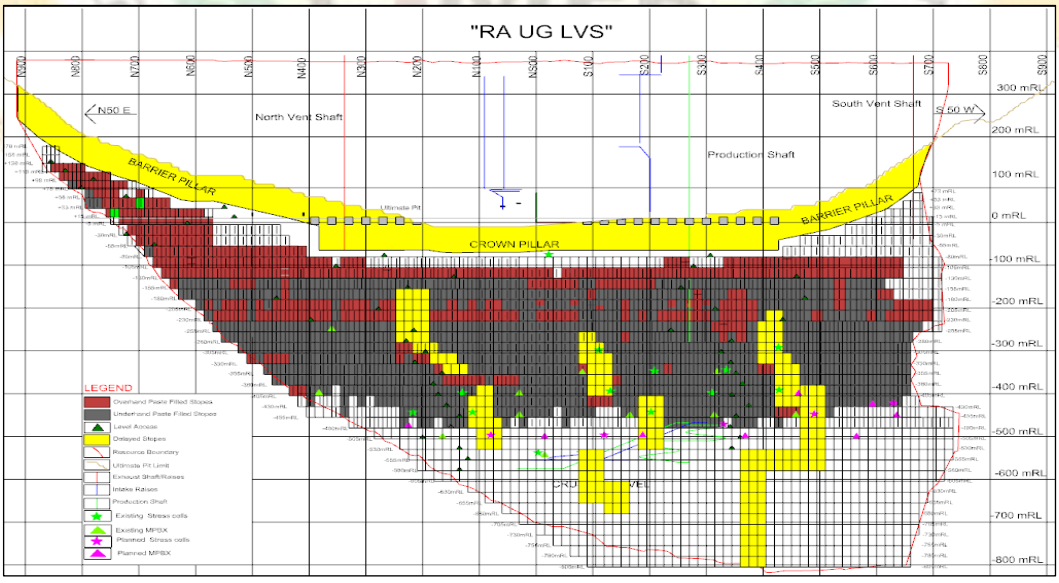


Fig. 9: Longitudinal Vertical Section (LVS) showing the present working stopes (overhand and underhand) and instrumental geotechnical monitoring locations by the middle of November 2024.

Additionally, CMS scans of some stopes showed no major changes post-blasting, indicating stability as shown in Fig. 10. The procedure followed in laboratory for determining the strength of paste fill material is shown in Fig. 11 and Fig. 12 shows the Histogram of the strength of in-situ paste fill sample with 13% binder after curing of 7 days, 14 days and 28 days.The study suggests improvements in record-keeping and emphasizes the importance of comprehensive ground support and monitoring as mining operations reach greater depths. Figs. 13-14 shows the photographs of the anchorage testing of Rock bolts and Tell tale observed at location -380L NN352 during field investigation.

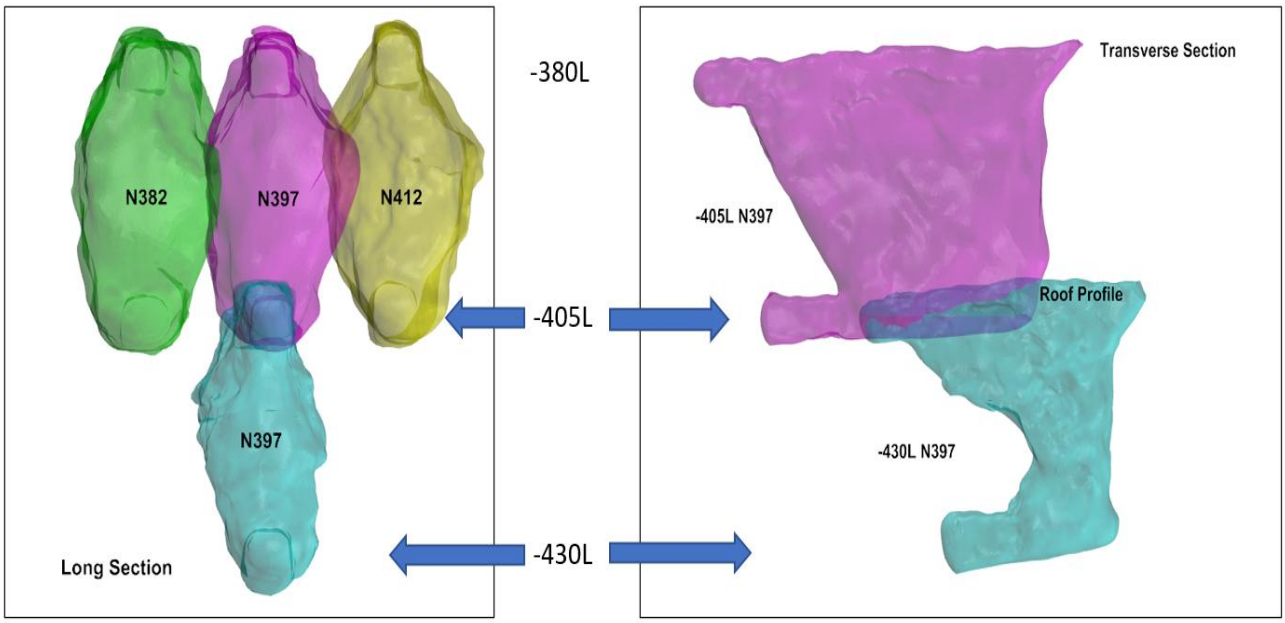


Fig. 10: CMS scan view of Stope -430L_N397.

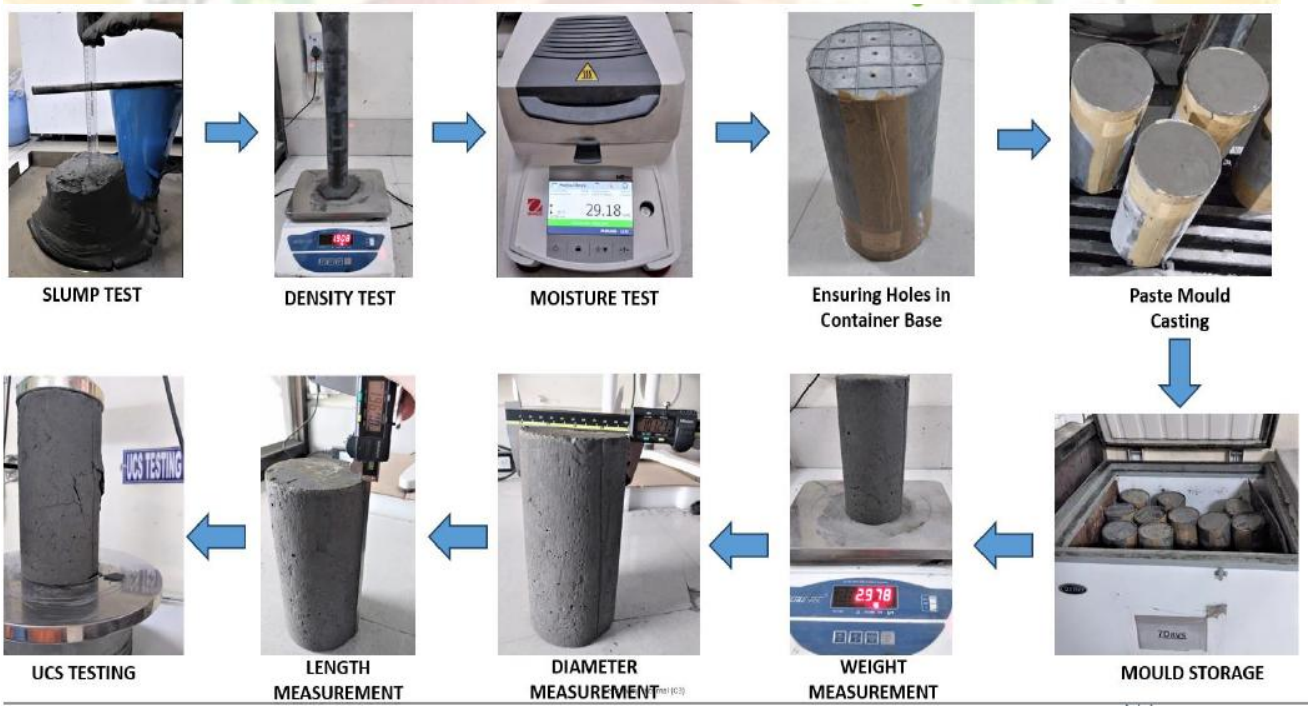


Fig. 11: Procedure followed in laboratory for determining the strength of paste fill material.

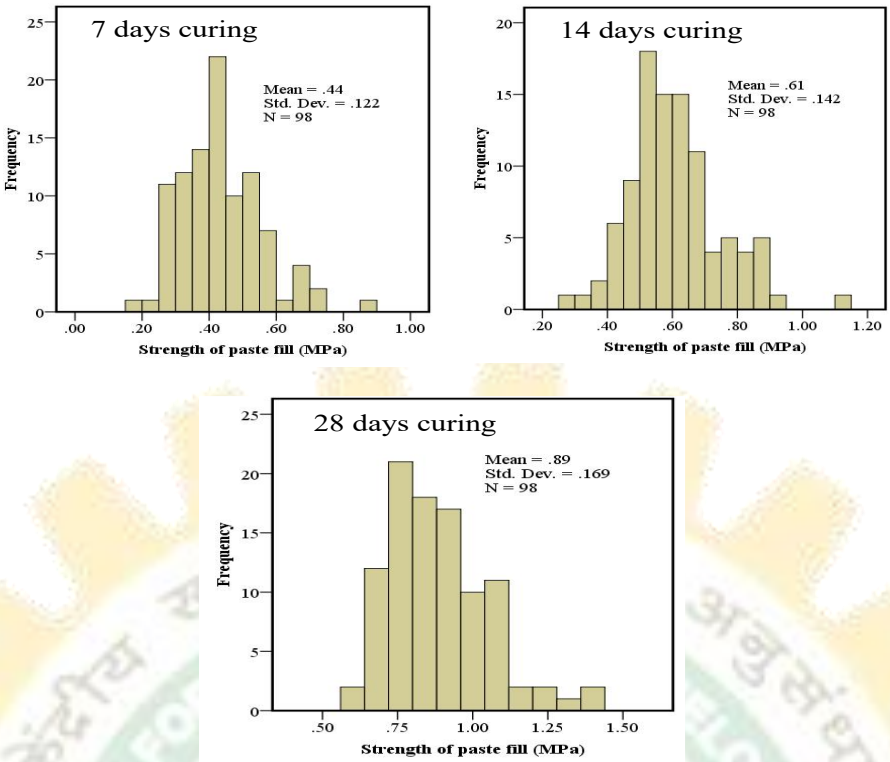


Fig. 12: Histogram of the strength of in-situ paste fill sample with 13% binder after (a) 7 days curing, (b) 14 days curing, and (c) 28 days curing.

Fig. 13: Anchorage testing of Rock Bolts at location -380L NN352.

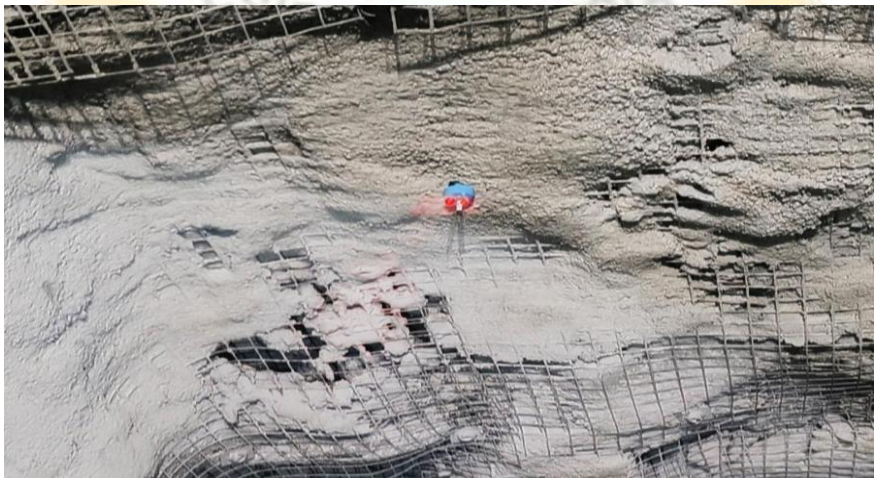


Fig. 14: Tell Tale in Paste development at -380L NN352.

6. Design of higwall mining operation under multi-seams conditions

Highwall mining under multi-seams conditions was designed at West Bokaro for Tata Steel Limited. Designing of highwall mining operation becomes significantly more complex under multi-seam geological conditions, where multiple coal seams of varying thickness, inclination, spacing, and geotechnical characteristics are present. These conditions pose unique challenges such as potential seam interactions, roof and floor stability, web pillar integrity, and control of overburden stress redistribution. There were surface structures above the surface which are to be protected during the extraction. Therefore, the design was carried out by numerical simulation and field investigations in such a way that there should not be any subsidence at the surface.

ROCKMASS CHARACTERISATION AND INNOVATIVE MINING METHODS SECTION

A number of industries sponsored projects are being carried out by our section related to design of geotechnical structures for safe, efficient and mechanised extraction of coal pillars and study of Rock mass characterization and determination of RMR (Rock Mass Rating) for support design for both conventional and mechanized mining during April 2024 to March 2025. The section is also involved in performance evaluation of underground structures through numerical modelling and using different types of strata control instruments for safe extraction of coal seams. Different R&D assignments/works were received from private and government companies like different subsidiaries of Coal India Ltd. (CIL), M/s SMS Limited Kondapuram, Adani Enterprises Ltd., Chhattisgarh State Power Generation Company Limited (CSPGCL), Hindalco Industries Ltd., M/s IMFA Ltd., Ambuja Cement Limited, Raigarh, M/s JSW Steel Ltd., Ranchi, M/s MPNRPL, etc.

1. Rock Mass Rating (RMR Study) at Gondbahera Ujheni Madhya Pradesh and Purunga Coal Block, Mand Raigarh Coalfield, C.G.

Rock Mass Rating (RMR) was determined for two coal blocks namely; Purunga Coal Block, Mand Raigarh coalfield, Chhattisgarh and Gondbahera Ujheni coal block, Madhya Pradesh. To determine the RMR of these blocks, core samples of different formation for varying depth range were collected from the core logs of two boreholes namely MPRD - 01 of Purunga Coal block (drilled up to 604m depth) and GBM-1 borehole (Figure 1a and b) of Gondbahera Ujheni coal block (drilled up to 628m depth). These two boreholes were selected for RMR determination because they are intersection all the coal seams which are existing in these blocks. The selected rock types were representative of the entire borehole length at various depths. RMR was evaluated at 40 different locations, encompassing all rock formations of the entire borehole length up to 604 m. The RMR values varied between 28 and 66, indicating a range from IV A poor to II A good roof conditions. The lowest RMR value of 28 was recorded for fine-grained sandstone and shale at shallow depth between 13 m and 19 m. Conversely, the highest RMR value of 66 was registered for medium-grained sandstone at a depth between 361 m and 364 m. Sandstone was the predominant rock type at most locations, followed by shale, coal, and shaly coal. The RMR computed between two consecutive seams ranged between 35 and 66. The highest RMR was recorded for the rock above IV seam (for depth spanning from 364.23 to 372.58 m), comprised of medium-grained sandstone. Likewise, for the depth intervals of 30.05 to 32.0 m and 71.88 to 72.78 meters for XIIIT and XIIB seams, the RMR value was determined to be 35, with medium to coarse-grained sandstone, shaly coal, and coarse-grained sandstone. The average RMR value for borehole rock sample was determined as 46.8 which comes under III A fair roof condition. RMR was evaluated at 22 different locations, encompassing all rock formations of the entire borehole length up to 628 m. The RMR values ranged between 26 and 57, indicating a range from IV A poor to IIL B fair roof conditions. The lowest RMR value of 26 was recorded for medium-grained sandstone at shallow depth between 6 m and 19 m. Likewise, the highest RMR value of 57 was also registered for medium-grained sandstone at a depth between 538 m and 559 m. Sandstone was the predominant rock type at most locations, followed by shale and coal. The RMR computed between two consecutive seams ranged between 38 and 51. The highest RMR was recorded for the rock above VI seam (i.e., between VII and VI seam) for depth ranging from 459.79 to 507.68 m, comprised of coarse to medium-grained sandstone. Likewise, for the depth intervals of 399.17 to 459.70 m above VII seam, the RMR value was determined to be 38, with medium-grained sandstone. The average RMR value for borehole rock sample was determined as 41.5 which come under III A fair roof condition.

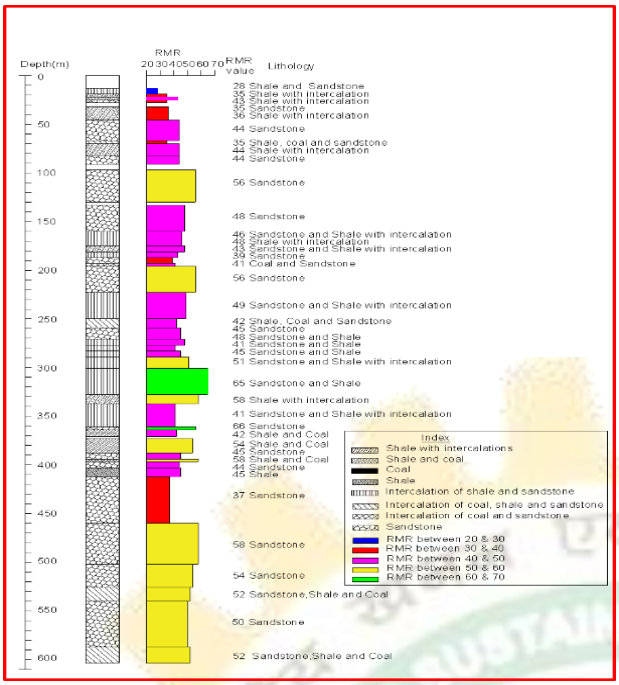


Fig. 1a: RMR value of different rock types with depth for Purunga Coal Block

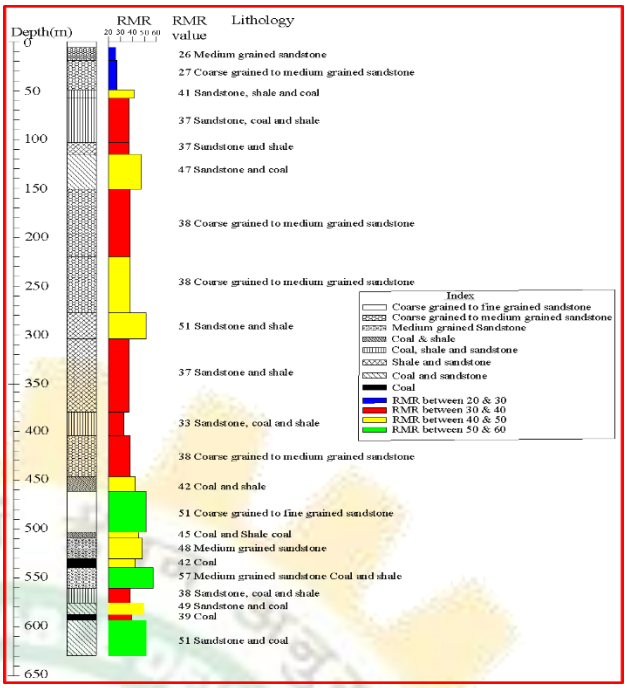


Fig. 1b: RMR value of different rock types with Gondbahera Ujheni Coal Block

2. Advice for safe development of galleries from punch entries in Thick Seam Bottom (TSB) at Kondapuram Project, Manuguru Area, SCCL on the basis of information/data provided by the mine management.

At Kondapuram Underground Project, Manuguru Area of Singareni Collieries Company Limited, CSIR-CIMFR is suggested to install Tell-tales for strata behaviour monitoring during development of Thick Seam Bottom (TSB) using CM. Considerable number of geological discontinuities like joints, slips, major and minor faults were observed during development of the seam. However, these joints and slips were found to be intact and also frequency of faults/ joints/ slips in the galleries were decreasing with depth of cover. No roof movements were observed in Tell-tales TT during development of the seam till date.

3. Advice on the ground support design of portal and initial 100m decline length and the stability design of benches around the portal at Sukunda Mines (Chromite) of M/s IMFA Ltd.

M/S Indian Metals & Ferro Alloys Limited has planned to extract the deep chromite ore from Band-I at -180mRL by underground method of mining at Sukinda Mine (Chromite). Up to -2mRL, critical depth of steeply dipped orebody of Band-1, the chromite is being extracted by open-pit mining method. The bench height and berm width of each bench is equal to 8m with an overall pit slope angle of 30^0. To access the underground mineral, it is proposed to construct an arch shape decline with a portal of 5.5m X 5m (width X central height) dimension from sixth number of benches counted from the surface. The length of decline portal made of reinforced concrete cement (RCC) is 17m depending up on the geological condition of hard serpentine. The gradient of the portal floor is 1 in 20 (i.e., from +86mRL to +87mRL) and the decline will start from +87mRL in down gradient of 1 in 7. The portal safety factor has been estimated with respect to the maximum dead load of the overburden. It is also considered that the portal will stabilize the abutment load due to buttress/embankment pressure from the benches protruded rockmass towards the open pit. Since, the opening is to create for the workmanship in hard serpentine formation intersect by prominent three set joints, which is vulnerable to fail under gravity loading, the “Forepole Support” (Figure 2), a monolithic support is designed for the safety of man and machine. This will form a canopy above to the opening under which the construction of RCC portal by ISMB ribs tied with TMT rods can be done. The filling of cement mortar using hose pipe and compressed air to achieve 300mm thick RCC structure. After the portal section, in initial 100m decline the support of green roof is by rock reinforcement method using rock-bolt and weld-

mesh support system. For this, 'Bieniawaski's rockmass classification system', has been applied to characterization of rock and determination of rock-load. The rock load of immediate roof has been used to design the roof bolting system is done. Also, to stabilized the exposed rock faces in benches at and above the portal, the shotcreting is designed so that it would protect the rockmass from long term weathering and direct rain water degradation/decomposition. The estimated area of shotcreting is approximately 7000m^2, which is spread in five number of benches (Figure 3).

Fig. 2: ISMB arches below the forepole support in portal

Fig. 3: Ground improvement by soil nailing surrounding to portal for slope stability

4. Stability Evaluation of Three Numbers of drivage gallery below the Damodar River from W-9 Panel in Lower Bachra Seam to access the Benti Block at Churi Mine.

Churi mine is an underground project in North Karanpura Area of Central Coalfields Limited and the coal production is being carried out by deployment of Continuous Miner with battery hauler. There are two coal

seams, namely Upper Bachra and Lower Bachra. At certain parts in Churi Block, Upper Bachra Seam (UBS) is of mineable thickness and is contiguous to Lower Bachra Seam (LBS), while in major portions this seam is too thin to be mined. The mine management has planned to introduce the Continuous Miner for development in virgin area, re-development and depillaring operation in Benti block. So, three new access galleries of dimension 4.8m (w) X 3.3m (h) from W-9 panel is planned to drive using Continuous Miner. In this regard, stability assessment of three numbers of drivage gallery of dimension 4.8m (w) X 3.3m (h) located at 85m below the Damodar River from W-9 Panel in Lower Bachra Seam is done for safe access to the Benti Block at Churi Mine. The methodology adopted for the support design of galleries below the river consist of borehole lithological study, strength estimation of coal pillars beneath river embankment, RMR of the immediate roof of galleries and design of support system (Figure 4). The design has been implemented successfully and three galleries has been driven below the Damodar river.

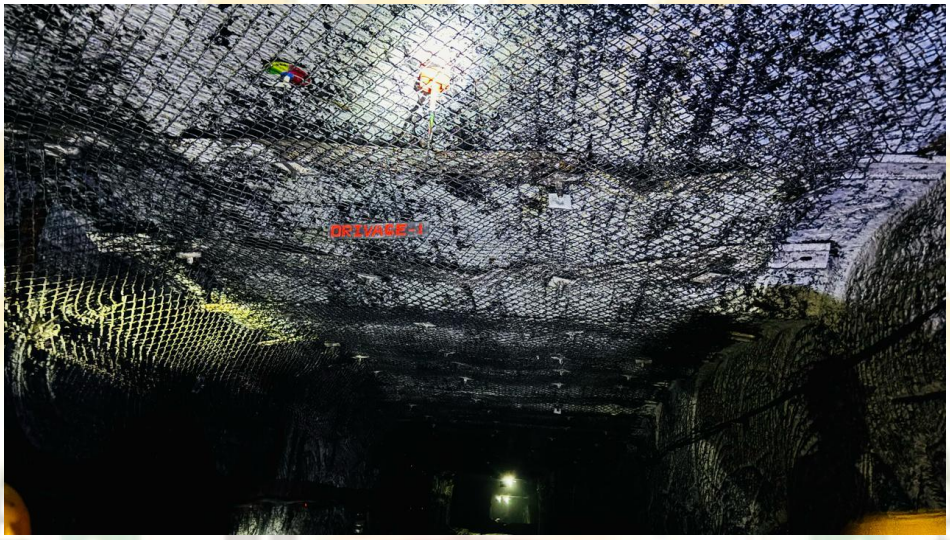


Figure 4: Support System designed for three galleries driven below Damodar River

5. Scientific study for design of support system for "Drivage of 2 Nos. Incline, sinking of return Air-Shaft & associated development works at Gondkhari U/G Coal Mine.

Gondkhari U/G Coal Mine of M/s Adani Power Limited (APL) is located at outskirts of Nagpur city, Maharashtra. There are two inclines in the mine viz. main incline & auxiliary incline of approximately 1.3Km & 1.2Km of respective length in a gradient of around 1 in 6.5 of is planned for the purpose of entry mode, coal transportation & ventilation. The dimension of both the Inclines is 5.4m x 4.0m (width X height) and the distance between these two inclines is 37m (center to center). A reinforced cement concrete (RCC) portal of length104m is also propose, which has been decided on the basis of borehole cores. The RCC portal has been constructed by diving the section in three zone by open box-cut method (Figure 5 and 6). After the Portal section, rock reinforcement method has been designed to support immediate roof in fair rock condition by applying CMRI-RMR (Figure 7). Secondary support is also provisioned to support the geologically disturbed or poor roof strata condition, if found anywhere in incline. Also, an air-shaft of 6.5m diameter and 214m depth is designed at a distance of about 1.4Km from the incline entrance and is for the purpose of outlet of ventilation air. The initial 15m depth of air-shaft from surface (i.e., shaft collar) will be constructed with RCC and the rest part is with PCC (plain cement concrete). The collar length is decided on the basis hydrogeological report of the mine. According to the hydrogeological report of the mine, the post monsoon ground water level is 14.15m (maximum).

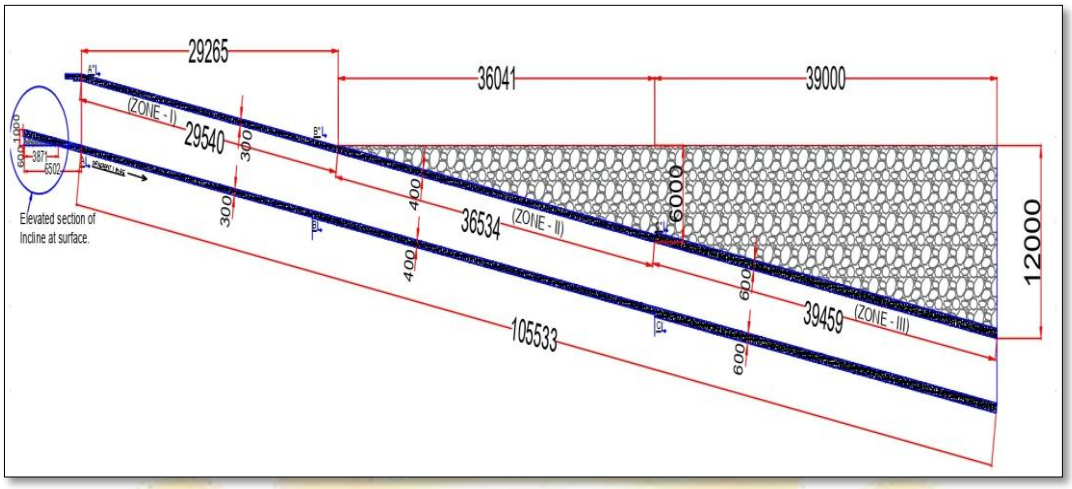


Fig. 1: Three section of RCC portal on the basis of rock load

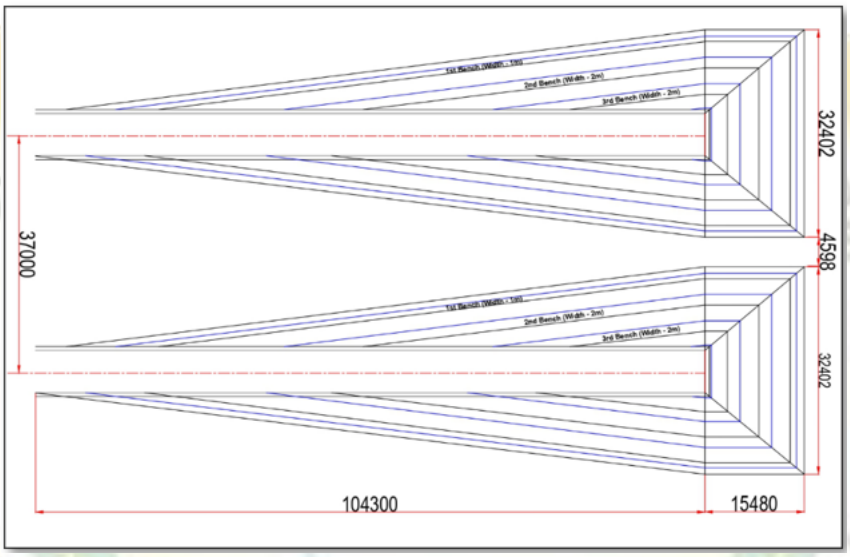


Fig. 2: Box cut for the construction of two portals

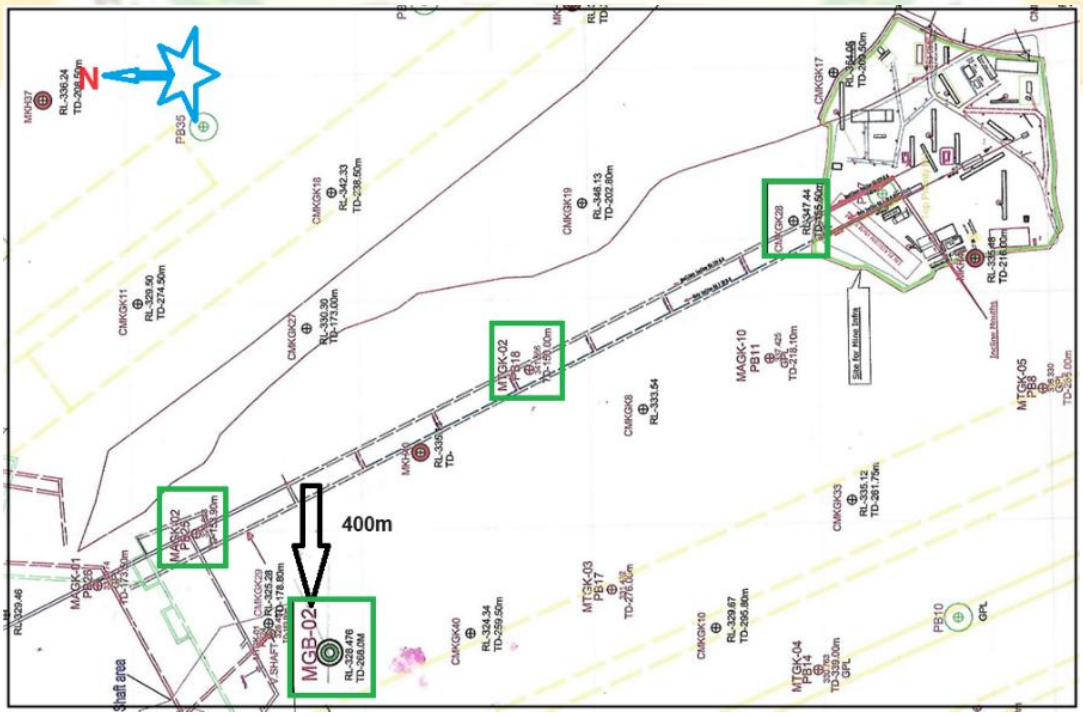


Fig. 3: The boreholes at different section of inclines utilised for RMR determination

INTELLIGENT MINING SYSTEMS SECTION

Project Details:

1. Sensor-based dust suppression system for haul roads in opencast mines

- *Sponsored by:* TEXMiN Foundation, IIT (ISM)

Project Brief:

A R&D project has been completed by CSIR-CIMFR jointly with IIT(ISM) Dhanbad with the following objectives: (i) Design of a cost-effective, distributed, and automatic dust suppression system for haul roads in opencast coal mines; and (ii) Development of a sensor-based water sprinkling system for reducing wastage of water and muddy environment of the road.

A wireless and sensor-based dust suppression system has been developed for haul roads in opencast mines to perform various tasks covering automatic and wireless control of solenoid valves connected to a group of sprinklers installed alongside haul roads as well as pump motor based on dust particle level in the air, vehicles movement, and soil moisture. The system facilitates: (a) wireless operation of nozzles connected with solenoid valves; (b) automatic controlling of sprinkling frequency and duration based on sensor-based on measurement of dust concentration along the haul road, the moisture level of the road, and vehicle motion status using different sensors; and (c) effective dust control using optimum water and electricity, thereby saving water, energy, and manpower cost. The integrated system has been designed in such a way that the system can be operated both automatically and manually. Functionality for remote control of the sprinkling operation is performed by switching the relay to switch on/off the solenoid valves through a wireless network. The system also provides real-time information about the sprinkler operation status, moisture concentration in soil, dust concentration in air, and the frequency of movement of vehicles through the developed web-based software.

A patent application has been filed entitled “A system and method for operating sprinklers” with Patent Application No. 202331081240, dated 30.11.2023. The developed “Sensor-based Sprinkler Software” has been copyrighted with Registration No. SW-18019/2023, dated 29.12.2023.

Fig. 1: View of the installed automatic wireless sprinkling system

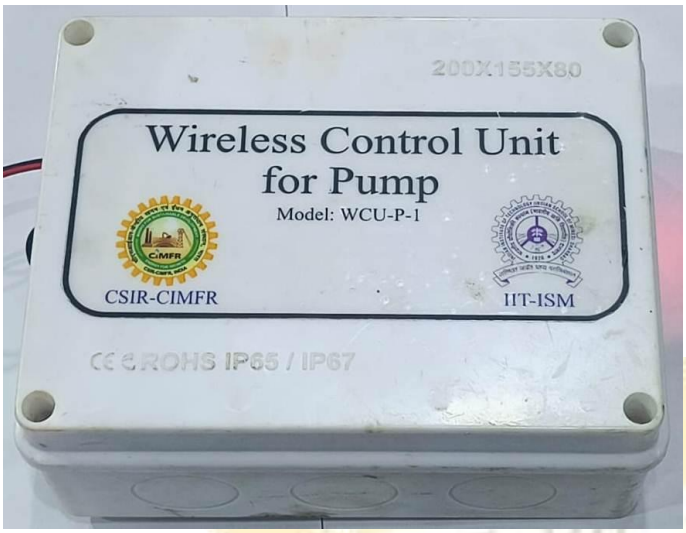


Fig. 2: Control unit for automatic pump operation

Fig.3: Control unit with sensors for sprinklers operation

2. An online system for classification and analysis of dispatched iron ore lumps and fines using computer vision and machine learning

- *Sponsored by:* TEXMiN Foundation, IIT (ISM)

Project Brief:

A R&D project has been undertaken by CSIR-CIMFR with the following two objectives: (i) Development of an automated online system for the classification and analysis of dispatched iron ore utilizing GigE machine vision and time-of-flight cameras, high-speed graphical processing unit, and artificial intelligence system; and (ii) Development of application software for the automatic classification of lump and fine sizes of iron ore, employing the Python programming language and the Django framework, along with machine learning models such as convolutional neural networks (CNN) for image processing to detect size, shape, texture, edges, and color, as well as Yolo8 models.

The classification and analysis of the dispatched ores based on lumps and fines sizes will be done using image processing with machine learning technology. The developed system will be a low-cost automated online system and software for the classification and analysis of iron ore will be designed based on these machine learning algorithms using convolutional neural network (CNN) models.

The developed model will be trained using a high-speed graphical processing unit (GPU) on a dedicated personal computer. The software will be developed using the Python language and the Django framework. Python is used specifically for programming the algorithm with libraries such as Keras, TensorFlow, and OpenCV.

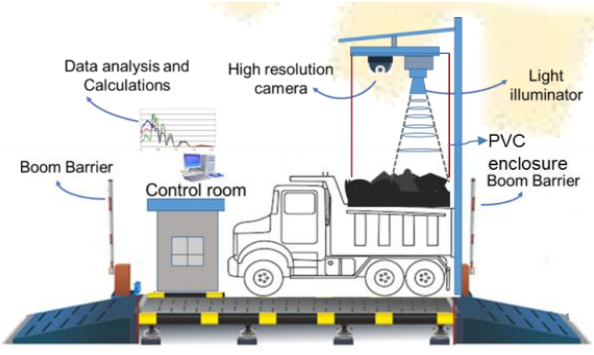


Fig.4: System setup for truck dispatch

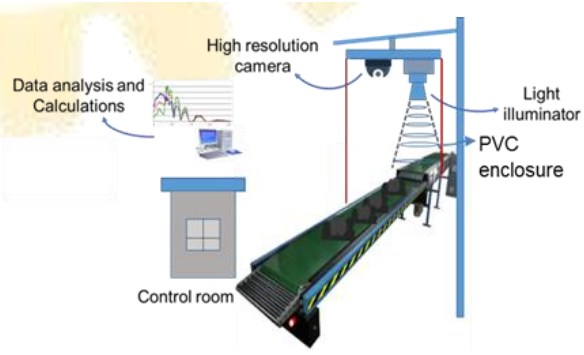


Fig.5: System setup for truck belt conveyor

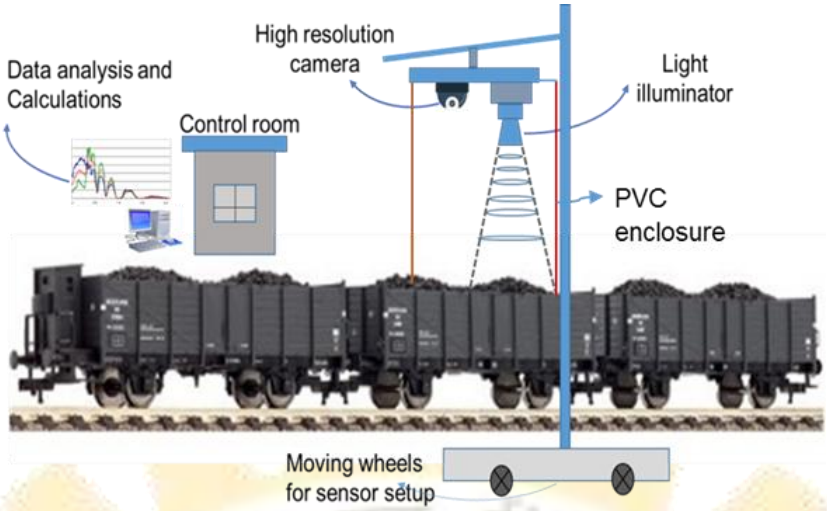


Fig.6: System setup for rail wagon dispatch

COAL-ROCK CHEMISTRY AND STRUCTURE SECTION

1. Underground Coal (and Shale) Thermal Treatment (UCTT) – A potential game changer

Major Objectives:

- In situ conversion (pyrolysis) of deep, un-mineable coal seams and organic-rich shales
- CO_2 sequestration in thermally treated coals and shales for negative GHG emissions
- Slow-heating, low-to-medium temperature pyrolysis of samples at laboratory scale for optimization of the UCTT process

Significant Contributions:

- Slow-heating of unmineable coal and shale samples across a temperature range of 300-650°C. These experiments identified 650°C as the optimal temperature for maximum hydrocarbon expulsion and micropore development, which enhances both energy recovery and CO_2 sequestration potential.
- Contributed to detailed petrophysical and geochemical characterization, including Rock-Eval pyrolysis, low-pressure gas adsorption (CO_2 and N_2), and advanced optical-electron correlative microscopy. These analyses revealed substantial micropore development (up to 97% increase at 650°C) and maceral-specific porosity evolution, especially in liptinite-rich zones.
- Delivered key outputs, including one SCI-indexed publication, support to one successfully defended PhD thesis, and development of a pore-structure and thermal maturity database. The project also provided foundational data for intellectual property generation and UCTT technology upscaling in India's clean coal strategy

2. Investigation of Critical Elements in Coal Mine Waste Rocks

Major Objectives:

- Evaluating valuable elements in coal waste
- Geochemical association of elements in coal waste
- Critical element concentrates preparation methods

Significant Contributions:

In the context of generating a comprehensive database detailing critical element content in in coal mining wastes, the sampling and analysis from Mumga area (Barmuri, Kapasara and Rajpura Mines), Singrauli

(Madhya Pradesh), Pakri-Barwadih Mine (Hazaribagh), Rajmahal and Sohagpur Coalfields have been carried out. Additional samples (n= 213) from Singrauli (Phase 2), Sohagpur (Phase 2), and mand-Raigarh coalfields have been collected, analysis of which have been going on. The key findings are:

- Coal mine waste rocks such as shale, igneous intrusion, sandstone and heat altered rocks/coals have been the more potential enrichment zones than coal.
- Shale, jhama and igneous intrusion samples of Barmuri, and sandstone and dolerite samples of Singrauli have significant K-Mg enrichment.
- Igneous intrusion has significant role in K-Mg enrichment.
- Sohagpur shale are the most promising zones for Ga and REE enrichment, followed by igneous intrusions and altered rocks/ coals of Mugma and Singrauli.
- Pakri-Barwadih shale has significantly high Ga (up to 156.7 ppm) and Ge (up to 30.7 ppm).

3. Understanding the Mechanism of Tsunamigenic Mega-Earthquake of the Sumatra Subduction Zone: A Microstructural Investigation

Major Objectives:

- Identifying the potential horizon, which is susceptible to develop future fault/decollement, and susceptible to contribute to an end-member earthquake.
- Decoding the micromechanical mechanism behind development of HANP horizon in the subducting sedimentary complex of Sumatra subduction zone
- Delineating the control of compaction and microstructural parameters on porosity-permeability relationship of the subducting sediments and their influence in developing subduction zone mega earthquake.

Significant Contribution:

- Completed sample preparation and analysis of the microstructure using BIB-SEM technique
- Estimated the evolution of spatial distribution of pores due to mechanical compaction
- Identified the potential horizon (HANP Horizon) which is susceptible to develop fault for end member earthquake at Sumatra subduction zone.

SLOPE STABILISATION AND LANDSLIDE MANAGEMENT RESEARCH GROUP

The Slope Stabilisation and Landslide Management Group has completed various projects on slope design and slope monitoring of pit and dump slopes for different opencast mines of various Public Sector Undertakings and Private enterprises which are listed below:

i. Determination of Optimum Safe Distance of Toe of Dump from Crest of Open-pit for Stability of Pit Slope under Different Geo-mining Conditions.

ii. Geotechnical Study and Slope Monitoring of Pits and Dumps at Jhamarkotra Rock Phosphate Mine, RSMML, Udaipur for the Year 2023-24.

iii. Scientific Studies for Design and Implementation of Overburden Dump Mixed with Flyash for its Disposal at DLCMP (Part-B Study: Dump Design Implementation and Slope Monitoring).

iv. Scientific Study and Advice on Slope Stability of Barjora (North) Coal Mine of WBPDCL.

v. Scientific Study and Advice on Slope Stability of Pit and Dump of Sonari Lignite Mine of M/s RSMML.

vi. Scientific Study and Advice on Slope Stability of Pits and Dump of Giral Lignite Mine of M/s RSMML.

vii. Scientific Study and Advice on Optimum Slope Design of One pit and Two dumps (one internal and one external) of West Block of Pakri Barwadih Coal Mining Project (PBCMP) of NTPC Ltd.

viii. Scientific Study and Advice on Slope Stability of Pit and Dumps of Gare Palma IV/6 Coal Block of M/s JSPL.

ix. Scientific Study on Slope Stability and Advice Thereon for Mine Pit, External Dump and Internal Dump of Talabira Coal Mine.

x. Scientific Study and Advice on Pit and Dump Slope Stability of Tubed Coal Mine of Damodar Valley Corporation (DVC).

xi. Scientific Study on Slope Stability and Advice Thereon for Design of Overburden Dump, Backfill Area and Quarry Slope Stability Study at Jindal Chromite Mines, Kaliapani.

xii. Scientific Study of Pit and Dump Slope Stability Along with Identification of Causes and Circumstances on Recent Slope Failure, Wide Crack Development and Recommendation on Safe Operation at Govindpur Ph-II OCP, Kathara Area, CCL.

xiii. Scientific Study on the Slope Instability of North-Eastern Corner of the Pit at Ostapal Chromite Mine and Advice to Make Those Benches Safe for Further Mining Excavations.

xiv. Scientific Study for Stability Assessment and Monitoring of Ground Surface Movement for Ensuring Stability and Safety of Surface Structures at Sawang Colliery, Kathara Area, CCL.

xv. Scientific Study on Slope Monitoring of Pit and Dumps for Ostapal Chromite Mine of Ferro Alloys Corporation Ltd.

xvi. Scientific Study on Slope Monitoring of Dumps and Pit Slope of Gare Palma-III Mine.

xvii. Slope Stability Monitoring and Analysis of RMP-4 Dump of Hindalco Industries Ltd., Muri Works.

xviii. Scientific Study and Advice on Slope Stability Analysis of Pit, Internal Dump and External Dump of Chatti-Bariatu Coal Mining Project.

xix. Scientific Study on Geotechnical Aspect and Slope Stability of Surkha (North) Lignite Mine, GMDC Ltd., Bhavnagar, Gujrat.

xx. Scientific Study and Advice on Slope Stability for Pit and Dumps of Kalamang West (Northern Part) Iron Ore Mine of M/s Tata Steel Ltd.

xxi. Scientific Study and Advice on Slope Stability of Pit and Dump Slope of Limestone Mine at Jaykaypuram of M/s J K Lakshmi Cement Ltd.

Following projects are being executed by Slope Stabilisation and Landslide Management Group:

i. Scientific Study and Advice on Slope Stability of Tailing Dump D-3 of Hutti Mines, Raichur Karnataka.

ii. Scientific study for slope monitoring of dumps and pits of Donimalai Iron ore mine (DIOM) and Kumaraswamy Iron ore mine (KIOM) of NMDC Ltd.

iii. Slope monitoring study of pit of Malanjkhand Copper Project, HCL.

iv. Scientific Study for Annual Reconciliation Survey of Overburden Excavation Volume of Dulanga Coal Mining Project of NTPC using Terrestrial 3-D Laser Scanner and Associated Software.

v. Scientific Study for OGL/Part initial Survey at Dulanga Coal Mining Project of NTPC using Terrestrial 3-D Laser Scanner and Associated Software.

vi. Scientific Study for Part Final Survey at Dulanga Coal Mining Project of NTPC using Terrestrial 3-D Laser Scanner and Associated Software.

vii. Scientific Study and Advice on Slope Stability of Pit and Dumps of Six Iron Ore Mines of M/s Tata Steel.

viii. Scientific Study and Advice on Slope Stability of Three Pits and Waste Dumps of Above Three Pits (06 nos. of Waste Dumps) of B.I.O.M., Kirandul complex, NMDC Limited.

ix. Slope Stability Monitoring Study of Pit and Dump by Analysis of Ground Movement Data of Sukinda Mines (Chromite), IMFA Ltd.

x. Slope Stability Study and Monitoring of Pit at Malanjkhand Copper Limited, Hindustan Copper Limited with Reference to Safety and Stability.

xi. Assessment of Slope Stability of Pit, Waste Dump and Ground Movement of Rampura Agucha Mine of M/s Hindustan Zinc Limited.

xii. Scientific Study and Advice on Slope Stability of Pit and Dump Slope of Bicholim Mineral Block, Vedanta.

xiii. Scientific Study and Advice on Slope Stability and Blasting of Subhadra OCP of M/s SCML (Aditya Birla Group).

MINE PLANNING AND ECONOMICS & SUBSIDENCE AND SURVEYING RESEARCH GROUP

MINE PLANNING AND ECONOMICS SECTION

Project Reoprt:

1. Feasibility study of Nigahi mine for dumping overburden mixed with pond ash in the running mine dumps

India's electricity sector has witnessed a major transformation in recent decades, reshaping its growth prospects. Sustained economic expansion continues to drive the nation's power demand, supported by the Union Government's ambitious *Power for All* initiative, which targets rapid capacity addition across the energy sector. As of May 2023, Central Electricity Authority (CEA) data shows India's total installed power generation capacity at 417,448 MW, with coal-based thermal power plants (TPPs) contributing 205,235 MW—approximately 49.01% of the total.

However, Indian coal is characterized by high ash content (30–45%) and relatively low calorific value. This results in significantly higher fly ash generation per unit of electricity compared to many other coal-producing nations. Due to limited utilization, large quantities of fly ash are disposed of in ash ponds, consuming vast land areas—often one-third the size of the TPP itself—causing permanent land degradation. The inefficient use of fly ash not only wastes a valuable by-product but also creates severe environmental challenges.

India, the world's second-largest coal producer, has seen fly ash production grow from 85 million tonnes (Mt) in 2000–01 to 270 Mt in 2021–22, generated from burning approximately 759 Mt of coal with an average ash content of 35.68%. With India targeting an 8–9% GDP growth rate, coal demand could reach 2000 Mt by 2030–31. At current trends, fly ash generation may approach 600 Mt annually by 2030. While utilization rates have improved, the absolute volume of unused ash continues to grow, with an estimated 1500 Mt (occupying 65,000 hectares) lying unused.

Fly ash management in India is regulated by the Ministry of Environment, Forest and Climate Change (MoEF&CC) and the Central Pollution Control Board (CPCB), which issue guidelines for safe disposal and utilization in eco-friendly applications such as cement manufacturing, brick production, road and dam construction, mine backfilling, and agricultural use. Despite these guidelines, the practice of blending fly ash with overburden (OB) dumps in nearby coal mines remains underutilized, even though nearly one-third of Indian TPPs are located near opencast coal mines.

Fig.1: Field study in Nigahi mines, NCL.

To address this, the MoEF&CC's December 31, 2021 Gazette Notification mandates 100% utilization of ash by all coal/lignite-based TPPs, with compulsory use by agencies within 300 km for approved applications. These include construction materials, ready-mix concrete, embankments, low-lying area filling, mine void filling, agricultural use (based on soil tests), and shoreline protection. In alignment with this directive, Northern Coalfields Limited (NCL), a Coal India Limited subsidiary, engaged CSIR-CIMFR, Dhanbad to evaluate the feasibility of mixing fly ash with OB in active mine dumps at Nigahi Opencast Project.

2. Scientific Study for Amalgamation of Nichitpur Colliery with Sendra Bansjora Colliery including estimation of extractable reserve, Slope Stability of pit and dump, method to control the fire from propagating towards DC Railway line etc.

M/s Bharat Cooking Coalfields Limited (BCCL) has assigned the CSIR-Central Institute of Mining and Fuel Research, (CSIR-CIMFR) vide LoA reference no. GM/SA/F-50/2024/3627 dated 13.11.2024 to conduct the Scientific Study for amalgamation of Nichitpur Colliery with Sendra Bansjora Colliery including estimation of extractable reserve, Slope Stability of pit and dump, method to control the fire from propagating towards DC Railway line, etc. Accordingly, CSIR-Central Institute of Mining & Fuel Research, Dhanbad has prepared a scientific report.

Both Nichitpur and Sendra Bansjora Collieries, originally operated through underground mining methods since the pre-nationalization era, are currently being worked by opencast methods to extract coal from the remaining worked out pillars. The Nichitpur mine is being developed with the II M seam as its base, while the Sendra Bansjora Colliery, which is currently affected by fire, is being worked with the IV seam as its base. These two collieries are divided by an unexcavated block boundary containing a fault with a throw of approximately 45 m with down throw towards Sendra Bansjora Colliery.

To enable coal extraction up to Seam II at the Sendra Bansjora Colliery and to safely remove coal from a fire-affected area, the mine authorities have proposed the amalgamation of Nichitpur and Sendra Bansjora Collieries. This initiative aims to ensure the safety of surrounding mines.

A critical concern is the DC railway line, which runs along the southern boundary of the Sendra Bansjora Colliery, approximately 60 meters from the pit boundary. Underground galleries located beneath this railway line are currently experiencing intense fires. Immediate and effective fire control measures are required to prevent the fire from spreading further and to protect the integrity of the railway line.

The proposed amalgamated mine area is divided into two sections: North and South Pits, separated by the DC railway line. At present, excavation activities are limited to the North Block.

To support this project, the CSIR-Central Institute of Mining and Fuel Research has conducted a scientific study to evaluate the extractable coal reserves, assess the slope stability of both the pit and the overburden dump, and recommend methods to prevent the fire from advancing toward the DC railway line.

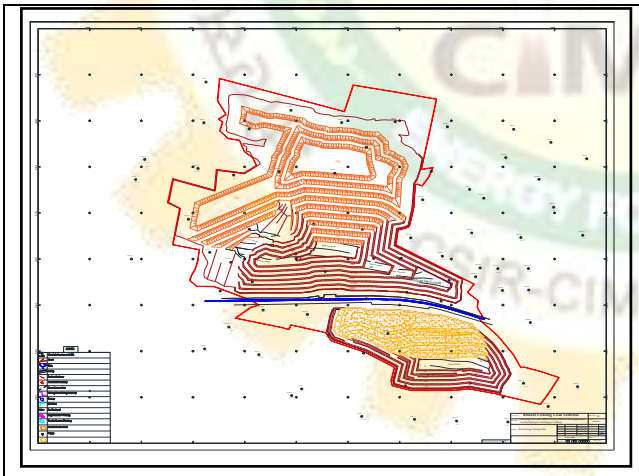


Fig.2: Final Stage Pit and Dump Plan

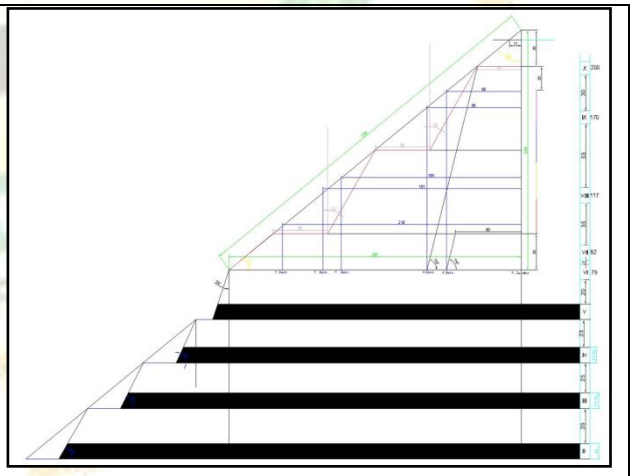


Fig.3: Final dump position near the pit boundary

3. Review of Geological Model and verification of the Annual Production Plan of Manoharpur Coal Mine Project for FY 2024-45

The Manoharpur coal mines of M/s Odisha Coal & Power Limited (OCPL) is situated in Himgir Tahasil, Distt. Sundargarh of Odisha. The Mining Plan with a lease period of 30 years is presently operating in the 6th year of operation. M/s BGR Mining & Infra Limited (BGRMIL) is working as MO in this project. As per the Mining

Plan, the target of coal production in the FY 2024-25 i.e., in the 6th year is 13 MT. Accordingly, MO submitted the APP to OPCL and the same has to be verified and reviewed by CIMFR.

M/s Odisha Coal & Power Limited (OCPL) in this regard vide LoA reference no. OCPL/Project-Ser/390/374 dated 19.05.2021 and subsequent extension letter no. OCPL/77 dated 06/02/2024 requested CSIR-Central Institute of Mining and Fuel Research, (CSIR-CIMFR) to Review the Geological Model and verify the Annual Production Plan of Manoharpur Coal Mine Project for FY 2026-27.

considering the input data supplied by OCPL, the new geological model has been prepared and verified the APP with the help of MINEX software (Fig: given below). For FY 2024-25, it is planned to excavate the coal through two different pits (North & South). In the South pit only, the seams i.e., L3, R3, and R21 are available and can be extracted. The average density and average GCV with mining losses of all the seams to be mined during the FY 2024-2025 were considered as per the Mining Plan.

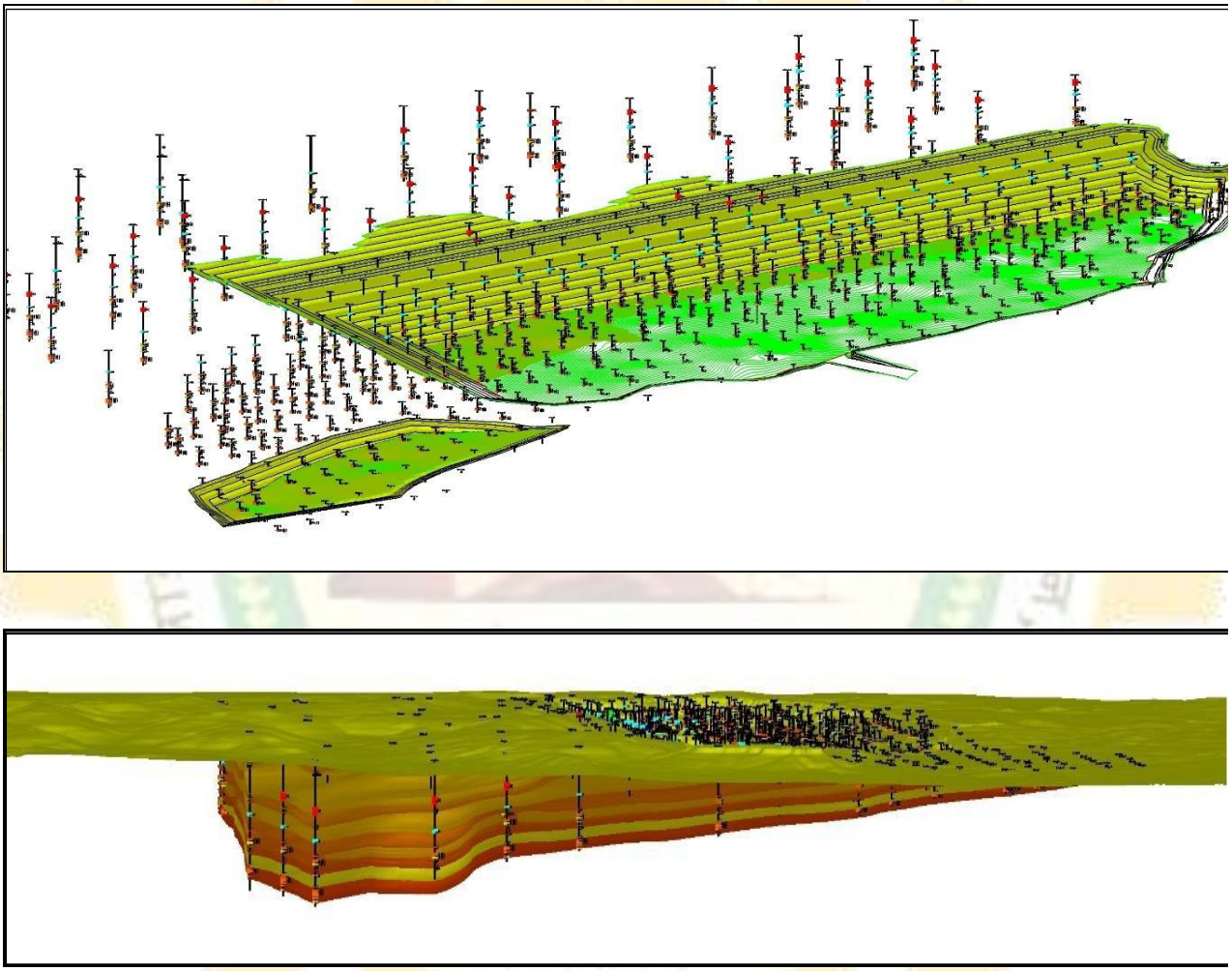


Fig.4: Geological Model & Pit design of Manoharpur Coal Mine Project for FY 2024-25

1. Whole body vibration study of NMDC mines (Kirandul, Bacheli, Donimalai and Panna).

CSIR-Central Institute of Mining and Fuel Research (CIMFR) conducted Whole Body Vibration (WBV) exposure assessment of HEMM operators at the NMDC mines (Kirandul, Bacheli and Donimalai Complexes). The monitoring of WBV was done in accordance with ISO 2631-1997 “Mechanical Vibration and Shock - Evaluation of human exposure to whole-body vibration”.

Operation of HEMM vehicles plying on the roughed and uneven haul road of mines for a long duration may lead Musculo-skeletal disorders and discomfort to the HEMM operator. So, quantitative evaluation of vibration produced by the different Heavy-Earth Moving Machinery (HEMM) used in mines is essential to

have minimum occupational diseases and thereby limit the exposure to such vibration to avoid human health effects. This study evaluated the whole-body vibration (WBV) exposure among operators of Heavy Earth Moving Machinery (HEMM) in accordance with ISO 2631-1 (1997) guidelines. Vibration measurements were conducted across three orthogonal axes (X, Y, and Z) using a tri-axial seat pad accelerometer to capture comprehensive data on WBV exposure among operators of Heavy Earth Moving Machinery (HEMM).

The results of the WBV risk assessment, based on both Daily Vibration Exposure A(8) values and Vibration Dose Values (VDV), indicate varying degrees of health risks across different machinery in Bacheli and Kirandule complex of Bailadila Iron Ore Mine and Donimalai Iron Ore Mine of NMDC.

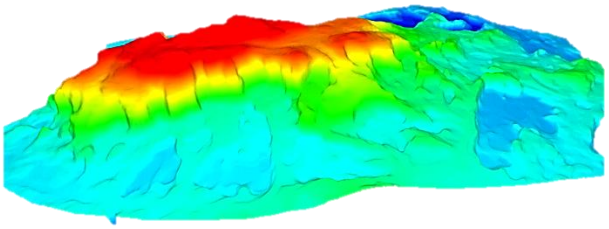
Fig.5: Whole body vibration meter and seat pad accelerometer.

MINE SUBSIDENCE AND SURVEYING SECTION

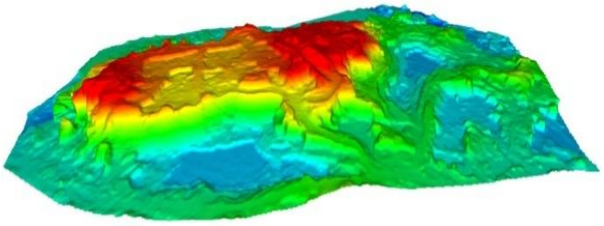
The Khanak Stone Mine of Haryana State Industrial and Infrastructure Development Corporation Ltd. (HSIIDC), spans a mining lease area of 258.30 Ha in the northern part of Bhiwani District, Haryana. A combination of Total Station and Terrestrial Laser Scanner were used to survey the existing topography during mining to create a detailed digital terrain model. The volume of rock excavated was computed from 11-04-2022 to 17-07-2024. The survey work was carried out with reference to the earlier established Base Station located near Weigh Bridge no. 1. Rock excavation was done in Block-A and Block-B. Broken rocks were filled at different locations in both the blocks for development of haul roads, preparation of berms and also for leveling the ground. Weathered and poor-quality rocks with soil materials were also dumped at the side of the hill. Total volume of rock excavated from 11-04-2022 to 17-07-2024 was computed using Trapezoidal Rule amounting to 22312120.998 t. The quantity of rock dispatched was 22237419.77 t as per the record provided by the mine management. A variation of 0.33% was observed from the actual tonnage dispatched which is within the acceptable range (2%).

Geo-reference establishment by Total Station

Survey by Terrestrial Laser Scanner



Before mining

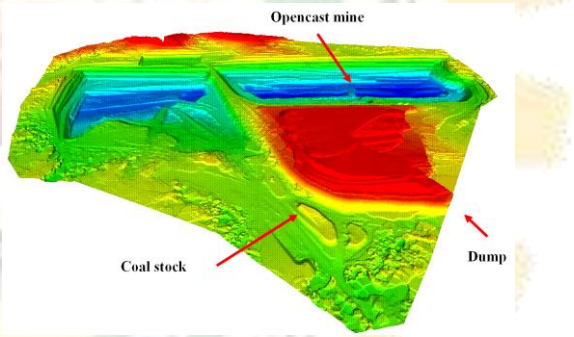


As on July 2024

Three-dimensional model of hill at Khanak

The Manoharpur coal mine of M/s Odisha Coal & Power Limited (OCPL), situated in Sundargarh district of Odisha, is bounded by latitude 21°55'52.168''N to 21°58''16.871'N and longitude 83°44'41.287''E to 83°47'42.750''E. Survey of Manoharpur opencast mine was conducted on quarterly basis by Terrestrial Laser Scanner (TLS) to compute quantity of coal, overburden and stripping ratio as well as availability of coal in the stockyards. Survey was carried out by establishing geo-reference stations through closed traverse and point cloud data were generated by setting the TLS over the established geo-reference stations using backsight mode. The point cloud data was processed and noise cleaning was done using ATLASCAN Software. Volume of opencast excavation, coal stocked in yards was computed using MINEX software. Net volume of opencast excavation between 01.01.2024 and 30.03.2024 including coal and overburden was 6762125 m^3 and the stripping ratio was 2.417 m^3/t. Total volume of coal stocked in June 2023, September 2023, December 2023 and March 2024 was 159937 m^3, 104958 m^3, 23490 m^3 and 226814 m^3 respectively. The variation in volume of coal and overburden excavation of opencast mine between survey conducted by CSIR-CIMFR using laser scanner and the mine management reported data based on quarterly measurement for the financial year 2023-24 was 0.38%, which is within the acceptable range.

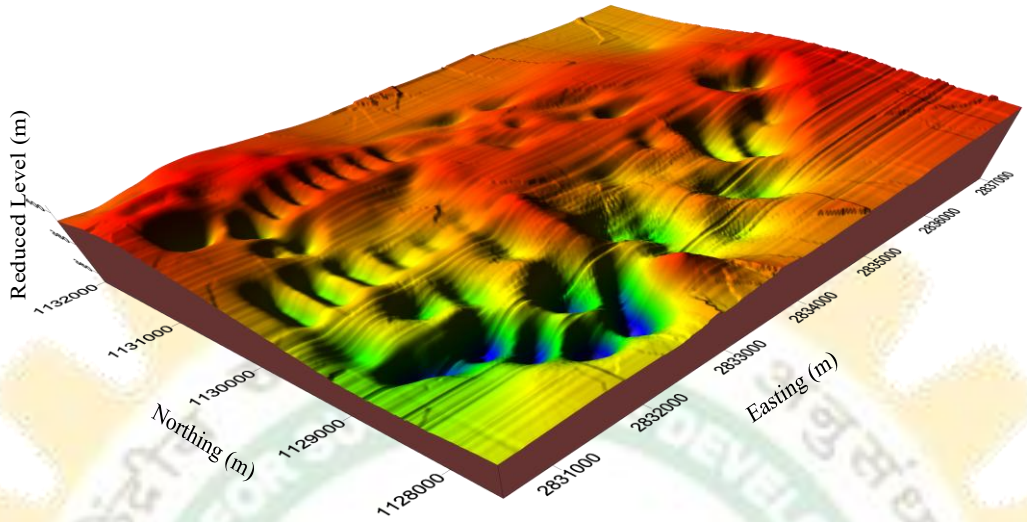
Survey by TLS



3D profile of Manoharpur opencast mine

The Gondbahera Ujheni Coal Block of M/s MP Natural Resources Private Limited (NRPL), covering an area of 20.40 km^2, is located in Singrauli Coalfield falling in Singrauli district, Madhya Pradesh. It falls between the latitudes 24° 08' 57" to 24° 11' 27" N and longitude 82° 19' 53" and 82° 23' 38" E. The mine management proposed to extract coal from five seams i.e. VIII, VII(T), VII(B), VI and V by Bord & Pillar method of mining with caving using continuous miner. The thickness of the seam varies from 1.50 m to 6.00 m and the depth of the proposed panels ranges between 267.3 m to 615 m. Altogether, 218 panels are proposed to be extracted from five seams in a span of 50 years. The area is traversed by seasonal nalla on southern boundary. Forest land, lying in the North and North-West part of block below which depillaring is proposed. Five villages namely Ujjaini, Talwa, Deora, Majhauli and Tingudi are located within the block. Most of the area of the block is occupied by privately owned agricultural land. Out of 218 panels 184 panels are proposed to be depillared in Gondbahera Coal Block from five seams with caving using continuous miner. The predicted maximum subsidence, slope and tensile strain due to extraction of coal from five seams after fifty years are 1482 mm, 10.0 mm/m and 2.97 mm/m respectively. The cumulative predicted maximum tensile strain of 2.97 mm/m would not cause any damage to surface structures and forest land. Only development should be done below

the water bodies and surface structures by maintaining 25° angle of draw from all sides. Width of panels located towards the side of the nalla should be reduced by maintaining 25° angle of draw to prevent influence of subsidence over it. Maximum anticipated subsidence of 1482 mm would affect the surface topography after mining. Suitable drainage should be made to avoid any water logging in the centre of subsidence troughs.

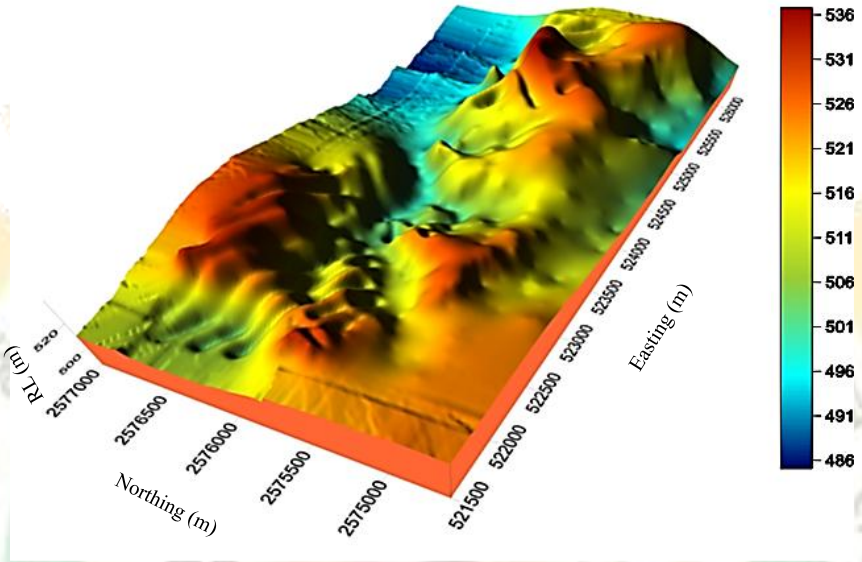


Anticipated 3D surface profile after mining of Gondbahera Coal Block

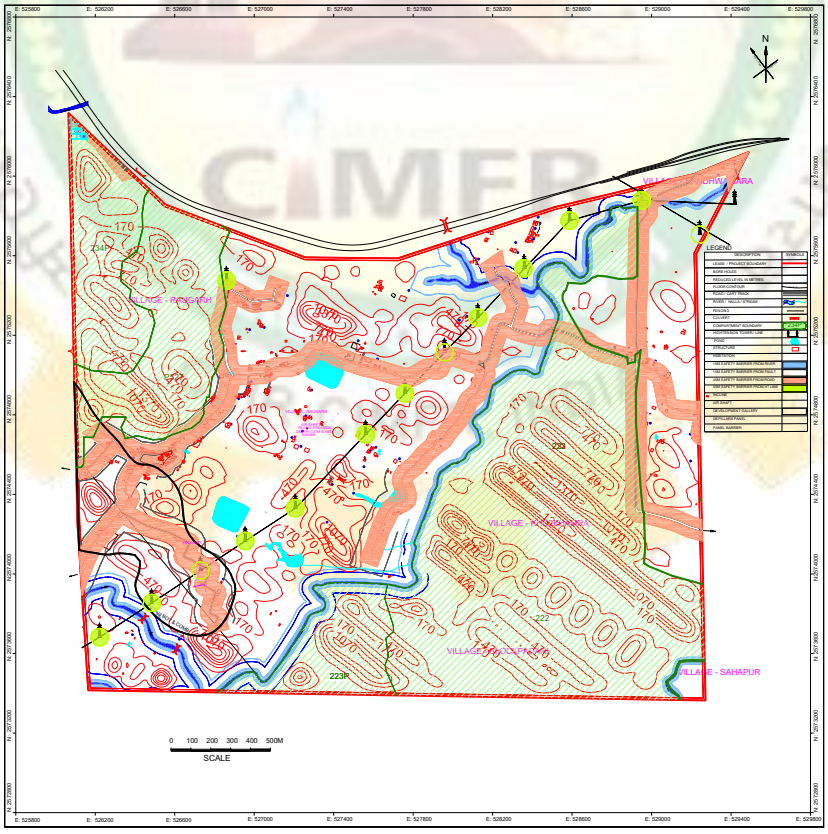
The Marwatola VII Coal Block of M/s Rama Cement Industries Private Limited, having an area of 1200 Ha, is located in the western part of Sohagpur Coalfield, Umaria district, Madhya Pradesh. The block, located in the western part of Sohagpur coalfield, is bounded by latitudes 23°16'1" and 23°18'4" N and longitudes 81°12' 38" and 81°15' 22" E. There are ten seams, out of which four seams namely VII(T), VII(B), V(T) and V(B) are proposed for underground mining below forest cover by Bord & Pillar method with caving using continuous miner. Though the seam thickness ranges from 1.55 m to 7.45 m, the maximum height of extraction was considered as 3.00 m. Percentage of extraction of coal ranges from 75 to 50. Altogether, 76 panels are proposed for depillaring within the coal block and all are located below the forest land. Three-dimensional subsidence prediction modelling using influence function method was used to predict the subsidence movements. Out of 76 panels 58 panels are proposed to be depillared in Marwatola VII coal block from VII(T), VII(B), V(T) and V(B) seams with caving using continuous miner. All the proposed panels are below forest cover. The predicted maximum subsidence, slope and tensile strain due to extraction of coal from VII(T), VII(B), V(T) and V(B) seams after forty years are 1382 mm, 20.05 mm/m and 4.96 mm/m respectively. The cumulative predicted maximum tensile strain of 4.96 mm/m would not cause any damage to forest land. However, cracks would be developed at the surface. The cracks should be filled immediately with mitti to avoid breathing of air. Maximum anticipated subsidence of 1382 mm would affect the surface topography after mining. Suitable drainage should be made to avoid any water logging in the centre of subsidence troughs. Dimension of panels located towards the nalla should be controlled by maintaining 25° angle of draw to prevent influence of subsidence over it.

The Marwatola VI Coal Mine of M/s JSW Cement Limited, located in the Shandol and Umaria districts of Madhya Pradesh, is having an area of 763 Ha. The block is bounded by latitudes 223° 05' and 23° 30' N and longitudes 81° 13' and 82° 12' E. Five seams, namely, L2, VII(T), VII(B), VI and L1 are proposed for underground mining with Bord & Pillar method by deploying continuous miners. The depth of the proposed panels ranges from 73.15 m to 196.60 m and the seam thickness varies from 1 m to 4.5 m. Altogether, 168 panels are proposed to be extracted in a span of 23 years. The block is partly covered by forest land, villages (Raugarh, Malchua, Blockpadari, Kholkhamra, Sahapur and Bandwa Bara), Arai nala, H.T. lines and ponds etc. Out of 168 panels, 126 panels are proposed to be depillared in Marwatola VI coal block from single five seams (L2,

VII(T), VII(B), VI and L1) with caving using continuous miner. The predicted maximum subsidence, slope and tensile strain due to extraction of coal from five seams i.e. L2, VII(T), VII(B), VI and L1, after twenty years are 1798 mm, 18.04 mm/m and 4.98 mm/m respectively. The cumulative predicted maximum tensile strain within 3 mm/m in non-forest land and 4.98 mm/m in forest land would not cause any damage to surface structures and forest land respectively. However, it is advisable to go for development/partial extraction in 42 panels, for the safety of surface structures and features. Maximum anticipated subsidence of 1798 mm would affect the surface topography after mining. Suitable drainage should be made to avoid any water logging in the centre of subsidence troughs.



Anticipated 3D surface profile after mining of Marwatola VII Coal Block



Anticipated subsidence contour (in mm) after mining of Marwatola VI Coal Mine

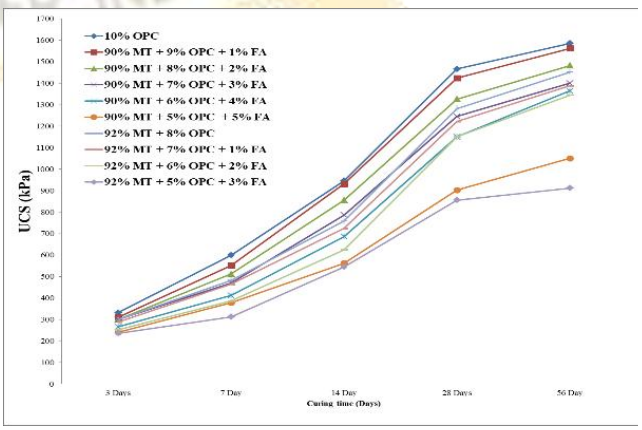
Dahegaon Gowari Coal Mine of M/s Ambuja Cement Limited, spreading over an area of 1562 Ha, is located towards the central part of the Kamptee Coalfield in Nagpur district of Maharashtra. The block is bounded by latitudes 21° 14' 58" to 21° 17' 49" N and longitude 78° 56' 03" and 78° 59' 32" E. The block, spreading over an area of 1562 Ha, is virgin and free from mining activity. The mine management proposed to extract coal from six seams i.e. X, VIII(T), VIII(B), VII(B), V and III by Bord & Pillar method of mining with caving using continuous miner. The thickness of the seam varies from 1.50 m to 4.00 m and the depth of the proposed panels ranges between 86 m to 606 m. Altogether, 113 panels are proposed to be extracted from six seams in a span of 47 years. Sindi, Gowari, Tondakhairi, Valni, Khandala and Khairi villages, forest land, Saptdhar nadi (western side of the block), nala, H.T. line, buildings in isolation, roads and vegetation are located within the block. Out of 113 panels 98 panels are proposed to be depillared in Dahegoan Gowari Coal Block from six seams with caving using continuous miner. The predicted maximum subsidence, slope and tensile strain due to extraction of coal from five seams after forty-seven years are 1625 mm, 15.46 mm/m and 2.95 mm/m respectively. The cumulative predicted maximum tensile strain of 2.95 mm/m would not cause any damage to surface structures and forest land. Only development should be done below the water bodies and surface structures by maintaining 25° angle of draw from all sides. Maximum anticipated subsidence of 1625 mm would affect the surface topography after mining. Suitable drainage should be made to avoid any water logging in the centre of subsidence troughs.

MINE BACK FILLING RESEARCH GROUP

Project Report:

1. A Scientific study on Paste Fill at RDM, Dariba, HZL

This project was awarded to CSIR-CIMFR for carrying out material characterization of Pb-Zn Tailings and also to determine its morphological and elemental composition using SEM and XRF, paste fill mix strength of the existing mix configuration adopted at HZL and also the assessment of strength requirement for working under paste and also the required strength of backfill after exposure along one side during secoundary pillar extraction, Plug fill and bulk fill interface properties were also required to be determined in addition to SSR for development through paste. From the results of grain size distribution analysis, it was found out that GGBFS is finest material followed by OPC, fly ash and tailings as indicated by their specific surface area. From the UCS results in the binder category of 12wt%, the maximum 28 days UCS of 1695 kPa was found for paste mix RD12 [88% MT + 12% OPC]. When OPC was replaced by FA, the 28 days UCS reduced. Similar type of strength variation with fly ash replacement was noticed with all other mix recipes. However, the targeted 28 days strength of 1100 kPa was achieved by paste mix 88% MT + 12% OPC, 88% MT + 10% OPC + 2% FA, 88% MT + 8% OPC + 4% FA, 88% MT + 6% OPC + 6% FA, 90% MT + 10% OPC, 90% MT + 9% OPC + 1% FA, 90% MT + 8% OPC + 2% FA, 90% MT + 7% OPC + 3% FA, 90% MT + 6% OPC + 4% FA, 92% MT + 8% OPC, 92% MT + 7% OPC + 1% FA, 92% MT + 6% OPC + 2% FA. The minimum required UCS of bulk fill for the stopes in between -270mRL to -345mRL, M6 block main ore body and for E4 is 480kPa with FS of 2.

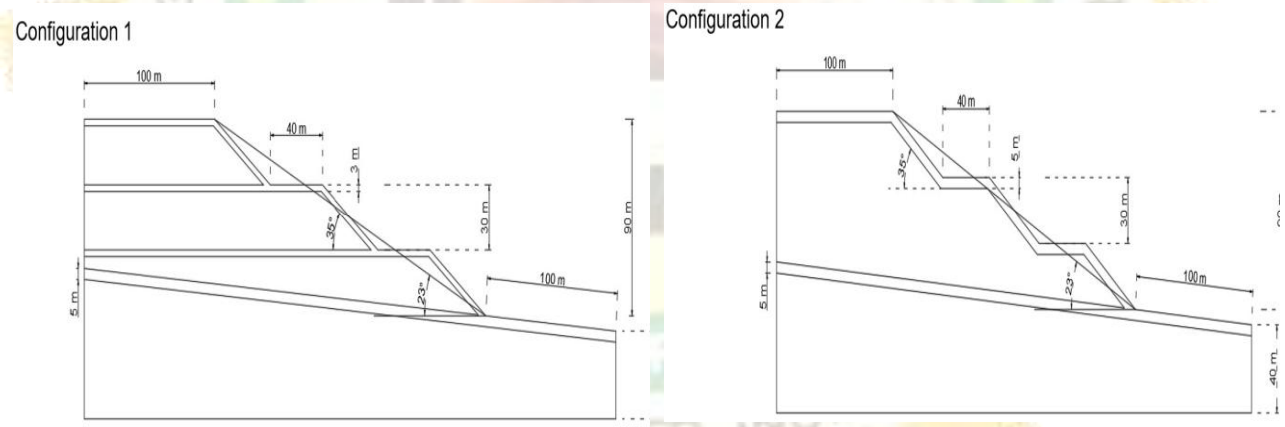


The minimum required UCS of plug fill for the stopes in between -270mRL to -345mRL, M6 block main ore body and between 600N to 1400N for E4 is 1070kPa. The plug height has to be 9 m. Underhand mining may

require drivage through paste fill. The minimum strength requirement for enabling development roadways of maximum 4.3m×4.3m in paste fill has been evaluated to the 1070kPa UCS for a safety factor of 2.

2. Utilization of Industrial waste (ash, black and burnt washery rejects, steel slag) along with overburden material for mine void filling at Jindal Power Limited and TLCMP, NTPC:

Jindal Group's steel vertical, Jindal Steel & Power Limited (JSPL) operates steel plants in the States of Chhattisgarh and Odisha, where Slag is generated as a by-product. M/s Jindal Steel & Power Limited (JSPL) is currently operating slag & fly ash-based cement making plant (clinker grinding facility) of 1.0 MTPA capacity at Raigarh under the brand name 'Panther Cement', Similarly, It has 3400 MW (thermal power plant, bringing the total generation capacity to 3400 MW at Tamnar in the Raigarh district of Chhattisgarh. The power plant sources coal from two coal mines i.e. Gare Palma IV/1 & Gare Palma IV/2 and utilizes coal having 30 – 40% ash. In addition to this, to meet the demand of high-quality coal, it has three pit head coal washeries. NTPC Talai Palli have their captive mines in Tamnar region of Chattisgarh and has proposed to utilize ash from its Captive Power Plant, there by generating mammoth amount of ash as a by-product of electricity generation. As such, JPL produces a huge amount of waste such as washery rejects, steel slag and huge quantity of coal ash is being generated at JPL and NTPC Thermal Power Plant. Keeping the above facts in mind, the management of JPL and NTPC approached Mine Backfilling department of CSIR – CIMFR to carry out a scientific study to utilize their industrial waste in an environment friendly manner as a backfill material along with OB. Detailed laboratory studies were undertaken to determine the suitability of this industrial material for backfilling such as its physico-mechanical properties, angle of repose, granulometric distribution, elemental composition, Atterberg limits, geo-technical properties such as shear strength of waste material in different proportion with OB (10:90, 20:80, 30:70, 40:60). Two dumping configurations of OB - waste materia l(ash, slag, black and burnt rejects) mix was tried out during limit equilibrium modelling. In the Dump Configuration 1, a 3m of OB layer placed after each bench in the dump and also along the edges to encapsulate the Ash – OB mix, in the Dump Configuration 2, a 5m OB layer is dumped all along the periphery of ash – OB mix to encapsulate the ash-OB admixture to prevent it getting exposed to rain, drain water etc.



Dump stability analysis was carried out with existing dump profiles as well as with the planned dump profiles at the end of the mine life. Stability analysis of different mix configuration of material with approved dump profiles yielded a Factor of Safety of more than 2 and was found to be stable. The dumping methodology for each dump configuration was also suggested to the clients. The finding of this scientific study will encourage the Power Industry as well as Mining Industry to utilize industrial waste in an environment friendly manner.

3. Scientific Study to Determine the Geo-Technical Parameter of Paste Fill being utilized at Malankhanj Copper Project, Balaghat:

Out of the five-operating unit, Malanjkhand Copper Project (MCP) is situated in Madhya Pradesh and was established way back in the year 1982. Presently it is an open pit copper mine with capacity of 2.5 MTPA . MCP plans to increase the mining rate to 5.0 Mtpa in the near future, hence, the management decided to

switchover to underground mining with paste backfilling after the ultimate pit depth of OCP is reached. HCL approached CIMFR to carry out Scientific Study to Determine the Geo-Technical Parameter of Paste Fill proposed at Malanjkhand Copper Project, Balaghat. One paste recipe (90% Tailings, 1% Portland Cement and 9% Ground Granulated Blast Furnace Slag) was investigated at three different curing period (7 days, 14 days and 28 days curing period) with a slump of 220mm.

Laboratory studies revealed that, UCS increase with the increase in curing period. At 14 days and 28 days curing period, the percentage increase in UCS was found to be 26.81 and 65.62 respectively. Similarly, the Young's Modulus of the sample also increases with the increase in curing period. A percentage increase of 19.20 and 59.88 was observed when the curing period increased to 14 days and 28 days respectively. From the results of Tri-axial test, it was found that with the increase in curing period, the cohesion of the paste fill mix {90% Mill Tailings + 10% Binder (90% Slag + 10% Portland Cement)} increases but angle of internal friction decreases. From the XRD diffraction patterns of slag sample it was found the that GGBS is mainly composed of Quartz, Calcite and Akermanite mineral phase. The Hydration Index of GGBS was found to be 1.25 which is more than 1 and hence its chemical reactivity is high.

Sample preperation and determination of USC, YM, PR

4. To determine the suitable backfill method for Ambaji Underground Mine and Scope of using waste rock, aggregate and marble waste as a mine backfill material:

The Ambaji Copper Project, GMDC is situated approximately 2 km northwest of the city of Ambaji in the State of Gujarat (India). The Mine Management is planning to start an underground mine project under the old open cast mines. Backfilling of the underground stopes is an integral part of underground mining operation. Considering the above, CIMFR was approached by GMDC to investigate and suggest best suited mine backfilling technique for the future underground mine by using locally available material such as waste rock generated during mine development, aggregate and marble waste found in abundance from nearby marble quarry. Considering the mining method and production scenario various backfilling methods were evaluated. The methods considered are Cemented hydraulic filling (CHF), cemented rock fill (CRF) using mine waste rock and marble waste rock and cemented aggregate fill (CAF). Accordingly, Tailings, waste rock, marble waste was tested in CIMFR laboratory and different mix recipe for CHF, CRF and CAF. Mix Recipe of CHF viz. 10wt% OPC, 65wt% solid, 8wt% OPC, 65wt% solid, 5wt% OPC, 65wt% solid, 12wt% OPC, 65wt% solid and 14wt% OPC, 65wt% solid indicated a very poor strength development at 7,14, 28 and 56 days curing period as the tailing samples provided by the mine management is weathered old tailings as there was no active mill in operation. Similarly, For CRF, it was found out that mix recipe made from marble waste rock have shown better strength development as compared to Ambaji mine waste rock. For CAF, the designed strength of 455 kPa was achieved with 5wt% cement. Hence, if CAF is to be used 5wt% cement in CAF would also serve the purpose. Based on the various backfill methods considered, strength, material availability, operational parameters,

and future mine production scenarios; it is recommended to initially start with CRF and/or CAF or both is a combined manner.

5. Instrumentation scheme and monitoring of backfilling of Stope Blocks of Mahagiri Mines (Chromite) , M.s IMFA Ltd.

At Mahagiri Mines (Chromite) of M/s Indian Metals and Ferro Alloys Ltd. which is situated in the Sukinda Valley of Odisha, Opencast mining has already been exhausted and currently, underground mining is in progress. The ultimate pit limit of opencast mine is at +185mRL. Underground mining has been developed below the ultimate pit bottom to extract the ore after leaving a safe cap rock of about 50m vertical thickness. Underground mining has been adopted with backfilling using Blast Hole Stoping with Post Filling as the method of stoping. This method of stoping leaves no rib pillars between two stopes. The management of IMFA approached to formulate an instrumentation plan and monitor the backfilling of stopes to enhance safety of the mine workings. It is observed that in stope being backfilled , the rate of increase in pressure development reduced gradually after the completion of pouring/filling the entire stope, The vertical stresses (due to backfill only) are higher than the horizontal stresses as monitored through instrumentation inside the stopes, which is a clear indication of consolidated backfill. The stress acting on the barricade is far below 200KPa. The maximum barricade pressure developed was found to be in the order of 160KPa. The pressure acting on the barricade declined after the complete filling of the stope has been done. The results of stability analyis of secondary stope backfilling with uncemented hydraulic sand filling indicates stable condition of the stopes. It can be inferred from the displacement contours of F/W, H/W and roof that the movements are in the order of cm which is acceptable considering the mining method and sequence of extraction (primary-secondary mode of stope extraction). Also, absence of active shear (shear-n), tension (tension-n) in the simulation results and FS of 1.3 of the secondary backfilled stopes indicate stable condition of the stopes. Similarly, the stress acting on the barricade in stope block 4P is far below than 200KPa. The maximum backfill pressure acting upon the barricade is 93 KPa.

WATER RESOURCE MANAGEMENT RESEARCH GROUP

A. Grant-In-Aid-Projects

1. Investigations Towards Mitigation of the Problem of Acid Mine Drainage in India

Supported by the ANRF Core Research Grant, this project aims to advance membrane-based technologies for the remediation of acid mine drainage (AMD) and the concurrent recovery of rare earth elements (REEs). Motivated by the chemically aggressive nature of AMD prevalent in northeastern India and the lignite mining regions of Gujarat, the research involves extensive field investigations, including physico-chemical characterization, metal load quantification, and acidity profiling of mine waters. A novel separation technique is being developed in the laboratory, combining a multi-stage membrane filtration cascade with chelating ligand-assisted selective recovery. This hybrid system is designed for the efficient removal of multivalent toxic metals while enabling the enrichment of strategic elements such as cerium and scandium. A patent application has been filed for the membrane-ligand technology, which features a modular design adaptable to diverse AMD chemistries and holds promise for both sustainable environmental management and critical material recovery.

2. Photocatalytic Hydrogen Generation from Mine Water Using Single-Atom Photocatalyst (M1-TiO_2)

This project aims to develop a sustainable approach for hydrogen production using mine water as a feedstock through photocatalysis, facilitated by a novel single-atom photocatalyst (M1-TiO_2). By integrating advanced materials science with solar-driven processes, the research addresses two critical challenges: the generation of clean energy and the remediation of contaminated mine water. A central innovation of the project is the

light-induced synthesis of the single-atom catalyst and its deployment in a photoassisted hydrogen production system. The study focuses on optimizing catalyst synthesis parameters, evaluating photocatalytic efficiency, and establishing the foundation for future scale-up. Beyond technological advancement, the project contributes to environmental sustainability, scientific knowledge generation, human resource development, and holds potential for intellectual property creation through patentable innovations.

B. Sponsored Research Projects

1. Scientific study on impact of fly ash dumping on water resources at Jamkhani OC mine of Vedanta Ltd.

This study presents a comprehensive environmental assessment of fly ash and bottom ash disposal practices in the mine void and external dumps of the Jamkhani opencast coal mine operated by M/s Vedanta Ltd. in Ib Valley, Sundargarh, Odisha, and its surrounding areas. Water samples from surface, sub-surface, and mine pit sources were collected and analyzed for physico-chemical properties to evaluate the existing water quality in areas proposed for ash disposal. Additionally, a representative fly ash sample was analyzed for heavy metal leaching characteristics using the Toxicity Characteristic Leaching Procedure (TCLP) and for radioactivity levels of selected radionuclides (^{238}U, ^{226}Ra, ^{232}Th, ^{40}K, and ^{137}Cs) to assess potential environmental and public health risks. Analysis of mine water from both pits and settling tanks indicated that pH values fell within the permissible effluent discharge range of 5.5–9.0, and concentrations of major anions (F^-, Cl^-, SO_4^{2-}, NO_3^-) and trace metals (Fe, Mn, Pb, Zn, Cu, Cr, Cd, Ni, As, Hg) remained below regulatory thresholds. TCLP results for two fly ash samples confirmed that leaching concentrations of trace metals were well within the USEPA regulatory limits, classifying the material as non-hazardous under RCRA guidelines. Furthermore, the measured radioactivity levels of fly ash were within safe limits, indicating no significant impact on water quality or public health from ash disposal. Based on these findings, the study concludes that fly ash may be safely disposed of in mine voids and external dumps, provided that appropriate precautionary measures and routine water quality monitoring are implemented to prevent potential leaching under field conditions.

2. Scientific study on impact of fly ash dumping on water resources and its Management at GP-IV/1 Mines, at Raigarh, Chhattisgarh.

A comprehensive geochemical and radiological study sponsored by Jindal Power Ltd. was conducted on coal ash samples from DCPP and JPL, Tamnar, alongside water samples from surrounding groundwater, surface water, and mine pits near the Gare IV/1 mine void, the proposed ash disposal site. The coal ash was found to be primarily composed of Si, Al, and Fe, with heavy metals like Fe, Mn, Zn, and Cr present in low concentrations, and TCLP tests confirmed non-hazardous classification per US-EPA standards. Radioactivity levels of most radionuclides were within acceptable limits, except slightly elevated 232Th, which aligns with global trends. Water quality analysis indicated mildly acidic to alkaline pH, fresh to very hard water types, and the presence of metals like Fe, Mn, and Zn, though most parameters met BIS and IS:2296 standards for drinking and effluent discharge. No significant leaching impacts from ash disposal were detected, due in part to the low permeability of the ash matrix. However, the study emphasizes the need for continued chemical characterization and regular water quality monitoring during and after ash disposal to prevent potential environmental contamination and safeguard public health.

3. Base lime environmental study for ash slurry disposal at Gare IV/1 Mine void

Jindal Power Ltd. has initiated a project titled Baseline Study for Wet Ash Slurry Disposal through Pipeline in Gare IV/I Mine Void, located in Tamnar, Raigarh, with the primary objectives of assessing the quality of surface water, groundwater, and mine water around the proposed ash disposal site, along with evaluating the heavy metal leaching potential and radioactivity of pond ash. As part of the study, the activity levels of radionuclides including ^{238}U, ^{226}Ra, ^{232}Th, ^{40}K, and ^{137}Cs in pond ash will be measured. Groundwater quality

assessment for drinking purposes indicates that most parameters fall within the limits prescribed by BIS:10500 (2012), although concentrations of Fe, Mn, and Ni exceed the desirable limits in a few samples. Other metals such as Zn, Ba, Pb, Cu, Cr, Cd, As, and Hg were found to be well within acceptable drinking water standards. Surface water samples collected in the vicinity of the fly ash disposal site exhibited alkaline characteristics, with all measured parameters conforming to Class C water quality standards under IS:2296. Similarly, mine water samples collected from the proposed disposal voids exhibited pH values within the effluent discharge range of 5.5–9.0, with concentrations of fluoride, chloride, sulfate, and nitrate remaining below regulatory limits. Trace metal concentrations in mine water, including Fe, Mn, Pb, Zn, Cu, Cr, Cd, Ni, As, and Hg, were also within the prescribed limits for discharge into inland surface waters, indicating minimal immediate risk to surrounding water resources.

4. Hydrological study of Gangaramchak & Gangaramchak-Bhadulia coal mine, West Bengal

M/s Gangaramchak Mining Private Limited, acting as the Managing Director for WBPDCL, has entrusted CSIR-CIMFR with conducting a detailed hydrological study of the Gangaramchak and Gangaramchak-Bhadulia coal mine blocks in Birbhum District, West Bengal, along with the surrounding regions. The study aimed to perform a comprehensive assessment of groundwater resources, including water level monitoring, estimation of the water balance, and evaluation of mining impacts on local water systems, followed by the recommendation of remedial measures. To facilitate groundwater level monitoring, a network of 46 dug wells was established across villages in both the core and buffer zones of the project area. Observations indicated that the phreatic water table in the buffer zone ranged from 2.29 to 13.14 meters below ground level (mbgl) during the pre-monsoon season and from 0.11 to 8.99 mbgl in the post-monsoon season. The Total Annual Replenishable Recharge (TARR) for the buffer zone was estimated at 67.443 million cubic meters using the rainfall infiltration factor method and 54.681 million cubic meters using the groundwater fluctuation method. The total annual water draft, including mine water discharge, was calculated to be 9.4363 million cubic meters, resulting in an estimated annual balance groundwater resource of 51.6257 million cubic meters. The groundwater development percentage was determined to be 15.5%, placing the area within the 'safe' category as per Central Ground Water Board (CGWB) guidelines. Based on this analysis, preventive and management measures were proposed to ensure sustainable utilization of groundwater resources in the region.

FLAME PROOF AND EQUIPMENT SAFETY RESEARCH GROUP

The flameproof and equipment safety (FES) department is one of the oldest laboratories of CSIR-CIMFR and having state-of-the-art facilities in India for testing and design evaluation of explosion proof electrical and non-electrical equipment for hazardous areas since CSIR-CIMFR's inception in 1956. The FES laboratory is engaged in the testing and certification of electrical and non-electrical equipment namely Explosion proof equipment like Flameproof (Ex d), Intrinsically Safe (Ex i), Pressurized (Ex p), Increased Safety (Ex e), Non-Sparking Tools, Conveyer Belt, Exploders, Flame Arrester, Brattice Cloth, Heat Tracing Cable, Short Firing Cable, Ventilation Ducting, etc. The department is also involved in inspection and maintenance of electrical installations in hazardous areas as per IS/IEC requirements. The laboratory has carried out various sponsored, consultancy and service to industry projects for Government/PSU sectors as well as private industries across India to name some BHEL, M/s Thermon India Pvt. Ltd., M/s Prabhu Industrial Udyog Pvt. Ltd., M/s Shreeji Process Control Pvt. Ltd. and M/s Ansys Engineering Pvt. Ltd. The department has tested and certified more than 680 Ex-equipment and submitted their reports during this financial year. This department has been utilizing the knowledgebase to enhance the safety of men and machineries in hazardous locations.

The FES department has submitted the following project reports during the financial year 2024-25:

1. Assessment of the electrical safety parameters of Increased Safety Ex-eb and Non-Sparking Ex-ec Motor, rated at 1450KW in Frame size: 1MA7802-2 as per IS/IEC 60079-7:2017 at M/s BHEL, Bhopal. The project work has been successfully completed at M/s BHEL, Bhopal. Based on the test results and design evaluation, the Purged Control panel and increased safety motor were found to be compliance with relevant standards and suitable for use in Zone-2 for Gas Group IIC hazardous area.
2. Assessment of Temperature Rise Classification of FLP Transwitch Unit/Load Centre up to 2500kVA, up to 6.6KV/1140-415V, FLP VCB Panel up to 7.2KV, up to 630A and FLP Plug & Socket 600A, 1140V of M/s Prabhu Industrial Udyog Pvt. Ltd., Kolkata for use in hazardous area.
3. *Assessment of the electrical safety parameters and Temperature rise of Thermon Trace Heating Cables of M/s. Thermon India Pvt. Ltd., Pune, Maharashtra for use in hazardous area.*

The FES department has also carried out the following inspections of factories during the financial year 2024-25:

1. Inspection of factory of M/s. S. R. Electrical Co., Rajasthan as required for the first time manufacturing of Flameproof equipment for the use in hazardous area.
2. Inspection of factory of M/s. Shreeji Process Control Pvt. Ltd., Gujarat as required for the first time manufacturing of Flameproof equipment for the use in hazardous area.
3. Inspection of factory of M/s. Ansys Engineering Pvt. Ltd., Thane as required for the first time manufacturing of Flameproof equipment for the use in hazardous area.

The FES laboratory is also engaged in organizing 'Executive development program' for ONGC executives for safe use of electrical equipment in hazardous location. The external cash flow of the department is approximately 3.5 crores during the financial year 2024-25.

MATERIAL CHARACTERIZATION RESEARCH GROUP

During April 2024 to March 2025, the Material Characterisation Laboratory of CSIR-CIMFR has undertaken various R&D assignments related to safety in mining as well as other industries which are given below:

Project Details:

1. **Scientific study for performance evaluation of 51mm diameter Multi strand steel type winding rope suitable for winding and man-riding haulages for underground mines as per different relevant Indian standards**.

The quality assessment comprising of physical examination of technical parameters and verification on dimensions and construction details for wire ropes were carried out at manufacturer company Wireco Germany GmbH for the four (04) nos. of wire rope samples of 51mm diameter (multistrand). After physical examination of these samples were sealed and dispatched to CSIR-CIMFR for further study.

The scientific study has been carried out on the wire ropes through Mechanical properties assessment which includes breaking strength of complete wire rope sample, tensile strength of individual wire, torsion & reverse bend and Metallurgical properties assessment comprising of chemical composition analysis, lubrication, galvanization and micro-examination as per different relevant standards for safe use in mines.

2. **Scientific study for failure of 32mm diameter winding rope used for the man winding at Kolihan Copper Mine of Hindustan Copper Limited**

The six (06) nos. of wire rope samples of 32mm diameter (FLC) have been received to evaluate from HCL, Khetri Nagar to CSIR-CIMFR, Dhanbad. The investigation has been carried out on the wire rope through Mechanical property and Metallurgical property comprising of various study like visual examination, examination of wear & corrosion, lubrication content and micro-examination as per different relevant standards.

3. **Performance Evaluation of 56 mm diameter wire rope used in SKM shaft tail rope 3 and 4 of Hindustan Zinc Limited**

The four nos. of wire rope samples of 56mm diameter have been evaluated, for various mechanical and metallurgical properties to check the healthiness of the wire ropes as per different relevant standards.

4. **Winding rope performance evaluation of size 26mm drawn from 400kW double drum winder installed at Uranium Corporation of India Limited, Turamdih Mines**.

The performance of four winding ropes of 26mm diameter have been evaluated after being used in mines. Ropes have been studied through destructive testing i.e. by breaking load test, tensile, torsion, reverse bend, wear & corrosion, lubrication and micro-examination. The study reveals that the conditions of the ropes are good except few ropes, which shows microstructural defects caused during its operation.

5. **Performance evaluation of winding ropes of Chasnalla Colliery**.

Performance evaluation on FLC winding ropes of different size used for winding at SAIL, Chasnalla has been carried out. The ropes were found in good condition and suitable for reuse except few ropes had poor lubrication and corrosion pittings.

6. **Performance evaluation of different sizes FLC wire ropes used at Surda Copper Mine**.

Four full locked coil wire rope samples of diameter 22mm and 26mm have been received for evaluation on its reusability. The ropes were subjected to breaking load, tensile, torsion, reverse bend, wear and corrosion, lubrication and micro examination to study its condition. The ropes were found in good condition and possess good strength.

7. **Performance evaluation of winding ropes, cage suspension gears and its components and vital parts of winders of Kharkharee Colliery.**

Four full locked coil wire rope samples of diameter 29mm and 25mm have been examined and accordingly advised about its reusability.

NDT has been carried out of Winders and its vital components and Cage Suspension Gear systems of both North side and South side of Kharkharee Colliery of BCCL and are found satisfactory except few components such as Top Shackle Pin of Safety Hook, Cage Shackle No -1, Cage Shackle No -2 and Top Shackle Pin of Safety Hook.

A replica was made of plaster of paris of the grooves of both the head gear pulley by mine management in 2020 and 2024 for comparison and it was observed that there is negligible wear on the replica of the groove of 2024 in comparison to 2020.

COMBUSTION RESEARCH GROUP

Combustion science and technology department deals with basic and applied research on coal combustion, clean coal technologies and support coal-based power generation industries for resolving problems. The department also deals with preparation of national GHG emission inventory for energy & manufacturing industries and assessment of normative coal requirement for different industries.

The department is having three major facilities for combustion studies. The three facilities are lab scale Thermogravimetric Analyser (TGA), bench scale Drop Tube Furnace (DTF) and pilot scale Fuel Evaluation Test Facility (FETF). These three facilities are utilized for studying combustion characteristics of coals, coal blends, coal-biomass blends and we are serving different industries like NTPC, Reliance Energy, Tata Steel, Gondowana Geotech Pvt. Ltd., NALCO.

1. **Energy Sector Inventory for National Communications of Govt. of India to UNFCCC**

India communicates its National GHG inventory time to time to UNFCCC to fulfil its commitment to United Nations. India submitted its first national communications in the year 2004 and CSIR-CIMFR had been involved in estimation of GHG emission from energy and Manufacturing sector since the beginning of this

century. India has already communicated three National communications (NCs) and Four Biennial Update Reports (BURs). Fourth Biennial Update Report (BUR-4) was submitted in December' 2024. In the tenure of fourth national Communication (4NC) of GOI, CSIR-CIMFR is working in the three projects on estimation of GHG emission from Energy Sector: First project (GAP-7051) deals with estimations for fourth Biennial Update Report (BUR-4), second project (GAP-7052) covers the estimations for First-BTR (BTR-1), and third one (GAP-7050) is for India's Fourth National Communication (4NC). Under the Enhanced Transparency Framework, Parties to the Paris Agreement including India are required to submit biennial transparency reports (BTR) every two years, first submission will be as BTR-1. According to the modalities, procedures and guidelines (MPGs) for the Enhanced Transparency Framework (annex to decision 18/CMA.1), BTR include information on national inventory reports (NIR), progress towards NDCs, policies and measures, climate change impacts and adaptation, levels of financial, technology development and transfer and capacity-building support, capacity-building needs and areas of improvement.

2. Assessment of Normative Quantity of Coal Requirement for Non-Power Sector

The department is involved in setting up modalities for normative coal requirement for different sectors which provide the scientific basis of estimating the normative requirement of coal in different sectors/industries at India to Coal India Limited. This will help to take policy decision by Ministry of Coal for judicious coal allocation and to prevent misuse of precious coal of different grades presently mined in India.

COAL CARBONIZATION RESEARCH GROUP

CARBONIZATION SECTION

1. Study on Characterization of Coal, Preparation of semi coke and semi coke briquettes prepared from coal sample supplied by M/S Mundra Petrochem Limited, Gujarat.

Objectives: Scientific study on preparation of semi coke and semi coke briquettes from the particular coal supplied by the company.

Project Outcomes/Report- After Comprehensively going through material characterization of Raw Coal/Pet-coke and binder samples including chemical composition of Ash, the blended mixture was being subjected to coke making process through available process controlling measures and found an improved fuel ratio. The measured physical/mechanical strength with specific binders provide impetus for subsequent uses of the semi-coke products. Specificity of the scientific development is protected under IPR.

2. Scientific Study of Quality monitoring of Iron Ore at dispatch point of NMDC, Donimalai.

Objectives - Scientific Verification through Physical and Chemical Analysis of Iron Ore Samples for its development including its implied direct socio-economic impact.

Project Outcomes/Report- A remarkable generation of Fund for CIMFR (Total in Rs- 10.5 Crore, approx.), fast track quality monitoring with facilitation for e- auction process, Comprehensive and critical Analysis of Test results to provide solution to Iron making process (from mining to better end product), implied direct impact on socio-economic parameters like generation of local employment, Royalties for state revenue/DMF in a more transparent manner, providing impetus to Corporate Social responsibilities, encouraging Iron Ore export, Provides better transparency and trust to adjust trade deficit gap between import of steel and export of Iron ore etc…. Details of Scientific development are protected under IPR.

3. Scientific and Technical Inspection/Audit of newly Constructed Special Smokeless Fuel (SSF) Plant, for M/S. S J Coke Industries Pvt. Limited; Kaimur, Bihar.

Objectives - Scientific and Technical Inspection/audit of SSF Plant w.r.t drawings provided by the firm based on which the plant was constructed and intended for enhancement of production capacity of the plant.

Project Outcomes/Report- After inspecting the existed operational facilities of raw material storage, conveying system, size reduction system, retort house, SSF quenching system, Tar recovery/storage/pumping system and by Analyzing the available integrated operational system with capacity assessment read with

material characterization, CIMFR provided necessary inputs to achieve its desired amount of throughput/ enhanced production quantity. Specificity of the Scientific and Technical Work is protected Under IPR.

4. Technology Transfer:

Name of the Technology- Improved Soft Coke making Technology for commercial soft coke production.

Name of the clients to which the Technology is transferred-

- Shree Balajee Industries, Jharkhand
- Anjaneya Fuels, Bihar
- Krishna Udyog, Bihar
- Synergy urja Ventures, Bihar
- SB Urja Pvt. Limited, Bihar

ENVIRONMENT EMISSION AND CRM SECTION

1. Investigation of Mercury and its mode of Occurrence in Indian coal (SERB, DST New Delhi, Feb 2022 to Feb 25, Rs 22.83 lakhs)

This project was focused on investigation of the mode of association of mercury in Indian coal, especially for high mercury-containing coal. The association of mercury with organic or various inorganic mineral matter of coal may assist in formulating pre-combustion or post-combustion techniques to reduce mercury load. In the ongoing project, coal samples from different coalfields were analysed for their mercury content. Some selected samples were studied for the association of mercury. In the studied sample, the Hg content was found to be mainly associated with mineral matter, with significant correlation with pyritic minerals.

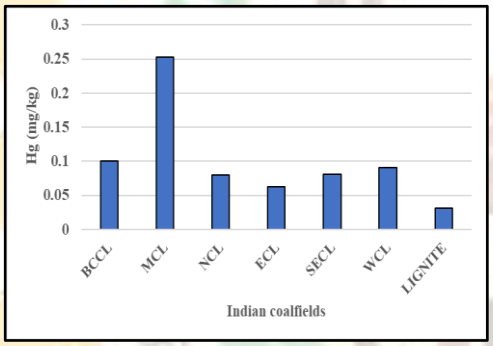


Fig 1: Average Hg content of various Indian coalfields

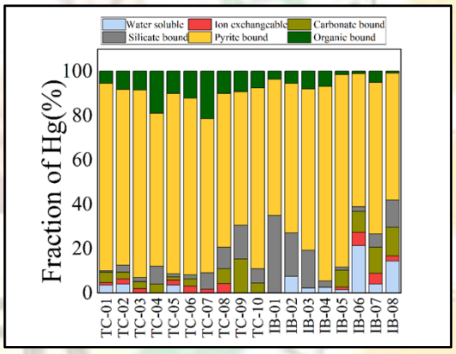
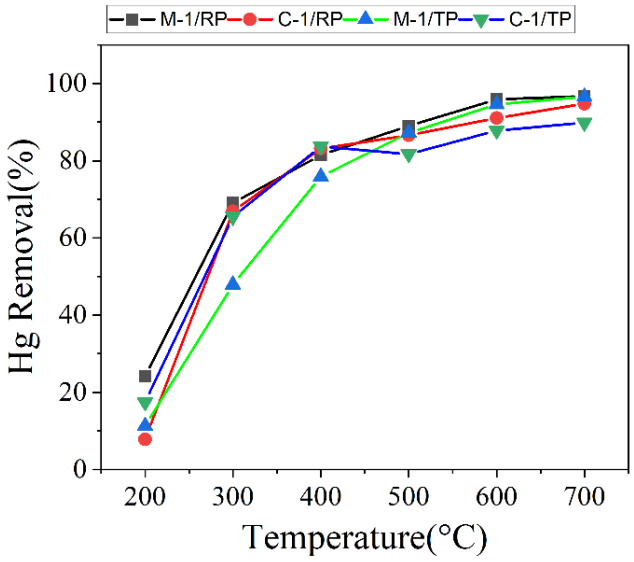


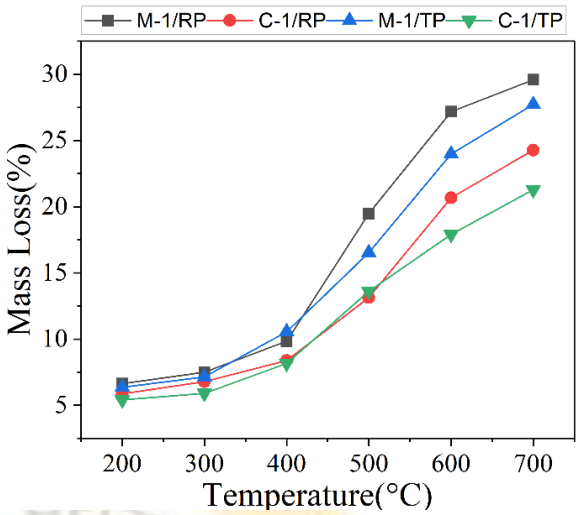
Fig 2: Mode of occurrence of Hg in coal

2. Investigation of thermal speciation of mercury in coal for pre-combustion mercury removal

In Indian coal, mercury predominantly exists in sulphide form, accounting for 60–87% of total mercury content, followed by organic-bound and silicate-bound species. Concentrations range from 0.100 to 0.282 mg/kg. Controlled pyrolysis trials demonstrated substantial mercury removal between 350°C and 400°C, achieving over 90% reduction. The process effectively eliminates mercury species in a stepwise manner from thermally unstable compounds to medium-volatility and high-temperature resistant forms. Pyrolysis results in mass loss due to moisture evaporation and reduction of volatile matter, which affects the coal's calorific value. Combustion analysis of the pyrolysed char indicates slower burn rates and reduced peak weight loss rates post-treatment. Additionally, the process has been evaluated for its co-benefits in mitigating other volatile pollutants such as arsenic, selenium, cadmium, and sulphur.



Hg removal Rapid & Temperature Programmed Pyrolysis



Mass Loss Rapid & Temperature Programmed Pyrolysis

5. **Development of coal and biomass-derived nanosensor for the selective and sensitive detection of mercury in water samples**

The investigation of coal and biomass derived fluorescent nanosensor, offers a sustainable and cost-effective route for developing functionalized carbon nanomaterials (CNMs) capable of selective and sensitive mercury (Hg) detection. The intrinsic carbon-rich composition of these materials has enabled the use of various bottom-up synthesis methods, including hydrothermal carbonization, pyrolysis, and chemical oxidation. These methods enable precise control over the surface functionalities, size, and morphology of CNMs. Incorporation of sulfur (S)-containing ligands i.e., thiol, thiophene etc. into CNMs enhances specific binding sites on the CNMs surface which leads to the high selectivity and affinity toward mercury ions due to the strong Hg–S interaction. Fluorescence techniques enable real-time visual monitoring while offering insights into the binding mechanisms and selectivity of CNMs, making them essential for the development of efficient fluorescence-based sensors for mercury detection.

The UV-vis and fluorescence spectroscopic study revealed that the synthesized water dispersed CNMs exhibited excellent fluorescent properties. The interaction of mercury with functionalized carbon nanomaterials can be effectively studied using fluorescence and ultraviolet-visible (UV-vis) spectroscopy. Among the various carbon nanomaterials, those derived from potato peels and North East coal exhibited notably high selectivity toward mercury detection. A measurable quenching or shift in fluorescence emission is typically observed upon binding mercury ions to specific functional groups, particularly sulfur-containing ligands. This change serves as a sensitive indicator of mercury presence and concentration. The high-resolution transmission electron spectroscopy (HRTEM) and X-ray diffraction (XRD) spectroscopic study of potato peel derived CNMs confirmed the amorphous nature and doted morphology. However, further optimization studies are ongoing to enhance the fluorescent CNMs-based mercury sensor's performance. The chip-based on-site detection of mercury in water samples will be demonstrated following the completion of the optimization study.

In addition, we have also achieved excellent results in sensing of hexavalent chromium using garlic peel derived fluorescent carbon nanomaterials during our study. Hexavalent chromium is a one of the most toxic and water-soluble heavy metal ions like mercury, causes major health issues such as lung cancer, edema, pulmonary congestion, gastrointestinal ulceration, dermal irritation and liver damage, even at trace levels. The HRTEM and XRD study showed that developed CNMs exhibit dotted morphology, are amorphous in nature and have an average size of 4 nm. The Fourier transform infrared (FTIR) spectroscopy and X-ray

photoelectron spectroscopy (XPS) analyses indicated that the carbon nanomaterials contain carboxylic surface functional groups, which are crucial to the sensing mechanism; this was further supported by zeta potential measurements. The decrease in fluorescence intensity of the carbon nanomaterials with increasing hexavalent chromium concentrations, serves as a key signal for the sensitive detection of hexavalent chromium in aqueous media with achieving a detection limit of 95.14 ppb, demonstrating greater sensitivity compared to previously reported studies. The interference study also confirmed that the developed fluorescence carbon nanomaterials-based sensing platform demonstrated strong anti-interference capability under both real and controlled laboratory experimental conditions. The practical applicability and reliability of the developed fluorescent carbon nanomaterials as sensors were further evaluated and validated through testing on real environmental water samples. These results validate the effectiveness of the garlic peel waste-derived fluorescent carbon nanomaterials a promising candidate for environmental monitoring of hazardous chromium species in real-life scenarios.

6. Improvement of the nitride-based slow-release fertilizer prepared from coal washery rejects and fly ash for its optimal use in agriculture

Significant advancements were made in enhancing the solubility of nitride-based fertilizers, with soluble nitrogen content ranging from 4% to 12%, achieved through treatment with H_2SO_4 and H_3PO_4. Release kinetic studies offered valuable insights into the solubility patterns of the fertilizers, while pot experiments with Amaranthus demonstrated a positive crop response to the nitride fertilizer. Coal ash and washery rejects were successfully utilized to produce fertilizers, promoting sustainable waste management and reducing environmental impacts.

7. Exploration and chemical fractionation of critical elements in fly ash and bottom ash generated from coal and biomass combustion

Lignite ash from Neyveli thermal powerplant-II shows strong potential for rare earth element (REY-Sc) extraction, with a REY content of 2939 mg/kg, compared to 1092 mg/kg from Neyveli thermal powerplant-I. Over 60% of REEs can be recovered by breaking down the metal oxide matrix. Coal ash from Patratu thermal powerplant also has potential, with 28.8% Al_2O_3 for alumina recovery and 44.8 mg/kg Ga. Also, 43% of REE and Sc are linked with mullite and quartz, while 25% are organic/sulfide bound and 21% metal oxide bound. The rare earth elements are enriched in finer fractions and medium density fractions 2.35-2.5. A flowsheet was developed for co-extracting Ti, Ga, and Fe in >2.85 density fraction and the rest for the extraction of REEs. A process flowsheet was developed in which rare earth elements were concentrated from 0.1% to 6% REE content.

GASIFICATION AND CATALYSIS RESEARCH GROUP

i. **Gasification Performance Evaluation of Lignite resource of GMDC's Surkha North lignite mine, Bhavnagar** (Project No.: SSP-9322/2023-24) Project Completion: 30th June 2024**,** Sponsor Agency: International Centre of Excellence in Mining Safety and Automation (iCEM), GMDC, Gujarat**.**

Gasification performance evaluation of lignite samples from GMDC's Surkha North Lignite Mine, Bhavnagar, was established in an ingeniously developed 1.5 TPD Oxy-blown PFBG Pilot Plant Facility (TRL–6). Lignite Gasification experiments conducted with operating parameters (ER: 0.28; Steam/Lignite: 0.77; Steam/Oxygen: 1.05), and was able to produce syngas yield of 1.65 – 1.70 Nm^3/Kg Lignite along with syngas composition of H_2: 32.34 – 34.13%, CO: 15.45 – 16.16%, CO_2: 35.61 – 37.21%, CH_4: 2.69 – 3.00% (vol.%) at gasifier operating temperature of ~935 – 955 °C. The Cold Gas Efficiency (CGE) and Lower heat value (LHV) were found to be 61.01% and 1750.80 kcal/Nm^3 at ER of 0.28. Syngas generated from lignite gasification has the potential to be utilized in different downstream applications such as Hydrogen generation, DRI, Methanol/DME, and many more.

ii. **Gasification/Co-Gasification performance evaluation of low rank Indian coal and blends of low rank Indian coal with biomass as a renewable source of energy in 1.5 TPD PFBG Pilot Plant** (Project No.: MLP-175/2022-23), Project Completion: 31st March 2025, Sponsor Agency: CSIR-CIMFR, DHANBAD.

Gasification performance evaluation of high-ash Indian coal (CCL, Ash%: 33.40 wt.%), and Agro-Industry biomass waste (rice-husk) was established successfully in an ingeniously developed 1.5 TPD Oxy-blown PFBG Pilot Plant facility (TRL-6). Established Gasification operational philosophy to utilize high-ash Indian coal and agro-industry biomass waste in an indigenously developed 1.5 TPD PFBG Pilot Plant to overcome the challenges of ash agglomeration, clinker formation, and entrainment during gasification. Gasification operational philosophy was developed for conversion of coal into Syngas of composition of CO: ~16-18%, H_2: ~25-29%, CH_4: ~2-3%, CO_2: ~32-35% (by vol.%), with gas yield of 1.0-1.2 Nm^3/Kg coal, CGE of 51-55%, LHV of syngas of 1600-1700 Kcal/Nm^3 syngas, and CCE of 92-95%. As well as, Gasification of Agro-Industry biomass waste (rice-husk), was able to produce syngas composition of CO: ~25-30%, H_2: ~10-12%, CH_4: ~6-9%, CO_2: ~45-50% (by vol.%), with gas yield of 1.25-1.80 Nm^3/Kg RH, LHV of syngas of 1100-1300 Kcal/Nm^3 syngas, CGE of 39-44%, and CCE more than 95%.

iii. **Assessment of tar cracking during coal, biomass/waste pyrolysis and gasification in existing retort furnace facility (**Project No. MLP-177/2022-23**),** Project Completion: 09th October 2024**,** Sponsor Agency: CSIR-CIMFR, DHANBAD.

Pyrolysis of selected coal sample (MCL Coal) and rice husk in an inert atmosphere and temperature up to 900 ^{0}C have been completed in the existing retort furnace system. Analysis of generated pyrolyzed gas composition has been done by using available online/offline GC. The yield of the generated pyrolyzed gas has been done based on Mass balance. Gasification studies of coal and rice husk char in CO_2 atmosphere at different temperatures such as 900 ºC, 950 ºC, 1000 ºC have been completed in the existing retort furnace system. The majority of gases were evolved during coal pyrolysis in the temperature range of 500 – 800 °C in the advanced pyro-cracker system, including H_2: 53-61%, CH_4: 21-25%, CO: 6-11%, and CO_2: 4-11% (v%/v%). The gaseous fraction includes yield of H_2: 17.96 g/Kg coal, CH_4: 48.03 g/Kg coal, CO: 41.87 g/Kg coal, and CO_2: 64.80 g/Kg coal. The majority of gases were evolved during rice husk pyrolysis in the temperature range of 400 – 800 °C in the advanced pyro-cracker system, including H_2: 26-49%, CH_4: 31-35%, CO: 5-24%, and CO_2: 10-16% (v%/v%). The gaseous fraction includes yield of H_2: 31.47 g/Kg rice husk, CH_4: 115.72 g/Kg rice husk, CO: 161.89 g/Kg rice husk, and CO_2: 164.11 g/Kg rice husk.

iv. **Feasibility of catalytic coal/biomass gasification with naturally occurring substances using Thermo Gravimetric Reactor** (TGR)(MLP-176/2022-2023), Project Completion: 31st March 2025, Sponsor Agency: CSIR-CIMFR, DHANBAD.

Selected earth-abundant-based catalytic materials were procured. XRF analysis of the selected materials was performed. XRF result showed the potential of Dolomite due to the presence of Ca, Mg, and Bentonite due to the presence of Na, K, and Red mud due to the presence of K, Fe, respectively. Reactivity analysis of selected materials using TGA was performed with the catalyst loading of 2% to MCL Coal. Comparative analysis of the gasification reactivity of MCL coal with and without different catalysts at various temperatures was performed. It was observed that Red Mud, Dolomite, and Bentonite showed ≈2-fold, ≈3-fold, and ≈3-4-fold better gasification reactivity at 950°C compared to without catalysts. These catalysts were observed to reduce the gasification temperature by 100-150°C by showing the equivalent gasification reactivity at 850°C as at 950-1000°C without catalysts.CO_2 gasification of MCL Coal with and without catalyst at various temperatures in the Advanced Tar cracker inbuilt bench scale reactor was performed to test the catalytic effect in actual gasification operating conditions.

v. **Enrichment of H_2 in Syngas using Water-Gas Shift Reaction (WGSR) and removal of CO_2 by alkaline solvent** (Project No.: MLP-151/2021-22), Project Completion: 04th July 2024, Sponsor Agency: CSIR-CIMFR, DHANBAD.

The project demonstrates a successful bench-scale development and integration of two critical processes, Water-Gas Shift (WGS) reaction and CO_2 absorption, for upgrading coal-derived syngas. The WGS process effectively enhanced the H_2/CO ratio from a near 1:1 ratio to a more suitable composition for methanol synthesis by converting CO and steam into H_2 and CO_2. Indigenous Fe-Cr-based catalysts performed comparably to commercial ones, achieving up to 92% CO conversion at 400°C with good thermal stability.

The optimized steam-to-CO ratio of 3:1 was identified as the best operational condition. In the subsequent CO_2 removal phase, various amine-based solvents were evaluated in a packed column. Primary amines like MEA showed high CO_2 absorption at low flow rates, though their performance declined slightly at higher flow rates. Secondary amines like DEA maintained over 95% efficiency even at high gas throughput when used at higher concentrations. Tertiary amine MDEA, when blended with 2% piperazine (PZ), achieved superior performance, maintaining over 98% CO_2 removal efficiency at high flow rates. Solvent regeneration trials confirmed the long-term usability of DEA and MDEA blends, although MEA showed thermal degradation upon cycling. The integration of optimized WGS and solvent-based CO_2 absorption resulted in a hydrogen-enriched, CO_2-depleted syngas suitable for methanol and other downstream fuel production. These findings establish the technical feasibility and process synergy for future scale-up to a 250 kg/day pilot plant and highlight the potential of indigenous catalysts and blended solvents for efficient, scalable syngas conditioning.

COAL AND MINERAL PROCESSING RESEARCH GROUP

During April 2024 to March 2025, the Group has undertaken various projects on washability, sampling of indigenous and imported coals, flotation, etc.

The clients included SAIL, Kolkata, Tata Steel, Tamilnadu Generation and Distribution Corporation Ltd., TANGEDCO, Krishna Antioxitants Pvt. Ltd. IISCO-Chasnalla (SAIL), SEPC-Tuticorin, Jindal Power Ltd.

1. **Pilot scale beneficiation to predict the yield improvement and other associated parameters of West Bokaro coal at 6mm top size, TATA Steel:**

The main objective and scope is to understand the pilot scale yield improvement and other associated parameters of West Bokaro coal at 6 mm top size. Detailed washability (both float and sink and froth flotation) is conducted on the first part of 6 mm top size composite sample. Float and sink test to be conducted at specific gravity range 1.30 to 1.80 at an interval of 0.1 specific gravity. During desliming process representative samples of coarse coal and fines coal are to be collected at regular intervals ((30 minute) and to be divided into 3 parts separately. First cycle of coarse beneficiation (Deslimed coarse coal to clean coal and Mid+Rej.)Second cycle of coarse beneficiation (Deslimed middling+rej). Fines coal beneficiation through froth flotation.

2. **Scientific and technical studies on Sampling and Analysis of Imported and Indigenous Coal unloaded at VOC Port end, Tuticorin** is ongoing under a bilateral agreement, with an estimated quantity to be handled 1.62 MMT/year.

Vessel arrival carry coal to be attained by CSIR-CIMFR at VOC Port Tuticorin

3. Sampling and analysis of slurry/ Rejects lying at different coal washeries of Bharat Coking Coal Ltd

CSIR - CIMFR was involved during the sample collection at different washeries like Bhojudih, Sudamdih, Patherdih, Madhuban etc from the heap/ponds. The sample preparation was done at the respective sites for the general analysis and the prepared samples were sent by the party to CIMFR for its complete characterization. During the period 2020-21 sampling was done at three sites of different washeries and the analytical report was submitted.

BCCL Coal Washeries: Coal Fines in the form of slurry and rejects

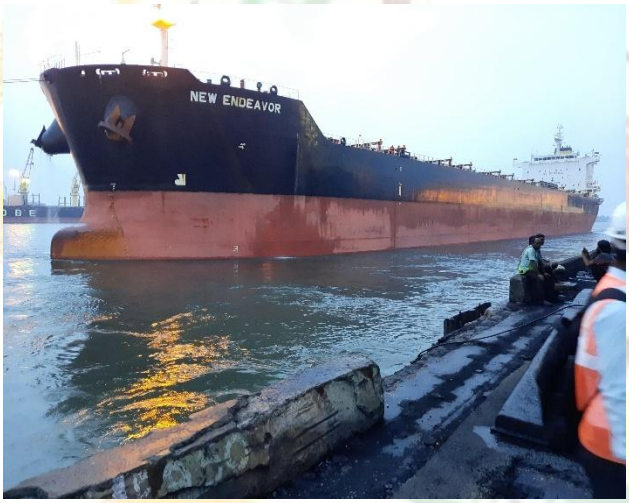
4. Scientific services for quality evaluation of coal for its optimum utilization in power generation at NCTPS-I, TTPS-I and MTPS-I for TANGEDCO

The main objective is to characterize the indigenous coal after collecting the representative samples during unloading of the coal at the port ends and preparation of samples for characterization as per the standard procedure.


TANGEDCO Port

5. Sampling and Analysis of imported coal unloaded at Port ends for Steel Authority of India Limited

CSIR - CIMFR was involved during the sample collection while the coal was discharged at the ports of Haldia, Paradeep, Dhamra and Vizag. The sample preparation was done at the respective sites for the general analysis and the prepared samples were sent by SAIL to CIMFR for its complete characterization. During the period 2022 - 23 sampling of total of three (3) vessels was carried out at unloading ports and the analytical report was submitted.



Sampling of Imported coal at Haldia and Vizag Port

6. Scientific and Technical Evaluation on "Effects of Developed Chemicals supplied by Krishna Antioxitants Pvt. Ltd. on coal slurry by Pilot scale flotation investigation

The objective of the project is to see the outcome of the best possible dosages of developed Chemical and possible yield of the concentrate at <17% ash as supplied by Krishna Antioxidants (P) Ltd. through Pilot Scale Flotation Investigation.

7. Studies on the estimation of theoretical yield at 18% (Plus/Minus) 0.5% ash level of washery by crushing feed coal in two different sizes and assess the recovery of cleans ash at 18% (Plus/Minus) 0.5% from coal slurry of Chasnala IISCO, SAIL".

The main objective and scope is to understand the yield improvement with two different size crushed coal feed to washery and recovery of cleans at 18% from slurry. Reagent doses for Lab scale and Pilot scale flotation run may be furnished by the sponsor.

8. Scientific study for conducting health survey for 2 Nos. of washery of Jindal Power Limited, located at DongamouhaTamnar, Raigarh CG".

The main objective to conduct Civil and Mechanical health survey of 2 Nos. of washery – 2 and washery -3 having capacity 3.2 MTPA (450TPH) and 3.6 MTPA (600 TPH) respectively.

Scope of the project is Visual and Physical inspection of structural health: Initially, CSIR-CIMFR Team will carry out visual and physical inspection of the machineries and associated building components for any sign of deterioration and fatigue accumulation, sign of distresses etc.

i) Evaluation using Non-Destructive Test: NDT tests will be performed as per various prevailing IS/ASTM codes to identify hidden defects, determine the extent of damage, and assess the structural integrity of a building using Schmid Hammer (Rebound Hammer) and Ultrasonic pulse velocity tester.

ii) Structural Health Assessment with Vibration Monitoring: Multiple number of advanced tri-axial velocity transducers will be used for assessment of vibration induced by the heavy machineries and its damage potential. All parameters of vibration induced by the machineries Velocity, displacement and acceleration will be measured and FFT analysis will be performed to assess damage potential and its impact on surrounding machineries if any.

iii) Vibration measurement (if any) of the civil and steel/mechanical structures of washery buildings due to self-load, surrounding building and surrounding machineries if any.

iv) Vibration measurement (if any) of the civil and steel /mechanical structures of washery buildings due to the washery equipments attached to the civil and steel structures.

v) Simultaneous vibration monitoring using multiple seismographs during on and off condition of the equipment.

9. CSIR Mission Mode Project : Waste to wealth : comprehensive solution towards circular economy and sustainability.

Project title : Value addition from coking coal tailings lying in waste settling ponds of washery

The main objective is to reduce the environmental pollution by treating the coal tailings lying in waste settling ponds at coking coal washery through beneficiation routes and utilize the clean effectively.

BILASPUR RESEARCH CENTRE

A. Project Reports

I. Quality evaluation of coal cores explored from different regions of CMPDI (RI-V) by CIMFR Research Centre Bilaspur

CSIR-CIMFR entered into an agreement with Central Mine Planning and Design Institute for resource quality evaluation of coal core samples explored from different regions. As a part of this study, CSIR-CIMFR Research Centre Bilaspur have been assigned altogether 21000 m of borehole coal cores from CMPDI per year.

During this period CSIR-CIMFR Bilaspur has received total 7835.76 m borehole coal cores (265nos. boreholes) from CMPDI RI-V in 2024-25. Out of this 5586.10 m borehole coal cores has been processed and prepared 9920nos. band by band samples. This included samples from five blocks from Korba and another five Mand-Raigrah coal field in Chhattisgarh. Another lot of coal samples from nine blocks of Sohagpur coal fields from Madhya Pradesh region is also received during this period.

Lithological studies were carried out of these cores and 9920 band by band samples were generated. Based on band-by-band data, overall samples were prepared and analyzed for Proximate and Gross calorific Value. Data generation and compilation on coal quality, coal properties and coal ash quality of each bore hole drilled by exploratory agencies in different blocks of various coalfields was carried out. From the geological and

geochemical data generated after core logging and analysis of coal samples, fixation of coal seam within the horizons becomes possible. Also, reserve estimation of a particular area or block can be done once the disposition and lateral extent of the coal seams and the quality of coal it harbors is known. Finally, the feasibility of mine development is also drawn from the overall study of an area.

II. Technical Aid to Industry

Under technical aid to industry (Testing & Analysis), that includes different power plants and other coal user industries like cement manufacturing, paper mills, sponge iron and steel etc., required analysis for various parameters was carried out for 265 numbers of coal samples. The analysis of all these coal samples received from different thermal power stations of NTPC, CSPGCL, MPPGCL, Adani Power, DB Power and MB Power helped them in the proper utilization of coal and oil. This study also helped in preventing environmental pollution due to proper combustion of coal having high ash and sulphur content.

III. Study of Quality of Coal for Effective Utilization in Power Generation, a "Mega Coal Quality Project,"(TPS Project)

CSIR-CIMFR along with its Units at Nagpur, Ranchi and Bilaspur took a project on "Study of quality of coal for effective utilization in power generation, a "Mega Coal Quality Project" sponsored by CIL, SCCL, NTPC, state GENCOs and other power utilities. CSIR-CIMFR Bilaspur Research Centre has carry out "sampling and analysis work" at loading ends of SECL and unloading ends of Power utilities like different NTPC plants, Power plants of Chhattisgarh State Power Generation Corporation Limited (CSPGCL), Madhya Pradesh Power Generation Corporation Limited (MPPGCL), Gujrat Electricity Corporation Limited (GSECL), Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRVUNL), Maharashtra State Power Generation Company Limited (MSPGCL), Lanco Amarkantak Power, DB Power Limited, Dhariwal Infrastructure, GMR Warora, Jay Prakash Power, Jindal Power Limited, Jhabua Power Limited, MB Power Limited, Maruti power, Adani Power, RKM Power, SKS Power, Torrent Power and TRN Energy. The projects have been successfully completed and results have been reported to SECL and related power utilities in soft as well as hard copy. Presently, the project report preparation work is under progress. We have generated ECF of Rs. 60 Cr from this work. The improvement in the quality of coal received at power plants due to strict monitoring has resulted in efficient utilization of coal and a reduction in environmental pollution. The import of coal has also been reduced substantially due to this project hence the cash flow of the Nation has been reduced.

IV. Optimization of controlled blast design parameters for safe and productive excavation of Surge Shaftat Kutehr Project Site

The Kutehr Hydroelectric Project, a 240 MW run-of-the-river scheme, is under construction on the Ravi River in the Chamba district of Himachal Pradesh, India. The project is of240 MW with turbine 3 x 80 MW Francis turbine generator units. It is located in Chamba district, Himachal Pradesh, on the Ravi River. Sponsoring agency requested CSIR-CIMFR Team for providing technical solution for excavation of 17 m dia and 99 m long surge shaft in expeditious manner.

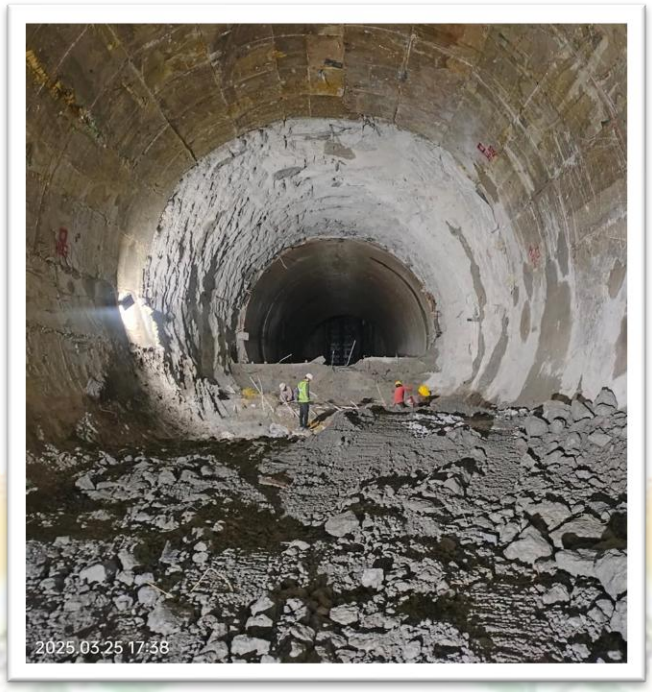
Shaft excavation using controlled blasting techniques at JSW-Kutehr Hydro Project

Team of scientist and research scholars CSIR-Central Institute of Mining and Fuel Research conducted a filed investigation and provided a details comprehensive optimised blast design and blast vibration monitoring scheme and also help in execution of the blast design. As per prevailing rock mass condition, the blast design parameters were re-calibrated. A weekly progress of more than 5.0 m was achieved and entire shaft excavation was completed in four months' time without causing any damage to the rock mass as well as the structures. This has helped M/s JSW, Sponsoring agency in timely commissioning of the project without any cost over-run.

V. Controlled blasting techniques for construction of PSP civil structures of Tehri Underground Hydropower complex, Tehri

Tehri Dam is a multipurpose rock and earth fill embankment dam built on Bhagirathi River for Hydropower generation and irrigation purposes. The project is located in Tehri district of Uttarakhand State. Tehri Hydropower Complex having installed capacity of 2400 MW, comprise of following components namely (1) Tehri Hydro Power Plant (1000 MW), (2) Tehri Pump Storage Plant (1000 MW) and (3) Koteshwer Hydro Electric Project (400 MW). Construction of Tehri Hydro Power Project is undertaken in two phases. Construction of Tehri Hydro Power Plant (HPP) and Koteshwar project is completed. Pump Storage Plant (PSP) with capacity of 1000 MW is under construction. PSP and HPP are located in the close vicinity of each other. It is anticipated that the blasting operation undertaken during excavation of PSP components may adversely affect safety of the hydro-mechanical installation of the HPP project. Therefore, it is important that the blasting operation be carried out in scientific manner and continuous vibration monitoring be carried out for the assessment of damage potential of blast induced ground vibration during excavation in PSP.

CSIR-CIMFR Dhanbad through its research Centre at Bilaspur (CG) is providing scientific support for optimization of controlled blasting techniques for excavation of various underground hydropower structures of PSP Project. Rock excavation is in completion stage and all major excavation works have been completed. Project authorities have appreciated scientific contribution made by CSIR-CIMFR particularly in critical excavation of complex adits connecting Butterfly Valve Chamber and Penstock Assembly Chamber with thin rock ledges of less than 2.5 m. Critical excavation such as concrete plug removal in close vicinity of water charged Head Race Tunnel was completed safely by the CSIR-CMFR RC Bilaspur team



Breakthrough of HRT-3 concrete plug of THDC PSP Tehri Project

Site photograph of TRT Outfall Structures of Pump Storage Power Plant Project, Tehri showing completion of critical rock excavation and associated rock mass support

VI. Blast Design Optimisation and Evaluation of Blast Induced Damage by Monitoring of Blasting Vibration during Rock Excavation at Vishnugaad-Pipalkoti Hydroelectric Power Project, Pipalkoti

Vishnugaad-Pipalkoti Hydroelectric power Project is a 444MW of THDC India Ltd (VPHEP) on Alaknanda River at Pipalkoti, Uttarakhand is a World Bank funded project. The major project components are a concrete Gravity Dam, Desilting Complex, Diversion tunnel and Head Race tunnel near Helong. Tail race tunnel, ventilation tunnel, Main access tunnel and underground power house complex all located on theright bank of river at Pipalkoti, Dam is being constructed on Alaknanda River in the district of Chamoli in Uttarakhand India. The project component consists of one head race tunnel (HRT) dia of tunnel is 8.8 m dia horse shoe shaped and approx... 11 km long. Surge shaft, having 22.0 mm dia and total length of 151 m, Butter fly valve Chamber of length 50 m, width 9.8 m, height 26m. Penstock Assembly Chamber is of dimension length 50 m width 9.8m height 26m. There are various interconnecting tunnels and galleries making the rock excavation complex.

View of entry adits to powerhouse complex of VPHEP, Pipalkoti

Engineering rock excavation works in young Himalayan rock formation cutting across numerous folds, faults and posing geotechnical challenges required site specific customisation and innovative approaches. CSIR-CIMFR Team provided technical solution of all such technical problems. Presently, rock excavation works of all major caverns are in the completion stage.

VII. Scientific Study on Assessment and Mitigation of Blast Induced Ground Vibration and Air Overpressure and Its Impact on Structures surrounding Granite Quarry of M/s Kizhakethalackal Rocks, Elappara Village, Idukki District, Kerala

M/s Kizhakethalackal Rocks, vide letter/email dated 07.01.2025, requested CSIR-Central Institute of Mining & Fuel Research (CSIR-CIMFR), Regional Research Centre Bilaspur (CG) for carrying out scientific study on assessment and mitigation of blast induced ground vibration and air overpressure and its impact on surrounding structures such as quarry slopes and nearby housing structures at Kizhakethalackal stone quarry project. Team of Scientists and Technical officer of Central-Central Institute of Mining and Fuel Research (CSIR-CIMFR) carried out comprehensive study at quarry site of M/s Kizhakethalackal Rock (Survey No. 184.1A) to assess the damage potential of ground vibrations and air overpressure induced by proposed blasting operations. Altogether nine experimental blast operations were conducted during field investigations.

Blast vibration monitoring at mine site M/s Kizhakethalackal Rock

During these nine rounds of blasting operations, extensive blast induced ground vibration and air overpressure monitoring was done using six sets of advanced triaxial seismographs at 54 different locations all around the blast site, both within and outside the mine lease area. It is observed from this scientific study that the observed blast-induced ground vibrations and air overpressure beyond a distance of 50 m from the blasting site remained below 3 mm/s and 115 dB(L) respectively against the safe permissible level of 10 mm/s and 134 dB(L) respectively. Therefore, it can be concluded that the observed blast-induced ground vibration and air over pressure are safe and well within the permissible limits. The blasting vibration observed are of very low intensity and values are well within the safe permissible limit and therefore the possibility of blast induce slope failure/ landslide hazard is minimal and quarry operation may be permitted following all the laws and recommendations as stipulated by the regulatory bodies and finding of the other studies carried out in this quarry site.

VIII. Study on the Effect of Ground Vibration Due to Underground Secondary Stope Blasting on Underground and Surface Structures, and Optimization of Blast Design for Secondary Stope Blasting at the Malanjkhand Copper Project, HCL

The Malajkhand Copper Project (MCP), operated by Hindustan Copper Limited (HCL), approached CSIR-Central Institute of Mining and Fuel Research (CSIR-CIMFR), Regional Research Centre, Bilaspur to carry out a scientific study Effect of Ground Vibration Due to Underground Secondary Stope Blasting on Undergroundand Surface Structures, and Optimization of Blast Design for Secondary Stope Blasting at the Malajkhand Copper Project, HCL.The stability of underground and surface structures is of paramount importance, as these structures are critical for both the safety and statutory compliance. However, the vibrations induced by large-diameter blast hole (LDBH) stoping pose a significant hazard, potentially causing damage to the primary underground structures such as decline, shaft, drives etc. and also causes safety risk to surface structures. Ensuring the safety of these structures requires evaluating threshold vibration limits and optimizing charge parameters to keep vibrations within these limits.

View of MCP open pit mine from north side viewpoint

In this study, the DGMS damage criteria for underground and surface structures were employed to determine the threshold vibration limits. Based on the average Rock Mass Rating (RMR) of the mine, threshold PPV limits were established as 120 mm/s for the North Mine and 100 mm/s for the South Mine of MCP. Fourteen experimental blasts were conducted in the North Mine, and vibrations were recorded at various underground and surface structures using tri-axial geophones. Using different models, optimized charge parameters were determined for safe blasting. For a critical underground structure located 40 m from the blast site, the optimized MCPD and TC were 169 kg and 1280 kg for the North Mine, and 127 kg and 956 kg for the South

Mine. These optimized values align with current secondary stope blasting practices, indicating minimal risk to both underground and surface structures from blast-induced vibrations.

IX. Scientific Investigation of impact of rock blasting on slope stability of Guda Clay Mine, Rajasthan.

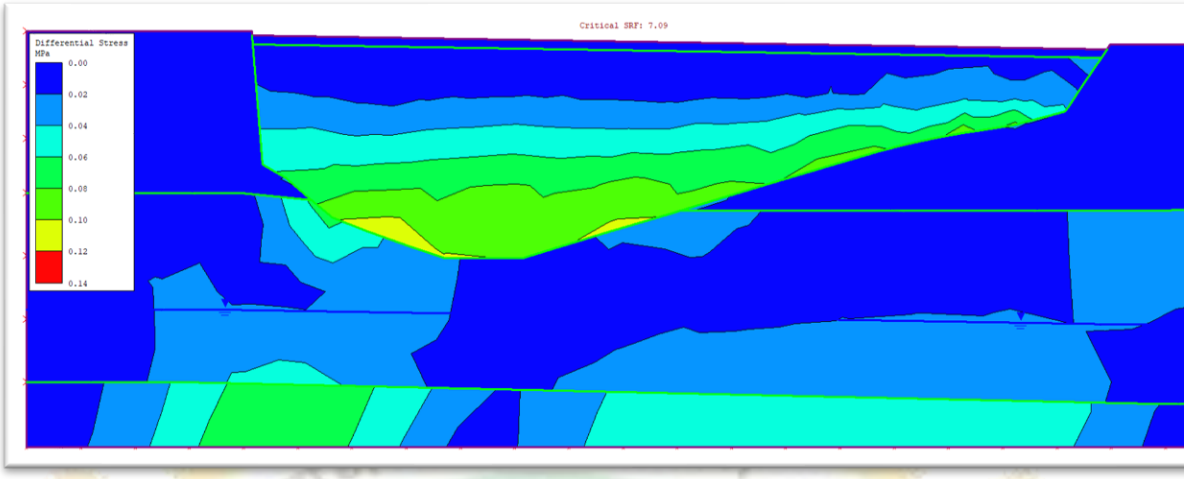
M/s Harish Clay, Bikaner, Rajasthan requested CSIR-CIMFR Regional Research Centre Bilaspur (CG) to conduct a scientific study on pit slope stability of Guda Clay Mine, Rajasthan keeping in view the clay formation and impact of blasting activities. The total area under the lease extends up to 284.20 ha. Total Production from both the Pit-1 and Pit No. 2 (Central Quarry) of the mine is 250000 TPA. CSIR-CIMFR Team has done a detailed field investigation in and around the current Pit No.1 & 2 (Central Quarry) to examine the current stability scenario of its benches which involved the collection of geological and geotechnical data related to the rock masses. The parameters for Rock Mass Rating (RMR) are collected and determined to characterize the rock mass of the pit area. Geological Strength Index (GSI) was also quantified. The Factor of Safety (FOS) is calculated by the Shear Strength Reduction (SSR) technique by reducing or increasing the shear strength of the material for making the slope to a state of limiting equilibrium. To investigate the effect of current geo-mining conditions on the stability of successive pit benches and overall mine slopes, FEM numerical stability analyses were performed. Multiple trials were conducted and simultaneous measurement of vibration were also carried out to evolve a model for safety of the mine.

View of working benches in Guda Clay Mine

X. **Scientific Study on Slope Stability of Fly Ash Dump in Mine Void of Minni OCM-Dry Patch (Kotma OCM) of SECL**

M/s MBMPL requested CSIR-Central Institute of Mining and Fuel Research, Regional Research Centre Bilaspur to carry out a scientific study to evaluate the flyash dump stability in the Dry Patch within Kotma Open Cast Mines of SECL as per advice by Directorate General of Mines Safety (DGMS). CSIR-CIMFR team have carried out a detailed investigation to evaluate the potential risk associated with the backfilling of fly ash in the mine out void of the Mini OCM Dry patch Kotma Open Cast Mine of SECL using conventional and numerical approaches. Initially, a field investigation was carried out followed by the characterization of material both rock as well as flyash by performing the laboratory and field works. Field-based geotechnical data were used to carry out the analyses. The CIMFR team have used geotechnical parameters for analysis from the geotechnical test reports provided by the sponsoring agency. Numerical stability studies were also carried out along different cross-sections considering the variation in the bottom topography of the mine and the profile of the mine-out void patches along the selected chainage. Rock mass characterization recommends

fair to good rock mass conditions of the underlying sandstone. During material characterization, various laboratory tests on flyash such as AFT, XRD, TGA and LoI were performed.



Contours of differential stress in along a Section in major axis

The numerical analysis results for the six (06) different cross-sections considering the variation in the bottom topography of the mine and the profile of the mine out void patches suggest discrete patches of mine voids having minor differential stress. The underlying sandstone layer and /or adjoining SM layer may have a minor influence on the shear strain and volumetric patterns. However, the overall mine stability after back-filled fly ash suggests quite a stable condition for all the six profile sections which is reflected in the observed FoS. For such cases, the FoS varied between 1.5 (for the Section A-A) to 7.09 (for the Section B-B). The total and vertical deformation in most of the cases was observed to be zero after the backfilling of fly ash in the mine-out void area of the Minni OCM-Dry Patch of SECL.

XI. Optimization of controlled blast design parameters and monitoring of blast induced ground vibration during construction of Head Race Tunnel at Tapovan Vishnugad HEP, Uttarakhand.

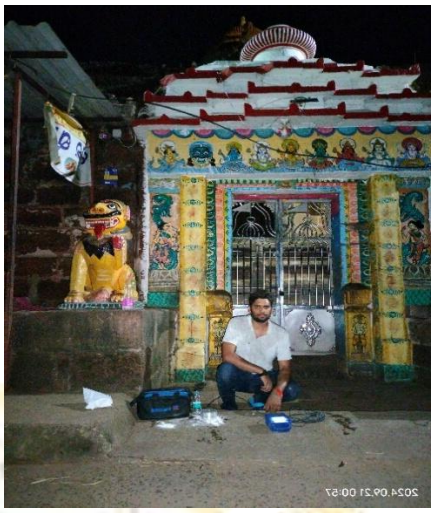
The Tapovan Vishnugad Hydro Power Project is a 520 MW run-of-river hydroelectric project being developed on the Dhauliganga River in Uttarakhand, India. The project is owned by NTPC (National Thermal Power Corporation). It is located in the Chamoli district and is designed to utilize a 518.50-meter drop in the river. Presently excavation of HRT is going on from three faces.The prevailing rock mass is QBS and it has been categorised as predominantly in poor rock mass class. The project became sensitive after appearance of crack in houses and other civil infrastructures of joshimath area.The proposed alignment of head race tunnel was passing below the joshimath town.

M/s HCC Mumbai requested CSIR-CIMFR RC Bilaspur for technical assistance Optimization of controlled blast design parameters and monitoring of blast induced ground vibration during construction of Head Race Tunnel at Tapovan Vishnugad HEP, Uttarakhand. CSIR-CIMFR team have optimized the blast design pattern for safe excavation in all three faces. A continuous supervision of blasting operations and monitoring of the blast induced ground vibration and air overpressure is carried out by CSIR-CIMFR team. So far more than 1.5 km from all the three faces have been completed safely.

XII. Investigation on Attenuation Characteristics and Damage Potential of Ground Vibration induced by Construction Equipment at Ekamra Kshetra Development Project, Bhubaneshwar, Orissa

The Ekmara Prakalpa Project is an ambitious initiative by the Government of Odisha to modernize the Ekamra Kshetra, the temple city of Bhubaneswar. During the construction, civil equipment such as breakers, excavators, rollers, and trucks (Hywa/Truck/Tipper)) are proposed for use. However, the operation of these heavy earth-moving machinery (HEMM) could generate ground vibrations that may pose risks to nearby sensitive and heritage structures. In response to this concern, the executing agency, OBCC, Bhubaneswar, requested the CSIR-Central Institute of Mining and Fuel Research (CSIR-CIMFR), Bilaspur (C.G.), to conduct a

scientific study to evaluate and assess the damage potential of ground vibrations induced by the proposed civil construction equipment.



Vibration monitoring at Ananta Vasudeva Temple during field investigation at project site

CSIR-CIMFR team carried out extensive field investigations at the Lingaraj Temple Project site in Bhubaneswar. Vibration monitoring was conducted using five sets of tri-axial seismographs. During the site visit, it was identified that the major. Field experiments were performed to monitor ground vibrations induced by construction equipment in use included a single-drum roller, backhoe excavator, JCB with an attached hydraulic breaker, and Hyawa trucksduring various activities. A specific recommendation of safe minimum operating distance for various construction equipment is recommended to be used at project site. Further, it is recommended that during construction monitoring of the temple structures shall be carried out for any deformation due to various unforeseen conditions.

ROORKEE RESEARCH CENTRE

Geotechnical Engineering & Underground Space Utilization Group

The primary focus areas of R&D and consultancy at the Centre include the application of engineering geology, rock mechanics, and mining technology in tunnelling, mining, and underground space development across the country, particularly within the geologically complex Himalayan region. Owing to its achievements in these domains, the Centre was designated as a Centre of Excellence in Underground Space Technology in 2002. Since 2016, it has been functioning as the Geotechnical Engineering and Underground Space Utilisation Group.

The CSIR-CIMFR Roorkee Research Centre currently comprises three scientists, one technical officer, and one support staff member. Despite its compact team size, the Centre has consistently met expectations associated with projects of national importance.

The Centre has been actively engaged in research and development to address tunnelling challenges in geologically difficult terrains. Notably, it has developed indigenous technologies for:

I. Predicting ground behaviour and determining appropriate tunnel support systems prior to construction, and

II. Cost-effective and safe rock excavation methods, aiming to minimize over-break and reduce damage to the surrounding rock mass during tunnelling.

These technologies, developed by CSIR-CIMFR, are now being effectively utilized in tunnelling projects across highway, railway, and hydropower sectors particularly in the Himalayan region and other geotechnically sensitive parts of India. Continuous refinement of these technologies has been made possible through experience gained from various high-risk and complex tunnelling assignments.

In addition, the Roorkee Centre is actively contributing to slope stabilization works in infrastructure projects of national significance, thereby strengthening its role as a vital contributor to India's geotechnical and tunnelling landscape.

Major Project:

1. **Study on stability of tunnels T-8 to T-16 during construction stage in connection with Bhanupali-Bilaspur-Beri New BG Railway Line Project of RVNL Chandigarh**

CSIR-CIMFR is providing technical expertise to RVNL in the design and construction of Tunnel Nos. T-8 to T-16 (including an escape tunnel) as part of the Bhanupali–Bilaspur–Beri (BBB) New Railway Line Project, situated in the geologically challenging Himalayan region. This project involves extensive underground construction in some of the most complex subsurface conditions.

The scope of CSIR-CIMFR's consultancy and sponsored project works includes:

- Geotechnical field investigations
- Tunnel support design (Fig.1)
- Evaluation of adequacy of tunnel supports and submit the revised design
- Stress analysis of the portal slopes and entire tunnel alignment for the long-term safety and stability
- Selection of appropriate excavation methods (Fig.2)
- Design of drill and blast operations
- Supervision of instrumentation and monitoring of tunnels during construction and analysis of the monitoring data to assess the stability of various stretches of the tunnels.

Through its domain expertise, CSIR-CIMFR is contributing to the safe, stable, and efficient execution of one of the nation's key strategic railway, highway and hydro infrastructure projects.

Fig.1: Face advancing with pipe roofs at BBB in tunnel T14

Fig.2: Ongoing benching work after completion of heading in tunnel T16

2. Closed continuous monitoring by Scientific agency of all the excavation works, specifically high wall excavation at SP-III Project of Kirandul Complex, NMDC Ltd, Kirandul, South Bastar Dantewada

CSIR-CIMFR, Roorkee Centre, is providing geotechnical and geological support to NMDC at Kirandul through continuous geological mapping, rock mass characterisation, and qualitative risk assessments at key excavation sites.

The work includes examining existing geotechnical reports, conducting daily inspections, and preparing excavation plans based on strata conditions.

CIMFR advises on slope stability, earthwork methodology, and monsoon preparedness, while also overseeing geotechnical sampling and testing as per IS codes. Qualified geologists and engineers are deployed on-site for one year to ensure safe execution of excavation works (Fig.3-5). Regular monitoring and technical reporting are carried out, with provisions for scope modification as needed to ensure the safety and stability of slopes.

Fig. 3: View of the Tertiary Area where surface drainage is required at the top

Fig. 4: Rock nailing work at slope site

Fig. 5: Installed Geo Jute and plantation in a Slope area

RANCHI RESEARCH CENTRE

Ranchi Research Centre is one of the leading Scientific and Research Centre at CSIR-CIMFR, that undertakes various research projects on borehole coal core analysis, party sample analysis, their sample preparation, quality analysis, quality monitoring, as per the IS standard and Fuel Supply Agreement (FSA) to improve the quality of life towards power utilization in India. The center plays a key role in the coal mining and power sector to support Indian Government. The center fosters partnerships with a network of coal mining and power plants, nationally on matters of continuous coal quality analysis.

During the financial year **2024-2025**, CSIR-Central Institute of Mining and Fuel Research, Research Centre, involved and fully dedicated to quality assessment of the borehole coal core received from various drilling agencies like Mining Associate Pvt. Ltd, APC Drilling, and Construction Pvt. Ltd, Thriveni Earthmovers Pvt. Ltd,

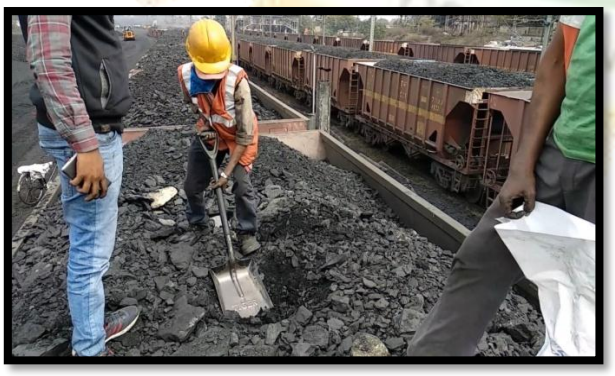
South West Pinnacle and Central Mine Planning & Design Institute (CMPDI) of various parts of Jharkhand, Odisha, Chhattisgarh, West Bengal, Maharashtra, Madhya Pradesh, and the coal fields namely Rajmahal (Bhalukasba, Mirzagaon), Raniganj (Kabitirtha, Lalgang, Shunuri, Itapara south, Jhanjra, Hingula,), Birbhum (Salbhadra Gomarpharil), East Bokaro (Chalkari Extension Angawali, Pichri), Auranga (Rajbar), IB Valley (Rampaia Dip Extn), Sohagpur (Chainpa, Shahdol, Jamui), Singrauli (Hatta Dhudhmania, Bandha North) and North Karanpura (Badam dip side, Dhadhu East), South karanpura (Sayal D), Jharia (kharkharee, Madhuband).

During this financial year total **3661.25 meters (886)** boxes coal core has been received and around **3029** nos. samples has generated for band-by-band analysis as per the advice. Based on band-by-band results, we have received seam-over analysis advice from the client and generated **987** samples for SOV and **760** samples for GCV analysis. Special test significant quantity for the same boreholes, Ultimate Analysis (75 samples), Distribution of sulfur (76 Samples), Ash Fusion Temperatures (76 samples), Ash Analysis (76 samples), Hardgrove Grindability Index (76 samples), Petrographic Test (75 Samples), LTGK coke type (47 samples), swelling index (47 samples), carbon % Test (136 Samples), Phosphorus (76 Samples), Total Sulphur (64 Samples).

Based on CSIR-Central Institute of Mining and Fuel Research analytical data the coal resources and reserve estimation has been calculated and ore body modeling will be made by concerned mining companies. These reserve estimation and ore body modeling will be more effective to prepare mining schemes and mining plans in mining industries. And the special test analytical data will be used in power plants and steel plants for smooth functioning plants and to enhance the production in the power sector as well as steel industries.

CSIR-CIMFR, Ranchi also provides consultancy services to government and private organizations by analysis of coal samples received from different parties namely CCO Ranchi, Adani Enterprises Pvt. Limited, Coal Controller, Jharkhand Ranchi, NTPC Ltd. Tanda M/s Brahmaputra Metallics Ltd, Monnet Daniel Coal Washeries Ltd; Dakra Ranchi, M/S NTPC Dadri, Chief Chemist/Coal Punjab State Power Corp. Ltd., Vimul Dugdha Utpadak, Bhagalpur, DGM (O & M -Chemistry) NTPC Limited. Sholapur STPS, AGM (Chemistry) NTPC Limited, Unchahar, Raibareli UP , AGM (Chemistry) NTPC Khalgaon, STPP, PO:-Kahalgaon STPP Deepti nagar, Bhagalpur, Barh STPP, NTPC Bhawan, Patna, Bihar and Bihar State Milk Co. Foundation, Ranchi, etc. which helped them the proper economic way of production and utilization of coal.

Ranchi Research Centre is well equipped with adequate infrastructure for testing and analysis of coal and providing services to various Industries. The sophisticated facilities available are Proximate Analysis of both Air dried & 60% RH & at an equilibrated basis, Determination of Moisture and Ash both AD & Equilibrated, AFT (Ash Fusion Temperature Range), CHNS & CHNSO, Direct Determination of Sulphur, Determination of Phosphorus % (by conventional method), Ash Analysis by using WD-XRF, Swelling Index SI, LTGK Type (Low Temperature Grey King Assay), Distribution of Sulphur etc.



Sample Collection and Preparation

Sample Collection and Preparation

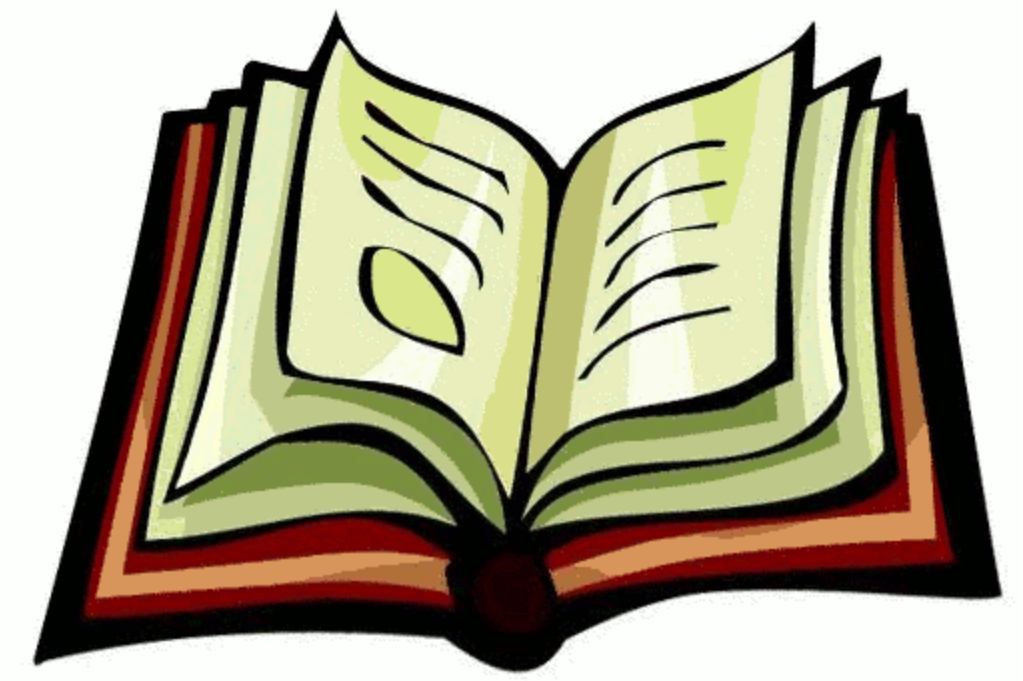
Automatic GCV Determination

Dual Furnace Proximate Analyzer

Coal Core logging

Automatic CHNSO Analyzer

LIST OF PROJECTS



LIST OF PROJECTS

GRANTS-IN-AID (GAP) PROJECTS

Sl. No.	*Title*	*Sponsors Name and Address*	*Project Leader*
1	Preparation of Fugitive Emission Inventory for Coal Mining and Handling Activities and Oil & Natural Gas Systems in India	Ministry of Environment, Forest and Climate Change	Dr. D. Mohanty
2	Investigation on in situ gasification kinetics to assess the syngas quality, cavity growth and, it's possible impact on groundwater for varying geologic conditions	Anusandhan National Foundation (ANRF), Science and Engineering Research Board (SERB)	Dr. D. Mohanty, Dr. Pallabi Das
3	Development and investigations of new chemical compositions to control the dust emission during blasting operation	Anusandhan National Research Foundation	Dr. Firoj Ali Dr. Vivek Kumar Himanshu
4	Investigations Towards Mitigation of the Problem of Acid Mine Drainage in India	Anusandhan National Research Foundation	Dr. Pallabi Das
5	Study on post-mining accelerated reclamation in coal mining area using soil microbial community	Central Mine Planning and Design Institute Limited	Dr. Siddharth Singh, Dr. Sudarshan Singh Rathore
6	An online system for classification and analysis of dispatched iron ore lumps and fines using computer vision and machine learning.	TEXMin Foundation IIT (ISM), Dhanbad	Dr.S.K. Chaulya
7	Determination of Coal Consumption for India Coal Gasification Projects	Ministry of Coal Government of India, New Delhi	Dr. Arti Sahu

SPONSORED PROJECTS (SSP)

Sl. No.	*Title of the Project*	*Sponsor*	*Project Leader*
1	Scientific study for gas potentiality, reservoir characteristics, petrographic and chemical analysis of borehole coal cores from Dhirauli Coal Block, Singrauli Coalfield, Madhya Pradesh.	Stratatech Mineral Resources Private Limited Village Jhalari, Tahsil Sarai Dhirauli, Singrauli, Madhya Pradesh- 486886	Dr. Vinod Atmaram Mendhe
2	Scientific study on Paste Fill at RDM, Dariba, HZL	Hindustan Zinc Limited RD Mines, Dariba Rajsamand, Rajasthan- 313211	Prashant, Dr. S. K. Behera, Dr. Sujit Kr. Mandal
3	Slope Stability Monitoring and analysis of RMP- 4 dump of Hindalco industries Ltd. Muri Works.	Hindalco Industries Limited Muri Works, Post- Chota Muri, District: Ranchi Pin- 835101	Dr. Sanjay Kumar Roy, Anand Singh
4	Scientific Study and advice for determination of controlled blasting patterns to work within 100-300 m of residential structures and railway line as well as use of Site-Mixed Emulsion explosives in the blasting operations at Mukutban Limestone and Dol omite Mine of M/s. RCCPL Pvt. Ltd., Dist- Yavatmal, Maharashtra.	RCCPL Private Limited Mukutban Cement Plant, Post- Mukutban, Taluka- Zari-Jamni, District- Yavatmal, Pin- 445319, Maharashtra	R. K. Singh, Dr. Narayan Kr. Bhagat, Dr. C. Sawmliana
5	Scientific study for assessing the suitability of 100% bottom ash for hydraulic stowing in underground working of Chasnalla Colliery.	Steel Authority of India Ltd GM/IC (P &&CC), Centralised Collieries Contract Cell, B- 1 Bungalow, CCWO Colony, Saraidhela, Dhanbad- 828127, Jharkhand	Kanhaiya Mishra, Dr. S. K. Behera, Dr. Sujit Kr. Mandal
6	Scientific Study on Slope Monitoring of Dumps and Pit Slope of Gare Palma- III Mine.	Gare Pelma- III Collieries Ltd. Near- Milupara Banjari Mandir, Khamhariya, Tamnar, District- Raigarh, Chhattisgarh- 496107	Anand Singh, Prince Kumar, Dr. Sanjay Kumar Roy
7	Hydrological study of Gangaramchak && Gangaramchak-Bhadulia coal mine, Birbhum District, West Bengal.	Gangaramchak Mining Private Limited 15C, Chakraberia Road (N), Ground Floor, District- Kolkata, West Bengal, Pin- 700020	Dr. Gautam Chandra Mondal, Dr. Abhay Kumar Singh
8	Scientific study for Ventilation design for Kheratarla underground Mine of Wolkem Industries Limited.	Wolkem Industries Limited E- 101, Mewar Industrial Area, Madri, District- Udaipur Pin- 313003 Rajasthan	Debashish Mishra, Dr. Santosh Kr. Ray, Dr. J. K. Pandey
9	Safety and feasibility study for backfilling fly ash in the mine	Jaiprakash Power Ventures Limited	Sandip Oraon, Anand Sharma,

	voids of the Amelia (North) Coal Mine, Singrauli, MP.	Complex of Jaypee Nigrie Super Thermal Power Plant, Nigrie, Tashsil-Sarai, District- Singrauli, Madhya Pradesh, Pin- 486669	Dr. Sujit Kr. Mondal
10	Subsidence investigation over depillaring panels at Tata Steel Collieries of Jharia Coalfied for safety of surface structures during the year 2022.	M/s.Tata Steel Limited Sr. Manager (Purchase and Store), Jamadoba, Tata Steel Ltd., PO- Jamadoba, District-Dhanbad, Pin- 828112	Dr. Amar Prakash, Dr. Sujit Kr. Mondal
11	Scientific study to analyze blast-induced ground vibrations at Boulder Stone Quarry at Laitkynsew Village, Raid Mawliesh, East Khasi Hills, Meghalaya (Total Lease Area-1.279 Ha)	Khrikshon Lyngkhoi K L Complex Demseiniong, Laitumkhrah, Demsein Long, Shillong, East Shillong Meghalaya - 793003	Dr. Narayan Kr. Bhagat, Rakesh Kr. Singh, Dr.C. Sawmliana
12	Environmental Study on impact of mine void filling with ash and mixing of fly ash to an extent of 25% with external dump at NTPC Talaipalli Coal Mine Project, Raigarh, Chhattisgarh	NTPC Ltd. Mr. Veera Suresh Rabba, DGM (C&M), 1071, Talaipalli Coal Mining Project, Lailunga Road, Gharghoda, Raigarh Chhattisgarh - 496111	Dr. Apurba Sinhamahapatra, Dr. Abhay Kumar Singh
13	Feasibility study for mine void filling with 25% ash in dumps of TLCMP, NTPC	NTPC Ltd. Mr. Veera Suresh Rabba, DGM (C&M), 1071, Talaipalli Coal Mining Project, Lailunga Road, Gharghoda, Raigarh Chhattisgarh - 496111	Prashant, Dr. Sujit Kr. Mondal
14	Instrumentation Scheme and monitoring of backfilling of stope blocks of Mahagiri Mines (Chromite), M/s IMFA Ltd.	Indian Metals & Ferro Alloys Limited IMFA, Sukinda, Jajpur Odisha - 755047	Prashant, Dr. S. K. Behera, Dr. Sujit Kr. Mondal
15	Study of different coal characteristics of X Seam of Bhelatand-A Colliery, Tata Steel Ltd. to assess the incubation period	Tata Steel Limited Bhelatand A Colliery, P.O.-Bhelatand Dhanbad - 828103	Dr. Jitendra Pandey, Dr. Santosh Kr. Ray
16	Rock Mass Rating (RMR Study) at purunga Coal Block, Mand Raigarh Coalfield, Chhattisgarh	CG Natural Resources Pvt. Ltd. Behind C R Heights, Opp Basant Filling Station, Kharsia Road, Ambikapur Chhattisgarh - 497001	Dr. Avinash Paul, Dr. Arun Kumar Singh
17	Rock Mass Rating (RMR Study) at Gondbahera Ujheni Madhya Pradesh	MP Natural Resource Private Limited Survey No. 1992-2-2, Daga, Bargawan Singrauli Madhya Pradesh - 486886	Dr. Avinash Paul, Dr. Arun Kumar Singh

18	Rock Mass Rating (RMR Study) at Bijahan Coal Block, Odisha, MMMPL, Odisha	Mahanadi Mines and Minerals Private Limited HIG-20, BDA Colony, Jayadev Vihar, Bhubneshwar, Kordha, Odisha - 751013	Dr. Avinash Paul, Dr. Arun Kumar Singh
19	Assessment of the success of Tree Plantation in ECL created over 1003.87 Ha in the last 10 years	Eastern Coalfields Limited (A Subsidiary of Coal India Ltd) General Manager (Environment & Forest), Borachak House, Post - Sitarampur Paschim Bardhaman, West Bengal - 713359	Dr. Siddharth Singh, Dr. Bhanu Pande, Dr. Shailendra Kr. Singh
20	Scientific study and designing of blasting pattern for optimum fragmentation along with contrulling blast vibration as per regulation 194 of CMR-2017 and optimizing the efficacy of explosive energy at Quarry AB coal mine of West Bokaro Division of Tata Steel Limited	Tata Steel Limited West Bokaro, Ghatotand Ramgarh, Jharkhand - 825314	Dr. Vivek Kumar Himanshu, Dr. Firoj Ali, Dr. C. Sawmliana
21	Safety and Performance studies of Non-explosive High voltage initiator for Non-Electric detonator (Shock Tube Initiation system) jointly develop by M/s Visvesvaraya National Institute of Technology (VNIT) and M/s AMA Commercial India Pvt. Ltd. Nagpur Maharashtra.	Visvesvaraya National Institute of Technology (VNIT) South Ambazari Road, Nagpur Maharashtra - 440010	Arvind Kumar, Dr. C. Sawmliana
22	Safety and Performance studies of shock tube initiator 'Super Shot' developed by M/s Solar Industries India Limited	Solar Industries India Limited Solar House 14, Kachimet, NH-06 Nagpur Maharashtra - 440023	Arvind Kumar, Dr. C. Sawmliana
23	Scientific study and advice for sleeping of explosive charged holes in blasting face at Pakri Barwadih Coal Mining Project, NTPC, Hazaribagh	Thriveni Sainik Mining Private Limited NTPC Pakri Barwadih Mines (6001-Mines), C/o NTPC Limited, Langatu, P.O. - Barkagaon, Hazaribag, Jharkhand - 825311	Arvind Kumar, Dr. C. Sawmliana
24	Design of controlled blasting patterns for the construction of plunge pool in the immediate downstream side of Bichom dam, Kameng Hydroelectric project of M/s NEEPCO Limited, Arunachal Pradesh	North Eastern Electric Power Corporation Ltd. (NEEPCO) 1st Floor, NEEPCO Bhawan, R.G. Baruah Road, Sundarpur, Guwahati, Kamrup Assam - 781005	Dr.C. Sawmliana, Prof. A. K. Mishra
25	Study and evalution of trial blast with SME explosives to obtain permission from DGMS under Regulation 155(1) & 162 (5) of	Steel Authority of India Ltd SAIL-RSP-Bolani Ores Mines General Manager (CC), Bolani Ores Mines,	Dr. R. K Paswan, Dr. C. Sawmliana

	MMR, 1961 at Bolani Ores Mines of M/s Steel Authority of India Limited (SAIL) and subsequent optimization of blast design parame ters to improve safety and productivity.	Rourkela Steel Plant, Keonjhar, Odisha - 758037	
26	EC Compliance study in Cluster VIII group of mines of BCCL	M/s Bharat Coking Coal Ltd. Bastacolla Area PO-Jharia, Dist-Dhanbad, Jharkhand - 828111	Dr. Bhanu Pandey, R. K. Singh, Dr. Siddharth Singh
27	Scientific Investigation on the degree of gassiness of the coal seam X of Bhelatand A. Colliery, Jharia, TATA Steel Ltd and advice on associated hazards	Tata Steel Limited The Manager Bhelatand A. Colliery, Jharia, Tata Steel Limited, Jharia Collieries Jamadoba, Dhanbad, Jharkhand - 828112	Jaywardhan Kumar, Dr. Vinod Atmaram Mendhe
28	Assessment of geochemical properties of coal and shale for CBM/Shale gas potentiality evaluation in the Jharia Baisn of Jharkhand and Pranhita Godavari Basin	Geological Survey of India The Deputy Director General Natural Energy Resources (NRnR), Mission - IIB, GSI, DK-06, Sector II, Salt Lake City, Kolkata, West Bengal - 700091	Dr. Vinod Atmaram Mendhe
29	Slope Stability Study and Monitoring of Pit at Malanjkhand Copper Project, Hindustan Copper Limited with reference to Safety and Stability.	M/s Hindustan Copper Limited Manager/DGM Mines, Malanjkhand Copper Project, Malanjkhand Balaghat Madhya Pradesh - 481116	Anand Singh, Dr. Sanjay Kumar Roy
30	Review of Geological Model and verification of the Annual Production Plan of Manoharpur Coal Mine Project for financial year 2024-25, 2025-26 & 2026-27	Odisha Coal and Power Limited Zone A, Ground Floor, Fortune Towers, Chandrasekharpur, Bhubaneswar Odisha - 751025	Anand Sharma, Sandip Oraon
31	Scientific study of ground vibrations geneated by blasting of seismic explosives/vibroseis during seismic survey and determination of influence zones for nearby structures at different seismic exploration sites of Oil India Limited (OIL)	Oil India Limited CGM Geophysics (HOD), Geophysical Department, OIL, P.O. Duliajan Dist. Dibrugarh, Assam - 786602	Dr.C. Sawmliana, Arvind Kumar, Prof. A. K. Mishra
32	Scientific study and advice for the use of plasma rock fracturing technique in the Powerhouse and Penstock area of 9MW Garudeshwar Weir Project and continuous monitoring of blast vibration in Proximity to the Retaining Wall to ensure greater safety	M/s P&R Infraprojects Limited 9MW Small Hydro plant Rajpipla Road, Indravana, Vadodara, Gujrat - 393151	Suraj Kumar, Dr. Murari Prasad Roy
33	Investigation on methane emission for classification of degree of gassiness of coal seam II	Ambuja Cement Limited Head Office Admin Procurement	Jaywardhan Kumar, Dr. Vinod Atmaram Mendhe

	of Gare Palma IV/8 coal mine of Ambuja Cement Limited at Raigarh and advice on associated gas hazards	Gare Palma IV/8 Coal Mine Village Karwahi Post Saraitola Raigarh Chhattisgarh - 496107	
34	Scientific study for ventilation investigation and planning of Ambuja Cements Limited (ACL) Dahegaon Gowari Coal Block	Ambuja Cements Limited Unit Maratha Cement Works, P.O. - Upparwahi, Tah-Korpana, Godchanpur, Chandrapur Maharashtra - 442908	Debashish Mishra, Dr. Niroj Kr. Mohalik, Dr. Santosh Kr. Ray
35	Scientific Study on the Detonation Properties of Site Mixed Emulsion (SME) Explosive of M/s Hiralal Industries Private Limited.	Hiralal Industries Private Limited 4th Floor, Karni Heights, Club Road Ranchi Jhakhand - 834001	Dr. Firoj Ali, Arvind Kumar, Dr. C. Sawmliana
36	Scientific studies of SME, LDC explosives and accessories used for blasting in OB removal of opencast coal mines of SCCL.	The Singareni Collieries Company Limited General Manager (R&D), Kothagudem Collieries Khammam Telangana - 507101	Arvind Kumar, Dr. Firoj Ali, Dr.C. Sawmliana
37	Scientific study on controlled blasting patterns, blast-induced ground vibration, flyrock, air overpressure at Khatkurbahal North Block Limestone & Dolomite Mines	Shiva Cement Limited Village - Telighana, PO - Birangatoli, Tehsil - Kutra, Sundargarh, Odisha - 770018	Dr. Narayan Kr. Bhagat, R. K. Singh, Dr. C. Sawmliana
38	Scientific Study to Determine the Geo-Technical Parameter of Paste Fill Being Used at Malanjkhand Copper Project, Balaghat	Hindustan Copper Ltd. Lalit Mohan Joshi, Chief Manager, Contract Cell, M & C Dept. Malanjkhand Project, HCL, Balaghat Madhya Pradesh - 481116	Prashant, Dr. Sujit Kr. Mondal
39	Volumetric measurement of opencast excavation of Khanak stone mine at Khanak using Laser Technology for the year 2024	HSIIDC, Development Corporation Ltd. Panchayat Bhawan Khanak, Haryana - 127040	Dr. Amar Prakash, Dr. Sujit Kr. Mondal
40	Assessment of danger of inundation to Jitpur colliery from different underground sources	Steel Authority of India Ltd. Sail Collieries Division, Jitpur colliery Dhanbad Jharkhand - 828309	Anand Sharma, Dr. Abhay Kumar Bharti
41	Scientific Study of Explosives and Blasting Accessories to Enhance Production and Productivity With Greater Safety at OMQ, Tata Steel	Tata Steel Limited General Manager (OMQ), M/s Tata Steel Limited, West Singhbhum, Noamundi, Jharkhand - 833217	Dr. Firoj Ali, Arvind Kumar, Prof. A. K. Mishra
42	Study and advice for blast desgn parameters optimization at Kayad under-ground mines of Hindustan Zinc Limited for the safety and stability of surface structures/dwellings of Kayad village and subsequent continuous monitoring of	M/s Hindustan Zinc Limited (Kayad UG Mine) Manager (Finance), Kayad UG Mine Hindustan Zinc Limited Kayad Ajmer Rajasthan - 305023	Dr. Murari Prasad Roy, Prof.A. K. Mishra

	vibration for their lo ng-term stability		
43	Scientific investigation on in-situ gas content, degree of gassiness and assessment of methane drainage potential at Lamatola coal block, Madhya Pradesh	Mining Tech Consultancy Services Limited Mining Tech CNSTNY SRVL First Floor, Admin Building Gram Bandhaura, Post-Karsua, Lal Singrauli Madhya Pradesh - 486886	Jaywardhan Kumar, Dr. Vinod Atmaram Mendhe
44	Quarterly measurement of coal, overburden quantity and determination of stripping ratio at Manoharpur Coal Mining project of Odisha Coal and Power Limited for three financial years	Odisha Coal and Power Limited Zone A, Ground Floor, Fortune Towers, Chandrasekharpur, Bhubaneswar Odisha - 751025	Dr. Amar Prakash
45	Scientific Study for OGL/Part Initial Surveys at Dulanga Coal Mining Project of NTPC using Terrestrial 3-D Laser Scanner and Associated Softwares.	NTPC Limited 1070, Dulanga Coal Mining Project, Dulanga, Sundergarh Odisha - 770001	Aniket Verma, Kartik Varwade, Dr. Sanjay Kumar Roy
46	Scientific study for Part Final Surveys at Dulanga Coal Mining Project of NTPC using Terrestrial 3-D laser scanner and associated softwares.	NTPC Limited 1070, Dulanga Coal Mining Project, Dulanga, Sundergarh Odisha - 770001	Aniket Verma, Anand Singh, Dr. Sanjay Kumar Roy
47	Scientific Study for Annual Reconciliation Survey of Overburden Excavation Volume of Dulanga Coal Mining Project of NTPC using Terrestrial 3-D Laser Scanner and Associated Softwares.	NTPC Limited Natonal Thermal Power Corporation Limited Dulanga Coal Mining Project, Dulanga, Sundergarh Odisha - 770001	Aniket Verma, Kartik Varwade, Dr. Sanjay Kumar Roy
48	Scientific study design of support system for "Drivage of 2 Nos. Incline, sinking of return Air-Shaft and associated development works at Gondkhari U/G Coal Mine	Adani Power Limited 14/12, Khasra No 101/159, Plot No 11-G, Mhada HIG Colony, Amravati Road, Waddhamana Nagpur Maharashtra - 440023	Niraj Kumar, Dr. Prabhat Kumar Mandal
49	Scientific investigation on in-situ gas content, degree of gassiness and assessment of methane drainage potential at Purunga coal block, Chhattisgarh	CG Natural Resources Pvt. Ltd. Behind C R Heights, Opp Basant Filling Station, Kharsia Road, Ambikapur Surguja Chhattisgarh - 497001	Jaywardhan Kumar, Dr. Vinod Atmaram Mendhe
50	Scientific study of blast-induced ground vibrations at Aditya Limestone Mine of M/s Ultratech Cement Limited (Unit: Aditya Cement Works), Shambhupura, Chittorgarh, Rajasthan.	Ultatech Cement Limited Aditya Cement Works, Adityapuram, Shambhupura Chittorgarh Rajasthan - 312662	Dr. Aditya Rana, Dr. C. Sawmliana
51	Scientific Study for flattening of southern portion of Ulwe hill by extracting rock using controlled	M/s CIDCO Maharashtra Limited, 2nd Floor CBD,	Dr. Murari Prasad Roy, Dr. C. Sawmliana

	blasting for the area development in Pushpak Node to the south of Navi Mumbai International Airport (NMIA) and flattening of balance portion of Ulwe h ill in the NMIA core area.	Belapur, Navi Mumbai Maharashtra - 400614	
52	Scientific study for controlled blasting at Takli Jena, Chandrapur coal mine project of M/s Auro Infra Private Limited, Chandrapur, Maharashtra	M/s. Auro Infra Private Limited H.No. 525, Ganesh Nagar, SH 261, Reliance Digital Express Mini, Nirman Nagar, Chandrapur Maharashtra - 442404	Amar Prakash Kausik, Dr. Vivek Kumar Himanshu
53	Scientific study for utilization of Fly Ash, Washery Reject Stag in Mines Void along with the Overburden Material at Gare Pelma IV/1 and Gare Pelma IV/2 &3 Coal Mine.	M/s Jindal Power Limited Kavita Gupta Vill-Dongamouha, Raigarh, Chattisgarh-496108	Prashant
54	Slope stability monitoring study of pit and dump by analysis of ground movement data of Sukinda Mines (Chromite), IMFA Ltd.	Indian Metal and Ferro Alloys Limited Sukinda Mines Chromite, Kaliapani, Jajpur Odisha - 755028	Rakesh Kr. Singh, Anand Singh, Dr. Sanjay Kumar Roy
55	Scientific study for performance evaluation of 51mm diameter Multi strand steel type winding rope suitable for winding and man-riding haulages for underground mines as per different relevant Indian standards.	M/s Maco Corporation (India) Pvt. Ltd. 2/5, Sarat Bose Road, Sukhsagar, 7th Floor, 7A, Kolkata West Bengal - 700020	Dr. Mousumi Mallick, Dr. Bhagirath Ahirwal,
56	Slope Stability Monitoring and analysis of RMP-4 dump of Hindalco Industries Ltd. Muri Works	Hindalco Industries Limited Hindalco Industries Limited, Muri Works, Post-Chota Muri Ranchi Jharkhand - 835101	Dr. Sanjay Kumar Roy, Anand Singh, Dr. Sanjay Kumar Roy
57	Assessment of Slope Stability of Pit, Waste Dump and Ground Movement of Rampur Agucha Mine of M/s Hindustan Zinc Limited	Hindustan Zinc Limited Yashad Bhavan, Udaipur Rajasthan - 313004	Manish Kumar, Dr. Sanjay Kumar Roy,
58	Scientific Study To determine the suitable backfilling method for Ambaji Underground mine and scope of using waste rock, aggregate and marble waste as mine backfill material.	Gujarat Mineral Development Corporation Limited Khanij Bhavan, 132 Ft Ring Road, Near University Ground, Vastrapur Ahmedabad Gujarat - 380052	Prashant, Dr. S. K. Behera
59	Evaluation of desorbed gas composition, geochemical, petrographic and other properties of coal/rock core samples for CBM exploration and resource assessment at Jharia CBM Block-1	Prabha Energy Private Limited 4th Floor, Rishabh Complex, Ashok Nagar, Ranchi, Jharkhand-834002	Jaywardhan Kumar, Dr. Vinod Atmaram Mendhe

60	Scientific investigation on gas desorption, and in-situ gas content for degree of gassiness of coal seams at Mahan Coal Mine, Madhya Pradesh.	JK Cement Limited Harduwaken, Tehsil-Amanganj, 0, Panna, Madhya Pradesh, Madhya Pradesh-488441	Dr.D. Mohanty, Dr. Vinod Atmaram Mendhe,
61	Scientific study and designing of controlled blasting pattern for deep hole blasting as per regulations 194 and 196 (3) of CMR-2017 at Kotre-Basantpur and Pachmo Coal mine.	KBP Mining Private Limited Qtr No. D-3, Kedla Officers colony, P.O; Kedla Nagar Ramgarh Jharkhand - 825325	Dr. Vivek Kumar Himanshu, Dr. A. K. Viswakarma, Dr.C. Sawmliana
62	Scientific study for the evaluation of incendivity properties, deflagration properties, velocity of Detonation and Continuation of Detonation properties of newly developed permitted explosive P5 type (Supremecoal-5) for use in Australian underground c oal Mines.	Solar Industries India Limited Solar House 14, Kachimet, N.H- 6, NagpurMaharashtra 440023	Arvind Kumar, Dr.C. Sawmliana
63	Study of different coal characteristics of VII and VIII Seam of Mahan Coal Block, Singrauli Madhya Pradesh to assess the incubation period	J K Cement Limited Mahan Coal Block Singrauli Madhya Pradesh - 486886	Dr. Niroj Kr. Mohalik, Dr. Santosh Kr. Ray
64	Geochemical analysis of coal cores retrieved from borehole drilled at Mahan Coal Mine, Singarauli, Madhya Pradesh	J K Cement Limited Harduwaken, Tehsil - Amanganj, O, Panna Madhya Pradesh - 488441	Jaywardhan Kumar, Dr. Vinod Atmaram Mendhe
65	Monitoring of Air Quality in Non-Monsoon Period at Identified Locations of Kenda Area (ECL), both ambient and the process area, to arrive ar the impact of proposed changes in the Cluster No.11	Eastern Coalfields Limited (A Subsidiary of Coal India Ltd.) Office of the General Manager, Kenda Area, Environment Department, Post-Haripur Paschim Bardhaman West Bengal - 713378	Dr. Bhanu Pande, Dr. Ranjeet Kr. Singh, Dr. Siddharth Singh
66	Scientific study for first quarterly survey of overburden excavation volume of Pakri Barwadih Coal Mining Project of NTPC using Terrestrial 3-D laser scanner and associated softwares	N.T.P.C Limited Barwadih/Kerendari/Chatti Bariatu, Pakri Barwadih, Sikri Site Office, P.O. Barkagaon, Hazaribagh Jhakhand - 825311	Dr. Amar Prakash, Dr. Sanjay Kumar Roy
67	Scientific study for second quarerly survey of overburden excavation volume of Pakri Barwadih Coal Mining Project of NTPC using Terrestrial 3-D laser scanner and associated softwares	N.T.P.C Limited Barwadih/Kerendari/Chatti Bariatu, Pakri Barwadih, Sikri Site Office, P.O. Barkagaon, Hazaribagh Jhakhand - 825311	Dr. Amar Prakash, Dr. Sanjay Kumar Roy
68	Scientific study for third quarterly survey of overburden excavation	N.T.P.C Limited Barwadih/Kerendari/Chatti	Dr. Amar Prakash, Dr. Sanjay Kumar Roy

	volume of Pakri Barwadih Coal Mining Project of NTPC using Terrestrial 3-D laser scanner and associated softwares	Bariatu, Pakri Barwadih, Sikri Site Office, P.O. Barkagaon, Hazaribagh Jhakhand - 825311	
69	Scientific study on survey of five de-coal (part final) patch of Pakri Barwadih Coal Mining Project of NTPC usin Terrestrial 3-D laser scanner and associated softwares	N.T.P.C Limited Barwadih/Kerendari/Chatti Bariatu, Pakri Barwadih, Sikri Site Office, P.O. Barkagaon, Hazaribagh, Jhakhand - 825311	Dr. Amar Prakash, Dr. Sanjay Kumar Roy
70	Scientific study for quarterly survey of overburden excavation volume, OGL survey and decoal survey of Pakri Barwadih Coal Mining Project of NTPC using Terrestrial 3-D laser scanner and associated softwares	N.T.P.C Limited Pakri Barwadih, Sikri Site Office, P.O. Barkagaon, Hazaribagh Jharkhand - 825311	Dr. Amar Prakash, Dr. Sanjay Kumar Roy
71	Study on the impact of blast-induced ground vibrations due to blasting operation at Sindesar Khurd Underground Mine of M/s Hindustan Zinc Limited on the residential houses/structures of Sindesar Khurd village resulting from continuous monitoring.	Hindustan Zinc Limited (Sindesar Khurd Mine) Head Office - Yasad Bhawan, Udaipur Rajasthan - 313001	Dr. Murari Prasad Roy, Dr.R. K Paswan, Prof.A. K. Mishra
72	Safety and Feasibility Study of Dumping Fly Ash in the Excavated Voids of Three Mines of Mn. Group of Mines, Tata Steel	Tata Steel Limited Head (Planning), FA and MD. Tata Steel, AT/P.O. Bichhakundi, Via - Joda Keonjhar Odisha - 758034	Prashant
73	Rock Mass Rating (RMR Study) at Lamatola Coal Block, Sohagpur coalfield, Madhya Pradesh.	Mining Tech Consultancy Services Limited First Floor, Admin Building Gram, Bandhaura, Post Karsua Lal Singrauli, Madhya Pradesh - 486886	Dr. Avinash Paul, Dr. Arun Kumar Singh
74	Scientific Study for detrmnation of density of drill core coal samples from Pakri-Barwadih Coal Mining Project of NTPC Limited, Hazaribagh, Jhakhand	NTPC Limited 1040 Pakri Barwadih CMP, Sikri Site Office, P.O. Barkaga, Hazaribagh Jharkhand - 825311	Pappu Rabidas, Dr. Saurav Rukhaiyar, Dr. John Buragohain
75	Investigation of the detonation behavior and incendivity properties of P1 emulsion permitted (IDEAL COAL I) Explosive for use in underground coal Mines.	IDEAL Industrial Explosives Limited 2nd Floor, Ideal Towers, Opp. Bhel Enclave, Akbar Road, Tadbund, Secunderabad, Hyderabad, Telangana - 500009	Arvind Kumar, Dr. Firoj Ali, Dr. C. Sawmliana
76	Scientific study on Fly Ash - Bottom Ash dumping at Jamkhani OC Coal Mines of M/s Vedanta	Dhansar Engineering Company Private Limited Surya Auto Campus, Surya Auto Campus,	Prashant

	Ltd. IB Valley CF, Sundergarh, Odhisa	Dhansar Dhanbad Jhakhand - 828106	
77	Scientific study on impact of fly ash dumping on water resources at Jamkhani open cast coal mine of M/s Vedanta Limited, Ib Valley, Sundergarh, Odisha.	Dhansar Engineering Company Private Limited Surya Auto Campus, Surya Auto Campus, Dhansar Dhanbad Jharkhand - 828106	Dr. Gautam Chandra Mondal, Dr. Abhay Kumar Singh
78	Scientific study of solid blasting using delay detonators in Kalidaspur Project, Satgram-Sripur Area, Eastern Coalfields Limited (ECL), Paschim Bardhman, West Bengal	Eastern Coalfields Limited (ECL) Office of CMD Sanctoria PO - Dishergarh, Paschim Bardhaman West Bengal - 713333	Dr.C. Sawmliana, Prof. A. K. Mishra
79	Scientific study of ground vibration, flyrock and noise for safe blasting operations at Gorumahisani Iron Ore Block of M/s Ghanshyam Misra and Sons Pvt. Ltd., Rairangpur, Mayurbhaj, Odisha	M/s Ghanashyam Misra and Sons Pvt. Ltd. Gorumahisani Iron Ore Block, P.O. Gorumahisani, Via-Tatanagar (S.E. Rly), Mayurbhanj Odisha - 757042	Dr.C. Sawmliana, Prof. A. K. Mishra
80	Comprehensive Scientific Studies of blast induced ground vibration, flyrock, noise and optimization of blast design parameters at Roida II Iron Ore Mines of M/s Narbheram Power and Steel Pvt. Ltd. Tonto, Keonjhar, Odisha	Narbheram Power and Steel Private Limited Barbil Mining Division, Sidhamath RF, Roida-II Iron Ore Mine, Tonto Keonjhar Odisha - 758035	Dr.C. Sawmliana, Prof.A. K. Mishra
81	Scientific study on controlled blasting operations for cavern excavation over the TBM at HRT-TBM of Pakal Dul HE Project of M/s L and T Ltd.	Larsen and Toubro Limited L and T Construction, Heavy Civil Infrastructure, Pakal DUL HE Project, HRT-TBM Package VPO-Dool, Kishtwar Jammu and Kashmir - 182204	Dr. Narayan Kr. Bhagat, Dr.C. Sawmliana
82	Scientific study for RMR Calculation and Preparation of Strata Control and Monitoring Plan (SCAMP) as par CMR-2017 at Parbatpur Central Coal Mine, Bokaro.	JSW Steel Limited 5th Floor, Unit No.-5A/5B, Maple Plaza, Ashok Nagar Road, Opposite Road No.-02, Ashok Nagar, Ranchi Jhakhand - 834002	Niraj Kumar, Dr. Arun Kumar Singh
83	Scientific Study on Desorption and In-situ Gas Content of Coal Seams and Roof-Floor for Gassiness Potential of 3 nos. of Boreholes at Pathora East Coal Block, Madhya Pradesh of M/s Shri Bajrang Power and Ispat Limited	Shri Bajrang Power and Ispat Limited Pathora East Coal Mine, House No. 04, Apple Residency Shahdol Madhya Pradesh - 484001	Jaywardhan Kumar, Dr. Vinod Atmaram Mendhe
84	Scientific investigation on methane emission for classification of degree of gassiness of coal seam I Tope of Gare Palma IV/8 coal mine of Ambuja Cement Limited at	Ambuja Cement Limited Head Office Admin Procurement, Gare Palma IV/8 Coal Mine, Village: Karwahi,	Jaywardhan Kumar, Dr. Vinod Atmaram Mendhe

	Raigarh and advice on associated gas hazards	Post - Saraitola Raigarh Chhattisgarh - 496107	
85	Scientific study of fly ash dumping along with washery reject and OB in coal mine void on environment (Air, Flora, Fauna, Aquatic Lives, Soil) of Gare Palma - IV/1 Mines JPL, Tamnar, Raigarh, Chhattisgarh	Jindal Power Limited Kavita Gupta, Village- Dongamouha Raigarh Chhattisgarh - 496108	Dr. Sudarshan Singh Rathore, Dr. Bhanu Pandey, Dr. Siddharth Singh
86	Environmental Study for Fly Ash dumping along with washery rejects and OB in Gare IV/I Mine void, Jindal Power Ltd., Tammar, Raigarh	Jindal Power Limited Kavita Gupta, Village - Dongamouha Raigarh Chhattisgarh - 496108	Dr. Apurba Sinhamahapatra, Dr. Abhay Kumar Singh
87	Instrumentation scheme and monitoring of backfilling of stope blocks of Mahagiri Mines (Chromite), M/s IMFA Ltd.	Indian Metals and Ferro Alloys Limited Sukinda Mines Chromite, Kaliapani Jajpur Odisha - 755028	Prashant
88	Occupational health and safety study at AEL Suliyari coal mine site	Adani Enterprises Limited Village - Jhalari, Block-Suliyari, Tehsil-Sarai, Singrauli Madhya Pradesh - 486886	Dr. Santosh Kr. Ray, Dr. B. Pandey, Dr. J. K. Pandey
89	RMR study for one borehole in Mahan Coal Block, Singrauli.	JK Cement Limited Harduwaken, Tehcil-Amanganj, 0, Panna, Madhya Pradesh - 488441	Dr. Avinash Paul, Dr. Arun Kumar Singh
90	Slope Stability Monitoring Study of Pits and Overburden Dumps of Jhamarkotra Rock Phosphate Mines (RSMML), Udaipur.	S N Mining Private Limited Jhamarkotra Mines, RSMM, Post-Jhamarkotra, Udaipur, Rajasthan - 313015	Dr. Sanjay Kumar Roy, Kartik Varwade
91	Scientific Study on Stability of Pit Slopes at Guda Clay Mine (ML No. 07/1993) of M/s Associated Soapstone Dist. Co. Pvt. Ltd.	Harish Clays Golcha Garden, Agra Road, Transport Nagar, Jaipur Rajasthan - 302003	Dr. Harsh Kr. Verma, Dr. Ashok Kumar Singh, Dr. S. P. Singh
92	Investigation Attenuation Characteristics and Damage Potential of Ground Vibration induced by Construction Equipment at Ekamra Kshetra Development Project, Bhubaneshwar, Orissa	BPC Infraprojects Private Limited Floor No 3rd Floor, Flat No. 3B, Ram Ratan Niwas, Plot No - 629, Nayapalli, Bhubaneswar Odisha - 751012	Dr. Harsh Kr. Verma, Pushpendra Patel Dr.S. P. Singh
93	Characterization of Flyash and Evaluation of Flyash Dump Stability for Two Abandoned Coal Mine Void of Minni OCM under Jamuna and Kotma Area of SECL.	MB Power (Madhya Pradesh) Limited Laharpura Murra Toia, Tahsil Jaithari Anuppur Madhya Pradesh - 484330	Dr. Harsh Kr. Verma, Dr. Ashok Kumar Singh, Dr. S. P. Singh
94	Study on assessment of Blasting on Railway track Hanamaneri, Limestone Auction Block: J.K Cement Works, Muddapur, Karnataka	J.K Cement Limited J.K Cement Works Muddapur (Unit: J.K Cement Ltd.) Works: Vill- Muddapur, Tal. Mudhol, Bagalkot, Karnataka- 587122	Anand Ganpatrao Sangode, Dr. Autar Krishen Raina

95	Scientific Investigation in to Blast Induced Ground Vibration, Airoverpressure and flyrock due to Blasting using SME in Rajashree Cement Limestone mine of M/s Ultratech Cement Limited.	M/s Ultratech Cement Limited. Aditya Nagar, Malkhed Road, Dist- Gulbarga, Karnataka Pin- 585292	Anand Ganpatrao Sangode, Dr. Autar Krishen Raina
96	Study on Pit Slope monitoring at Barytes and Dolomite, shale mine at Mangampet of AMPDC Ltd.	The Andhra Pradesh Mineral Development Corporation Limited Mangampet Barytes Project, Mangampet, Annamayya, Andhra Pradesh- 516106	Dr. Saurav Rukhaiyar, Dr.J. C. Jhanwar
97	Scientific Study on Pit slope Stability at The Morwad Marble Mine.	R.K. Marble Pvt. Ltd. Morwad marble mine, Near Village Morwad, Rajsamand, Rajasthan Pin- 313324	Dr. Saurav Rukhaiyar, Dr. J. C. Jhanwar
98	Advice && guidance on ground monitoring for stope blocks at Mahagiri Mines (Chromite) M/s. Indian Metal && Ferro Alloys Ltd. for one year (2024)	Indian Metals && Ferro Alloys Limited (IMFA) Sukinda, Jajpur, Odisha, Pin- 755047	Dr. John Loui P., Dr. J. C. Jhanwar
99	Scientific studies of blasting operations within 50/60m of Karo and other village and recommending safe blast design at Karo OCP, Bokaro && Kargali Area, CCL.	Central Coal Fields Limited Project Officer, Karo OCP Bokaro && Kargali Area, CCL, PO- Bermo, Dist- Bokaro, Jharkand, Pin- 829104	Anand Ganpatrao Sangode, Dr. More Ramulu
100	Scientific study on controlled blast and Pit Slope design at Kachurwahi-Wadegaon Manganese Mines of Veet Rag Exploration and Minerals Pvt. Ltd., Maharashtra	Veet Rag Exploration and Minerals Private Limited SMS Limited, 20, IT Park, Parsodi Nagpur, Maharashtra - 440022	Dr. Neelratan Singh, Dr. Saurav Rukhaiyar
101	Optimum stope design i KNE-21 Lens (between-50m RL and-340m RL) and sill pillar mining (between 300 m RL and 325 m RL) at Kayad Mine, HZL for a period of 2024-25	Hindustan Zinc Limited Sri Rajni Lohar, Commercial, RDM, Rajpur-Dariba Mine, HZL, Railmagra, Udaipur, Rajmasand, Rajasthan - 313211	K. Nageswararao, Dr. John Loui P.
102	Numerical modelling studies for underground mining at Mochia and Balaria Mines, HZL for a period of two years 2024-2026.	Hindustan Zinc Limited Zawar Mines-313901 ZM, P.O. Zawar Mines Udaipur Rajasthan - 313901	Dr. John Loui P., Dr.J.C. Jhanwar
103	Numerical modelling studies for undrground excavation at Rajpura Dariba Mines, HZL for a period of two years 2024-2026	Hindustan Zinc Limited Rajpura-Dariba Mine, HZL Rajmasand Rajasthan - 313211	Dr. John Loui P., Dr.J. C. Jhanwar
104	Evaluation of blasting variables of openpit over the underground workings at Chikla Mine of Manganese Ore India Limited	MOIL Limited MOIL Bhavan, 1A, Katol Road Nagpur Maharashtra - 440013	Dr. Autar Krishen Raina, Dr. Manoj N. Bagde

105	Scientific assessment on Blast Induced Ground Vibration, Air Overpressure and flyrock during blasting activity at ltagi Limestone Mine of M/s Orient Cement Limited, Chittapur, Karnataka	Orient Cement Limited Tq. Chittapuritaga Po Malkhed Road Chittapur Gulbarga Karnataka - 585211	Anand Ganpatrao Sangode, Dr. Autar Krishen Raina
106	Design of blast hole Stoping at Kandri Mine of MOIL Limited	MOIL Limited MOIL Bhavan, 1A, Katol Road Nagpur Maharashtra - 440013	K. Nageswararao, Dr. John Loui P.
107	Feasibility study of Underhand Stoping in Zawar Mines, Hindustan Zinc Limited	Hindustan Zinc Limited Zawar Mines, Yashad Bhawan, Udaipur Rajasthan - 393901	Dr. John Loui P., K. Nageswararao
108	Numerical modelling studies for underground exacavations at Sindesar Khurd Mines, HZL for a period of three years (2024-2027)	Hindustan Zinc Limited Sindesar Khurd Mine SKM P.O. Dariba Rajmasand Rajasthan - 313211	Dr. John Loui P., K. Nageswararao
109	Stability analysis of Transition Crown and design of stoping parameters at Ramrama Manganese Mine	A .P. Trivedi Sons Ramrama Manganese Mine, Ward No. 15, Main Road, Balaghat Madhya Pradesh - 481001	Dr. Chandrani P. Verma, Dr. Manoj N. Bagde
110	Scientific Study for Design of Shotcrete Barricades for Paste Fill Stopes at Malanjkhand Copper Mine, HCL	Hindustan Copper Limited Malanjkhand Copper Project, Tamra Bhavan, P.O. Malanjkhand, Balaghat Madhya Pradesh - 481116	Dr. Chandrani P. Verma, Dr. John Loui P.
111	Evaluation of the pre-construction design and optimization of support during construction of Tunnels T17-T20 for the Bhanupali-Bilaspur-Beri Rail project of RVNL	Rail Vikas Nigam Limited Room No. 1 and 2, Land Acquisition Officer(Railways) Bilaspur Himachal Pradesh - 174001	Dr. Ramadhar Dwivedi
112	Reservoir Rim Stability Study for Naitwar Mori Hydro-electric Power Project	Indian Institute of Technology Roorkee SRIC, Main Building, IIT Roorkee, Haridwar Uttarakhand - 247667	Dr. Ashok Kumar Singh, Dr. Ramadhar Dwivedi
113	Study on the treatment of seepage and block failure problems in Tunnel No.-23 on Karaput-Rayagada BG Line of East - Coast Railway	East Coast Railway Odisha Region Office of the Senior Divisional Engineer (North), DRM Office Complex, Dondaparthi, Visakhapatnam Rail Sadan, Chandrasekharpur Bhubaneswar Odisha - 751017	Dr. Ashok Kumar Singh, Dr. Ramadhar Dwivedi
114	Close Continuous monitoring by Scientific agency of all the excavation works specifically high wall excavation at SP-III Project of	NMDC Limited Kirandul Complex, PO-Kirandul Dantewada Chhattisgarh - 494556	Dr. Ashok Kumar Singh, Dr. Ramadhar Dwivedi

	Kirandul Complex, NMDC Limited, Kirandul, South Bastar Dantewada		
115	Scientific study on the slope stability and stabilization design of hill cut slope on highway of Ganeshpur-Dehradun Section NH-307 (Old NH72A) under Bharatmala Pariyojana	Himalayan Construction Ganeshpur Sunderpur Saharanpur Uttarpradesh - 247662	Dr. Neelratan Singh, Dr. Ramadhar Dwivedi
116	Sampling and analysis of Imported and Indigenous coal unloaded at VOC port, Tuticorin for SEPC Power Private Limited and studies on blending strategies for various coals as sampled.	Tuticorin Thermal Power Station, St.-IV, Check Post, VOC Road, Thoothukudi - 628004, Tamilnadu, India	Dr. Krishna Murari Prasad Singh
117	Assessment of the coal quality unloaded from vessels at VOC Port, including variance analysis with 'as-fired' coal samples, to ensure optimal utilization in power generation for SEPC Power Private Limited, Tuticorin.	Tuticorin Thermal Power Station, St.-IV, Check Post, VOC Road, Tuticorin - 628004, Tamil Nadu, India	Dr. Krishna Murari Prasad Singh
118	Gasification potential evaluation and performance testing of identified coal from Margherita coal field in an indigenously developed fluidized bed gasification technology and its utilization strategy.	Numaligarh Refinery project, Golaghat, Assam, India, PIN-785699	Rupesh Kr. Singh

CONSULTANCY PROJECTS (CNP)

Sl. No.	Title	Sponsors Name and Address	Project Leader
1	Scientific Study and Advice on Slope Stability of Pit and Dumps of Gare IV/6 Coal Block of M/s JSPL	M/s. Jindal Steel && Power Limited Shri. Ramana Rao T, Gare Palma IV/6 Coal Mine, Gare Palma, Tamnar, District: Raigarh, Chhattishgarh, Pin- 496107	Dr. Sanjay Kumar Roy, Kartik Varwade
2	Scientific study and advice for controlled blast design parameters at Dalmia Cement (Bharat) Limited Lanjiberna.	Dalmia Cement (Bharat) Limited Lanjiberna, Rajgangpur, Sundargarh, Odisha- 770017	Dr. Aditya Rana, Dr. C. Sawmliana
3	Scientific study on the slope instability of north-eastern corner of the pit at Ostapal Chromite Mine and advice to make those benches safe for further mining excavations.	Ferro Alloys Corporation Limited Head Projects, D.P. Nagar, Randia, Bhadrak, District- Bhadrak, Odisha Pin- 756135	Dr. Sanjay Kumar Roy, Kartik Varwade
4	Advice/feasibility study for the introduction of Highwall Mining technology in VII, VIII and IX seams at Gare Palma IV/1 Coal Mine of M/s. Jindal Power Limited.	Sanjay Kumar Jindal Power Limited., Village- Dongamouha, Dist- Raigarh (C.G), Chhattisgarh- 496108	Dr. Arka Jyoti Das, Dr. Prabhat Kumar Mandal,
5	Advice on three-dimensional subsidence prediction due to underground mining for Marwatola VI Coal Block at Umaria district, Madhya Pradesh.	JSW Cement Limited Jindal Mansion, 5A Dr. G. Deshmukh Marg, District- Mumbai, Maharashtra- 400026	Dr. Amar Prakash, Dr. Sujit Kr. Mondal
6	Advice on three - dimensional subsidence prediction pertaining to Dahegaon Gowari Coal Mine, Nagpur, Maharashtra	Mr. Sudheer janga, Ambuja Cements Limited Post-Upperwahi, Tehsil - Korpana, Chandrapur-442908, Maharashtra	Dr. Amar Prakash, Dr. Sujit Kr. Mondal
7	Scientific study and advise for designing of controlled blast design patterns for carrying out safe blasting operations at Borkhedi-Nayagaon Limestone Mines of M/s UltraTech Cement Limited, Khor, Neemuch, Madhya Pradesh.	Ultratech Cement Limited (Unit: Vikram Cement Works) Khor, Tehsil : Jawad Neemuch, Madhya Pradesh - 458470	P. Hembram, Dr.C. Sawmliana
8	Scientific study and advise for designing of controlled blast design patterns at Kerendari Coal Mine Project of M/s NTPC Limited [MDO: BGR Mining & Infra Limited], Hazaribagh, Jharkhand	BGR Mining and Infra Ltd. Kerendari A Coal Block, MDO Project, Pandu Village, Hazaribagh, Jhakhand - 825311	P. Hembram, Dr.C. Sawmliana
9	Ventilaton planning and design for Gondbahera Ujheni Coal Block, Singrauli Coalfield, District Singrauli, Madhaya Pradesh	MP Natural Resources Private Limited Survey No 1992-2-2, Daga Bargawan,	Dr. Niroj Kr. Mohalik, Debashish Mishra, Dr. Santosh Kr. Ray

		Singrauli Madhya Pradesh - 486886	
10	Scientific Study and Advice on Slope Stability of Pit and Dumps of six iron ore mine of M/s Tata Steel	Tata Steel Limited Tisco Works, General Office, Bistupur, Jamshedpur, East Singhbhum Jharkhand - 831001	Dr. Sanjay Kumar Roy, Anand Singh
11	Advice on mitigation measures to be adopted for the villagers of the GPII coal block area in Tamnar, District Raigarh, Chhattisgarh	Gare Palma II Collieres Private Limited Khasara No. 150, Village - Dholnara, Tahsil - Tamnar Raigarh Chhattisgarh - 496107	Dr. Bhanu Pande, Dr. J. K. Pandey
12	Scientific study for assessment of blasting impacts on the nearby surrounding and advice for designing for design of controlled blasting pattern at Raika Iron and Manganese Ore Mines of M/s S.D. Sharma over Area 26.243 HA, Village-Raika, Keonjhar Dist ., Odisha	Green Force Associates Private Limited Plot No. 1363-3892, Baibhab Realcon, Fulnakhara, Cuttack, Odisha, India - 754001	Arvind Kumar, Dr. C. Sawmliana
13	Scientific Advice and designing of controlled blasting pattern as per Reg. 196 (2), (3) & (4) of Coal Mine Regulation-2017 at Quarry SE, West Bokaro Division of M/s Tata Steel Limited for controlling vibration in the structures not belonging to the ow ner lying within 500 meters and beyond 100 meters from the blasting site.	Tata Steel Limited West Bokaro, Ghatotand, Ramgarh Jhakhand - 825314	Dr. Vivek Kumar Himanshu, Dr. Murari Prasad Roy
14	Scientific Study and Advice on Slope Stability of Pit and Dumps Slope of Limestone Mine at Jaykaypuram of M/s JK Lakshmi Cement Ltd.	JK Laxmi Cement Ltd. Jaykaypuram, Sirohi Rajasthan - 307019	Prince Kumar, Anand Singh, Dr. Sanjay Kumar Roy
15	Advice on RMR study (including slake durability test) for different rock types from a borehole core at Dahegaon Gowari coal mine of M/s Adani Group	Ambuja Cement Limited (Unit: Maratha Cement Works) At Post - Upparwahi, Tah. - Korpana, Dist. Chandrapur, Gadchandur Maharashtra - 442908	Niraj Kumar, Dr. Arun Kumar Singh
16	Scientific Study and Advice on Slope Stability of Tailing Dump D-3 of Hutti Mines, Raichur, Karnataka.	The Hutti Gold Mines Company Limited Hutti Raichur Karnataka - 584115	Dr. Ritesh Kumar, Kartik Varwade, Dr. Sanjay Kumar Roy
17	Advice on blast-induced ground vibration due to blasting activities being carried out at Kiru H.E. Project's quarry areas and to assess the anticipated impact on nearby establishments (UT-J and K).	Patel Engineering Limited 381 - Kiru H.E. Project (Lot-1) Village Kiroo, Tehsil-Nagseni, Kishtwar Jammu and Kashmir - 182204	Dr. Narayan Kr. Bhagat, Dr. Autar Krishen Raina, Dr. C. Sawmliana

18	Advice for rock excavation work using drilling and blasting at Kwar HEP (540 MW), Kishtwar, J and K.	Patel Engineering Limited 392-KWAR H.E. Project (Lot-1) Village Padyarna, Tehsil-Nagseni, Kishtwar Jammu and Kashmir - 182204	Dr. Narayan Kr. Bhagat, R. K. Singh, Dr. C. Sawmliana
19	Advice for Optimization of Controlled Blasting Design for Rock Excavation at Ratle Hydro Electric Project (850 MW), J and K and Analysis of Vibration Data Records and Interpretaion.	Megha Engineering and Infrastructures Limited 1,2,3, H.No. 01,52, Grand Hayatt, National High Way, Sonamarg, Gangangeer, Ganderbal Jammu and Kashmir - 191202	Dr. Narayan Kr. Bhagat, R. K. Singh, Dr.C. Sawmliana
20	Advice and preparation of Detailed Project Report (DPR) for establishment of IoT- based Communication System in underground at Hutti Gold Mine	The Hutti Gold Mines Company Limited P.O. Hutti, Raichur Karnataka - 584115	Dr. S.K. Chaulya, Dr. Prabhat Kumar Mandal
21	Scientific Study and Advice on Slope Stability of Barjora (North) Coal Mine of WBPDCL, Dist. Bankura, West Bengal.	Montecarlo Limited Montecarlo Limited Ground Floor, CF-214, Sector-1, Salt Lake City, Bidhan Nagar North, Kolkata, North 24 Parganas West Bengal - 700064	Kartik Varwade, Dr. Sanjay Kumar Roy
22	Advice on electrical safety parameter of Pressurized (Ex 'P') Motor Rated at 2600KW in Frame Size 1DN513X-Y for use in EPL Gb (Zone 1&2) for Gas Group IIC hazardous areas.	Bharat Heavy Electricals Ltd. Block-II, EW, II Floor, BHEL Bhopal, Madhya Pradesh - 462022	Dr. Rakesh Kr. Mishra, Dr. Debasish Basak
23	Scientific Study and advice on Slope Stability of pit and dump of Sonari Lignite Mine of M/s RSMML	Rajasthan State Mines & Minerals Limited SBU and PC - Lignite, Khanij Bhavan, Tilak Marg, Jaipur Rajasthan - 302005	Kartik Varwade, Dr. Sanjay Kumar Roy
24	Scientific Study and Advice on Optimum slope design of one pit and two dumps (one internal and one external) of West Block of Pakri Barwadih Coal Mining Project (PBCMP) of NTPC Ltd.	Thriveni Sainik Mining Private Limited C/o NTPC Limited, Langatu, P.O. - Barkagaon, Hazaribag Jharkhand - 825311	Prince Kumar, Kartik Varwade, Dr. Sanjay Kumar Roy
25	Scientific Study and Advice on Slope Stability of pits and dump of Giral Lignite Mine of M/s RSMML	Rajasthan State Mines & Minerals Limited SBU and PC-Lignite, Khanij Bhavan, Tilak Marg Jaipur Rajasthan - 302005	Anand Singh, Dr. Sanjay Kumar Roy
26	Scientific Study and Advice on Slope Stability of Bicholim Mineral Block, M/s Vedanta Limited	M/s Vedanta Limited (GA) Sesa Ghor, 20 EDC Complex, Patto, Panaji Goa - 403001	Anand Singh, Rakesh Kr. Singh Dr. Sanjay Kumar Roy
27	Advice on estimation of pillar size and design of support system for	Innovative Mining Projects Private Limited	Nilabjendu Ghosh, Subhashish Tewari,

	development of trunk roadways by Road Header at Chinakuri Mine No. 1 of ECL.	Room No. 405, 4th Floor, 83/2/1 Topsia Road (South), Kolkata West Bengal - 700046	Dr. Prabhat Kumar Mandal
28	Scientific study and advice on slope stability of FRS area of QAB for design of ultimate pit for exploring the possibility of coal extraction upto seam-III using shovel dumper combination.	Tata Steel Ltd. West Bokaro, Ghatotand, Ramgarh Jhakhand - 825314	Dr. Sanjay Kumar Roy, Manish Kumar
29	Scientific Study and Advice on Slope Stability of Three Pits and Waste Dumps of above three pits (06 nos. of Waste Dumps) of B.I.O.M., Kirandul Complex, NMDC Limited.	NMDC Limited Balladila Iron Ore Mine, Kirandul Complex,P.O - Kirandul, Dantewada Place of Supply: ChhattisgarhChhattisgarh 494556	Kartik Varwade, Dr. Sanjay Kumar Roy
30	Scientific Study and Advice on Slope Stability and Blasting of Subhadra OCP of M/s SCML (Aditya Birla Group) (Part A: Slope Stability Study)	Subhadra Coal Mining Limited HIG 51, Pal Heights, Nandan Kanan Road, Jaydev Vihar, Bhubaneswar Khordha Odisha - 751013	Anand Singh, Dr. Sanjay Kumar Roy
31	Scientific Study and Advice on Slope Stability and Blasting of Subhadra OCP of M/s SCML (Aditya Birla Group) (Part B: Blasting Study)	Subhadra Coal Mining Limited HIG 51, Pal Heights, Nandan Kanan Road, Jaydev Vihar, Bhubaneswar Khordha Odisha - 751013	Dr. Narayan Kr. Bhagat, Rakesh Kr. Singh, Dr. C. Sawmliana
32	Advice for the optimisation of the web pillar dimension for Highwall Mining in R-VII Top Seam within the designated area/blocks at Narayankuri OCP of Mahabir (R) Colliery, Kunustoria Area, ECL	Resurgent Mining Solutions Private Limited Narayankuri Highwall Mining Project of ECL, Searsole Rajbari Raniganj, Mahabir Colliery, Asansol Paschim Bardhaman West Bengal - 713358	Dr. Arka Jyoti Das, Rana Bhattacharjee, Dr. Prabhat Kumar Mandal
33	Scientific studies on strengthening existing support system at Kandri Mine, MOIL	MOIL Limited MOIL Bhavan, 1A, Katol Road Nagpur, Maharashtra - 440013	K. Nageswararao, Dr. John Loui P.
34	Annual Ground Control Management Plan audit at Kayad Mine, HZL. 2024	Hindustan Zinc Limited Kayad Mine, P.O. Kayad, Dist Ajmer (Raj) Dist. Ajmer - 305023	K. Nageswararao, Dr. John Loui P.
35	Advice on vibration control and blast design for safe blasting at ML No.172/1989, Kana Pahad, Jhunjhunu Rajasthan, Jawan Rock Movers Pvt. Ltd. (JRMPL) M/s Jawan Rock Movers Private Limited	Jawan Rock Movers Private Limited G-1, Ajeet Apartment, Plot No. 1, Shree Ram Nagar-A, Khirni Phatak Road, Jotwara Rajasthan - 302012	Anand Ganpatrao Sangode, Dr. Autar Krishen Raina
36	Advice and guidance on ground monitoring for stope blocks at Mahagiri Mines (Chromite) M/s Indian Metal and Ferro Alloys Ltd. for one year (2025)	Indian Metals and Ferro Alloys Limited IMFA, Sukinda Jajpur Odisha - 755047	K. Nageswararao, Dr. John Loui P.

37	Proof checking and advice for typical cross-section of main tunnel and cross-passage on Delhi-Vadodara green field alignment. (NH- 148N) under Bharat Mala Pariyojna (Rajasthan)	Dilip Buildcon Limited C-35, Jawahar Colony, Jhalawar, Rajasthan- 326001	Dr. Ramadhar Dwivedi
38	4-laning of Tejajinagar to Balwara section of NH-347BG (Indore to Boregaon, Pkg-II) Design Ch.9.000 to Design Ch. 42.4000 (Length 33.40km) under Bharatmala Pariyojna Phase-1 in the state of Madhya Pradesh on Hybrid Annity Mode-Technical vetting of tun nel design report	Megha Engineering and Infrastructures Limited Fifth Floor, Office Block No. 9 and 10, Corporate Park, D.B. City Mall, Arera Hills, Bhopal, Madhya Pradesh - 462004	Dr. Ramadhar Dwivedi, Dr. J. K. Mohnot
39	Scientific and technical inspection/audit of newly constructed Special Smokeless Fuel (SSF) plant.	M/S S.J. Coke Industries Pvt. Ltd.; Kaimur, Bhabua, Bihar, Pin 821105	Rajiv Ranjan

TECHNICAL SERVICE PROJECTS (TSP)

Sl. No.	Title	Sponsors Name and Address	Project Leader
1	Assessment and advice on the present condition of track and haulage rope of bi-cable aerial ropeway passenger installation at Gangtok, Sikkim.	M/s. Damodar Ropeways && Infra Ltd. Chrton Road, Deorali Bazar, Todong, Gangtok- 737102	S. Waghmare, Dr. Debasish Basak
2	Assessment and advice on the present condition of haulage rope at Solang Nallah, Manali, H.P	M/s. Ski Himalayas Ropeway Pvt. Ltd. Solang Ropeway Cum Ski Center, Solang Valley, PO- palchan, District: Manali Pin- 175103	S. Waghmare, Dr. Debasish Basak
3	Assessment and advice on the present condition of haulage rope of Maa Chamunda Devi Passenger Ropeway, Dewas, M.P	M/s. Trehan Damodar Ropeways Pvt. Ltd 6, Station Road, District: Dewas, Pin- 455001	S. Waghmare, Dr.Debasish Basak
4	Assessment and advice on the present condition of rope of cable car and ropes on flying eagle installed in Dreamland Amusement Park, Siliguri, West Bengal.	M/s. Lucky Exports India Pvt.Ltd. 327, Bidhan Road, Near Auto Stand, District: Siliguri, West Bengal - 734001	S.Waghmare, Dr.Debasish Basak
5	Assessment and advice on the present condition of four nos. of track ropes (single visit) and two nos. of haulage ropes (two visits) of Passenger Cable Car Aerial Ropeway installation of M/s. Timber Trail, Asia Resorts Limited, Parwanoo (HP)	M/s. Asia Resort Ltd. Timber Trail Resort, Parwanoo, Solan Himachal Pradesh - 173220	S.Waghmare, Dr.Debasish Basak
6	Inspection of factory of M/s. MG Technicals kanpur as requried for the first time manufacturing of Flameproof equipment for use in hazardous area.	M/s. MG Technicals 98, Industrial Estate, Kalpi Road, District: Kanpur Pin- 208012	Amit Kumar, Awanindra Pratp Singh
7	Preformance evaluation of Girder installed at PB Area, Dhanbad.	Eagledeep PB Dhanbad Coal Private Limited An M/s. Eagle Infra India Ltd. PB Project, Dhanbad, Jharkhnad, Pin- 828116	Surajit Dey, Dr. Mousumi Mallick, Dr.Bhagirath Ahirwal
8	Study the performance evaluation of vital component of 450KW winding system wire rope installed at Mahagiri Mines.	Indian Metals && Ferro Alloys Limited, IMFA Sukinda, Dist- Jajpur, Odisha, India, Pin- 755047	Surajit Dey, Dr. Mousumi Mallick, Dr.Bhagirath Ahirwal
9	Inspection of factory of M/s S.R. Electrical Co. Rjasthan as required for the first time manufacturing of Flameproof	S.R. Electrical Co. Old Masuda Road, Outside Suraj Pole Gate, 43/538 Bearwar Rajsthan - 305901	Amit Kumar, Awanindra Pratp Singh

	equipment for use in hazardous area.		
10	Study for the evaluation of incendivity properties and various safety parameters of permitted electronic detonator (CDET ACCUPRA-P) for use in underground coal mines of india.	CDET Explosives Industries Private Limited 3rd Floor, Chaitanyanand Heights, 78, Shivaji Nagar Nagpur Maharashtra - 440010	Arvind Kumar, Dr.Firoj Ali, Dr.C. Sawmliana
11	Study of the evaluation of incendivity properties and various safety parameters of permitted electronic detonator (Smart Det) for use in underground coal mines of india.	Solar Industries India limited Kh. No. 37-39, 78-83, Village-Chakdoh, Tah. Katol, NH-6, Amravati Road, Bazargaon, Nagpur Maharashtra - 440023	Dr.C. Sawmliana, Arvind Kumar, Prof.A.K.Mishra
12	Study the performance evaluation of 29mm dia. rope in kendadih Mine at Hindustan Copper Limited, Gastsila	Hindustan Copper Limited Sr. Manager (Mech), Kendadih Mine Hindustan Copper Limited, Moubhandar Ghatsila East Singhbhum Jhakhand 832303	Manoranjan Kr. Verma, Dr. Mousumi Mallick
13	Study and advice on 35mm dia. FLC rope of Man winder used in Churcha Mine	South Eastern Coalfields Limited Sub. Area Manager (E & M), SECL, Churcha Mine (RO), Baikunthpur Area, P.O. Churcha Colliery Korea Chhatisgarh - 497339	Manoranjan Kr. Verma, Dr. Mousumi Mallick
14	Evaluation and advice on the present condition of haulage rope of Girnar Passenger Ropeway, Junagadh, Gujarat	Usha Breco Limited Girnar Ropeway, Near Sudarshan Talav, Behind Lambe Hanuman Temple, Bhavnath Taleti, Bhavnath Junagadh, Gujarat - 362004	S. Waghmare, Dr. Debasish Basak
15	Evaluation and advice on the present condition of haulage rope of Maa Kalika Devi Passenger Ropeway, Pavagad, Gujarat	Usha Breco Limited Maa Kalidevi Udan Khatola, Manchi, Pavagadh Panchmahal, Gujarat - 389360	S. Waghmare, Dr. Debasish Basak
16	Evaluation and advice on the present condition of haulage rope of Ambaji Passenger Ropeway, Banaskantha, Gujarat	Usha Breco Limited Maa Ambaji Udan Khatola, Ambaji, Gabber Hill, Taluka - Danta Banaskantha, Gujarat - 385110	S. Waghmare, Dr. Debasish Basak
17	Assessment of Electrical Resistance Trace Heating (Electrical Heat Tracer apes/Cables). Contact Watt Series Resistant, 25Watt/45Watt for use in hazardous area.	Thermotech Industries M/s Thermo-Tech Industries 129, Vora Industrial Estate No. 04, Navghar, Vasai (East), Maharashtra - 401210	Amit Kumar, Dr. Awanindra Pratap Singh
18	Inspection of factory of M/s Sudhir Switchgears Pvt. Ltd., Palghar, Maharashtra as required for the first time manufacturing of Flameproof	Sudhir Switchgears Private Limited Ground Floor, Godown No. 5 to 17, Shree Durga Industrial Estate, Achhad Industrial Area, Palghar, Maharashtra - 401606	Amit Kumar, Dr. Awanindra Pratap Singh

	equipment for use in hazardous area.		
19	Inspection of factory of M/s Kushako, Pune, Maharashtra as required for the first time manufacturing of Flameproof equipment for use in hazardous area.	Kushako India Nandep Opp. Sr. No.25/1A Village, Savali Dhaba, Sinhgad Road, Pune, Maharashtra - 411041	Amit Kumar, Dr. Awanindra Pratap Singh
20	Inspection of factory of M/s Linia Engineering Services, Panvel, Raigad, Maharashtra as required for the first time manufacturing of Flameproof equipment for use in hazardous area.	Linia Engineering Services Radhakrishanan Varier, Plot No. 89, 1st Floor, Panvel Ind. Co-Op Estate Ltd., Behind Simran motors, Panvel Raigad, Maharashtra - 410206	Dr. Awanindra Pratap Singh
21	System Certification of Diesel Automated Teller Ultimate Machine (DATUM), Model: DATUMZ of M/s Repos IOT India Pvt. Ltd., Pune, Maharashtra for use in hazardous area.	Repos IOT India Private Limited Office No. 103, Kumar Vastu CHS Ltd., S. No. - 209/1/1-A, Bhosale Nagar, Shivaji Nagar, Pune, Maharashtra - 411020	Amit Kumar, Dr. Awanindra Pratap Singh
22	Assessment of Physico-mechanical properties of rock core samples of BH # GBM-01, BH # GBH-02 and BH # GBH-03 of Gondbahera Ujheni Coal Block, Singrauli Coalfield, MPNRPL Mine, Madhya Pradesh	MP Natural Resources Pvt. Ltd. Survey No 1992-2-2, Daga, Bargawan Singrauli Madhya Pradesh - 486886	Dr. John Buragohain, Dr. Prabhat Kumar Mandal
23	Assessment of Physico-mechanical properties of rock core samples of BH CMPU-01, BH MRPD-01(PBH-5) and BH MRPD-02(PBH-1) of Purunga Coal Block, Mand Raigarh Coalfield, Chhatisgarh	CG Natural Resources Pvt. Ltd. Behind C R Heights, OPP Basant Filling Station, Kharsia Road, Ambikapur, Surguja, Chhattisgarh - 497001	Shailendra Kr. Singh, Dr. John Buragohain, Dr. Prabhat Kumar Mandal
24	Assessment of Physico-mechanical properties of rock core samples of BH MD-8(PBH-1), BH MD-18(PBH-09) and BH MD-19 (PBH-08) of Dhirauli Coal Block, Singrauli Coalfield	Stratatech Mineral Resources Private Limited Plot No. 6, Sec No.3, Near-Sunday Market, Main Road, Navjiwan Vihar, Vidhya Nagar, Singrauli, Madhya Pradhesh - 486886	Shailendra Kr. Singh, Dr. John Buragohain, Dr. Prabhat Kumar Mandal
25	Inspection of factory of M/s Shreeji Process Control Pvt. Ltd., Gujarat as required for the first time manufacturing of Flameproof equipment for use in hazardous area.	Shreeji Process Control Private Limited Plot No. D-2E-402, Phase-2, GIDC Industrial Estate, Dahej Gujarat, Bharuch, Gujarat - 392130	Dr. Rakesh Kr. Mishra, Dr. Awanindra Pratp Singh
26	Assessment and advice on the present condition of haulage rope of cable car and Ropes of Sky Diver Ride at Nicco Parks	Nicco Parks and Resort Ltd. Jheel Meel, Sec-IV, Salt Lake City, Kolkata, West Bengal - 700106	S. Waghmare, Dr. Debasish Basak

	and Resorts Limited at Salt Lake, Kolkata, West Bengal.		
27	Assessment of Slake Durability Index for scientific study of rock core samples of Kumardih-B Colliery, ECL, Paschim Burdwan, West Bengal	Gainwell Commosales Private Limited Near 1 and 2 Incline (CM Project), P.O. Ukhra, Kumardihi, Paschim Burdwan, West Bengal - 713363	Dr. John Buragohain, Dr. Prabhat Kumar Mandal
28	Inspection of factory of M/s GSG Lighting Private Limited, Uttar Pradesh as required for the first time manufacturing of Flameproof equipment for use in hazardous area.	GSG Lighting Private Limited Second Floor, D-351, Sector 10 Noida, Goutambuddha Nagar, Uttar Pradesh - 201301	Dr. Rakesh Kr. Mishra, Dr. Awanindra Pratp Singh
29	Condition assessment of two Cage Suspension Gear Through NDT installed in Mahagiri IMFA, Jajpur	Indian Metals & Ferro Alloys Limited IMFA, Sukinda Jajpur, Odisha - 755047	Dr. Surajit Dey, Dr. Bhagirath Ahirwal
30	Performance evaluation of different sizes FLC wire ropes used at Surda Copper Mine.	Maheshwari Mining Pvt. Ltd. Surda Mines, HCL/IC, P.O. Surda Mines, East Singhbhum Jhakhand - 832303	Navin Kumar, Dr. Bhagirath Ahirwal
31	Assessment on Non-Sparking Ex ec induction motor rated at 180KW/6.6KV/6P Frame Size: NDCE400F3 of M/s. Marathon Electric Motors (India) Limited, Kolkata - for use in zone-2 hazardous area.	Marathon Electric Motors India Limited 1, Taratala Road, Kolkata, West Bengal - 700024	Biswajit Modak, Dr. Awanindra Pratap Singh
32	Assessment and advice on the present condition of haulage rope of Shri Naina Deviji Monocable Ropeway at Shri Naina Deviji, H.P.	Ganpati Ropeways Pvt. Ltd. P.O. Shri Naina Devi Ji, Bilaspur Himachal Pradesh - 174310	S. Waghmare, Dr. Debasish Basak
33	Scientific study for failure of 32mm diameter winding rope used for man winding at Kolihan Copper Mine of Hindustan Copper Limited	Hindustan Copper Limited Dy. General Manager (Mech.), Khetri Complex, Khetri Nagar, Jhunjhunu Rajasthan - 333504	B. Ravi Kumar, Dr. Mousumi Mallick, Dr. Bhagirath Ahirwal
34	Inspection of factory of M/s. Altop Industries Ltd. Vadodara, Gujarat as required for the first time manufacturing of Flameproof equipment for use in hazardous area.	M/s Altop Industries Ltd. 392, GIDC, Makarpura, Vadodara Gujarat - 390010	Manoj Kr. Vishwakarma, Dr. Awanindra Pratap Singh
35	Assessment of the electrical safety parameters of Flameproof Air Conditioner, Model No. FLP AC 5 of M/s AMANCIO Cooling Equipments, Vadodara, Gujarat for use in hazardous area.	M/s AMANCIO Cooling Equipments Conrad Lobo, Lukshmi Villas Palace Estate, Gate No. 4, Opp. Kashi Vishwanath Temple, Vadodara Gujarat - 390001	Amit Kumar, Dr. Awanindra Pratap Singh
36	Inspection of factory of M/s. Advanced Technology Solutions, Mohali, Punjab as	M/s. Advanced Technology Solutions B-30, Phase 3, Industrial Area, Mohali Punjab - 160055	Manoj Kr. Vishwakarma, Dr.

	required for the first manufacturing of Flameproof equipment for use in hazardous area.		Awanindra Pratap Singh
37	Winding rope performance evaluation of size 26mm drawn from 400kW double drum winder installed at Uranium Corporation of India Limited, Turamdih Mines.	Uranium corporation of India Ltd Turamdih Group of Mines, Turamdih Sundarnagar, East Singhbhum Jhakhand - 832107	Dr. Mousumi Mallick, Dr. Bhagirath Ahirwal
38	Performance evaluation of 19mm dia. size (6X7) wire ropes used in W240 winder at UCIL-Bhatin Mines, Jaduguda.	M/s. MFB Geotech Pvt. Ltd. P.O. Jadugora, 499, P.S. Jadugora, Navrang Market, Jadugora, East Singhbhum Jharkhand - 832102	Dr. Mousumi Mallick, Dr. Bhagirath Ahirwal
39	Assessment and advice on the present condition of haulage rope of Jatayupara Passenger Ropeway, Kollam, Kerala.	M/s Usha Breco Limited C/o Jatayupara Tourism, Jatayu Junction, MC Road, P.O. Chadayamangalam Kollam Kerala - 691534	S. Waghmare, Dr. Debasish Basak
40	Assessment and advice on the present condition of haulage rope of Malampuzha Passenger Ropeway, Palakkad, Kerala.	M/s Usha Breco Limited Malampuzha Udan Khatola, Near Malampuzha Dam, Palghat Kerala - 678651	S. Waghmare, Dr. Debasish Basak
41	Assessment and advice on the present condition of haulage rope and track ropes of passenger ropeway from Bhawan to Bhairon Ghati, Katra, Jammu & Kashmir.	Damodar Ropeways and Infra Ltd Mata Vaishno-Devi Ropeways, Katra, Reasi, Jammu and Kashmir - 182320	S. Waghmare, Dr. Debasish Basak
42	Investigations into incendivity properties and various safety parameters of permitted electronic detonator (CDET ACCUPRA-P) for use in underground coal mines of india.	CDET Explosives Industries Private Limited 3rd Floor, Chaitanyanand Heights, 78, Shivaji Nagar, Nagpur Maharashtra - 440010	Arvind Kumar, Dr. Firoj Ali, Dr.C. Sawmliana
43	Performance evaluation of winding ropes of Chasnalla Colliery.	Steel Authority of India Ltd. BSL-Collieries Division, Centralised Collieries Contract Cell, B-1 Bungalow, CCWO Colony, Saraidhela Dhanbad, Jhakhand - 828127	Dr. Mousumi Mallick, Dr. Bhagirath Ahirwal
44	Assessment of the electrical safety parameters of Flameproof Automatic Valve Changing Machine without Evacuation of LPG Cylinder operating by FLP cum Hydro pneumatic system Type FLP/DE/AVCN/01 M/s. Dey Enterprises, Kolkata for use Gas Group IIA and II B atmosphere.	M/s. Dey Enterprises HE/19/5/2, Sachindralal Sarani, Ashwininagar, Baguiati Kolkata West Bengal - 700159	Dr. Rakesh Kr. Mishra, Dr. Awanindra Pratap Singh

45	Assessment of the electrical safety parmeters of emission reducing system of M/s. Septech Project Engineering Private Limited, Sadar, Nagpur - 444001 for use in EPL Gc hazardous area.	Septech Project Engineering Private Limited Block No. 3C, 4th Floor, Bajaj Wing Mangalwari, Complex Sadar, Nagpur Maharashtra - 444001	Biswajit Modak, Dr. Awanindra Pratap Singh
46	Inspection of factory of M/s. Ansys Engineering Pvt. Ltd. Thane as required for the first time manufacturing of Flameproof equipment for use in Hazardous area.	M/s. Ansys Engineering Private Limited Plot No. A-31/1, Behind Bunty Foods, Additional Ambernath MIDC, Thane, Maharashtra - 421506	Dr. Rakesh Kr. Mishra, Dr. Awanindra Pratp Singh
47	Inspection of factory of M/s Rajson Industries, Vatva, Ahmedabad as required for the first time manufacturing of Flameproof equipment for use in hazardous area.	Raison Industries Plot No. 301/2, Dr. Dinesh and Ramesh Foundry, Compound. Opp. SSPM. Ambica Hotel Cross Road, Ph-II, Ahmedabad Gujarat - 391410	Manoj Kr. Vishwakarma, Dr. Awanindra Pratap Singh
48	Study of the evaluation of incendivity properties and various safety parameters of permitted electronic detonator (Elecon-C) for use in underground coal mines of India.	IDEAL Detonators Private Limited Sy No. 115, 2nd Floor, IDEAL Towers Opp. BHEL Enclave, Akbar Road, Tadbund, Secunderabad Telangana - 500009	Dr. C. Sawmliana, Arvind Kumar, Prof. A. K. Mishra
49	Assessment and advice on the present condition of haulage rope of mono cable detachable continuous passenger ropeway at Dharamshala, Himachal Pradesh	Dharamshala Ropeway Limited 34, Civil Lines, MMR Snow Pines Dharamshala Himachal Pradesh - 176215	S. Waghmare
50	Assessment and advice on the present condition of haulage rope of Maa Taratarini Passenger Ropeway, Ganjam, Odisha	M/s Usha Breco Limited Tara Tarini Ropeway, Post - Tara Tarini Hills, Village - Gobindpur, Via – Purushottampur, Ganjam, Odisha - 761018	S. Waghmare, Dr. Debasish Basak
51	Assessment and advice on the present condition of haulage rope of Maa Chandidevi Passenger Ropeway, Haridwar, Uttarakhand.	M/s Usha Breco Limited Maa Chandidevi Udan Khatola, Nazibabad Road, Haridwar Uttarakhand - 249408	S. Waghmare, Dr. Debasish Basak
52	Assessment and advice on the present condition of track and haulage ropes of passenger Ropeway across river Brahmaputra at Guwahati Assam	M/s Usha Breco Limited Guwahati Ropeway Terminal, Forest Campus, Near DC Court, M.G. Road, Panbazar, Guwahati Assam - 781001	S. Waghmare, Dr. Debasish Basak
53	Assessment of the electrical safety parameters of Purge Panel, SPM Dust Analyser, HVAC System, Gas Analyser ZRE/ZKJ/ZPA/ZAF and TDLS O2 Analyser of M/s. Analyser	M/s Analyser Instrument Co. Pvt. Ltd. E-29 (A), Road No: 2, I.P. Industrial Area, Kota, Rajasthan - 324005	Dr. Rakesh Kr. Mishra, Dr. Awanindra Pratap Singh

	Instrument Co. Pvt. Ltd., Kota, Rajasthan for use in hazardous area.		
54	Assessment of the electrical safety parameters of LNG Calibration Kit (Prover) M/s. TGT Fuel Technologies Pvt. Ltd. Sonipat, Haryana for use hazardous area.	M/s. TGT Fuel Technologies Pvt. Ltd. 517, HSIDC, Industrial Area, Phase IV, Kundli, Sonipat, Haryana - 131028	Biswajit Modak, Dr. Awanindra Pratap Singh
55	Assessment and advice on the present condition of haulage rope of Pushkar Ropeway site, Pushkar, Rajasthan	Damodar Ropeways and Infra Ltd. Parikarma Marg, Pushkar, Ajmer Rajasthan - 305022	S. Waghmare, Dr. Debasish Basak
56	Study of the evaluation of incendivity properties and various safety parameters of permitted electronic detonator (Indira Electronic Detonator) for use in underground coal mines of India.	Regenesis Industries Private Limited S.Y. No. 50, Bommalaramaram Main Road, Yadadri, Telangana - 508126	Arvind Kumar, Dr. Firoj Ali, Prof. A. K. Mishra
57	Assessment and advice on the present condition of haulage rope of detachable grip mono-cable passenger ropeway at Maihar, M.P.	Damodar Ropeways and Infra Ltd Maa Sharda Devi Mandir Maihar Madhya Pradesh - 485771	S. Waghmare, Dr. Debasish Basak
58	Performance Evaluation of 56 mm diameter wire rope used in SKM shaft tail rope 3 and 4 of Hindustan Zinc Limited	Euro Smile Facility Management Services Pvt. Ltd. S-511/A & S-511/B, 202/A, Second Floor, School Block, Vikas Marg, Shakarpur, Delhi - 110092	Dr. Mousumi Mallick, Dr. Bhagirath Ahirwal
59	Assessment of Physico-mechanical properties of rock core samples of BH MDG-01, BH MDG-02 and BH MDG-03 of Dahegaon Gowari Coal Mine, Ambuja Cements Limited, Maharashtra.	Ambuja Cements Limited Post-Upparwahi, Tahsil - Korpana, Godchandur, Chandrapur Maharashtra - 442908	Shailendra Kr. Singh, Dr. John Buragohain, Dr. Prabhat Kumar Mandal
60	Inspection of factory of M/s. YPL Instruments Pvt. Ltd. Faridabad as required for the first time manufacturing of Flameproof equipment for use in hazardous area.	YPL Instruments Private Limited Plote No. 86-B, New DLF Industrial Area, Faridabad Haryana - 121003	Biswajit Modak, Dr. Awanindra Pratap Singh
61	Inspection of factory of M/s. I-Vision Bangalore as required for the first time manufacturing of Flameproof equipment for use in hazardous area.	Kannan Subramanian Prasanna M/s. I-Vision Site No. 8, Inside C.S.R. Golden Gate, Near K.R. Puram R.T.O., Medahalli extn, Virgo Nagar Post Bangalore, Karnataka - 560049	Amit Kumar, Dr. Awanindra Pratap Singh
62	Assessment of the electrical safety parameters of Local Control Panel Size 2000(L) X 1000(W) X 2200(H) Transit of M/s Prei Polar Engineering Pvt.	Prei Polar Engineering Private Limited M/s Prei Polar M-17, SIPCOT, Hi-Tech SEZ, Sriperumbudur, Sunguvarchathiram, Kanchipuram Tamil Nadu - 602105	Amit Kumar, Dr. Awanindra Pratap Singh

	Ltd. Tamil Nadu for use in hazardous area.		
63	Assessment of Physico-mechanical properties of borehole rock core samples of BH JP-06, BH JP-22 and BH JP-23 from Gare Palma IV/1 Coal Mine, Jindal Power Limited, Chhattisgarh	Jindal Power Limited Vill - Dongamouha, Raigarh Chhattisgarh - 496108	Pappu Rabidas, Dr. Saurav Rukhaiyar, Dr. John Buragohain
64	Assessment and advice on the present condition of track and haulage rope of Nainital Ropeway at Nainital, Uttarakhand.	M/s Kumaon Mandal Vikas Nigam Ltd. Oak Park House, Mallital, Nainital Uttarakhand - 263001	S. Waghmare, Dr. Debasish Basak
65	Assessment and advice on the present condition of haulage rope of Rajgir ropeway, Rajgir, Bihar	M/s Conveyor and Ropeway Services Pvt. Ltd. 75-C Park Street, 6th Floor Kolkata West Bengal - 700016	S. Waghmare, Dr. Debasish Basak
66	Assessment of the electrical safety parameters and Temperature rise of Thermon Trace Heating Cables of M/s. Thermon India Pvt. Ltd. Mumbai for use in hazardous area.	M/s. Thermon India Pvt. Ltd. A-1701:17-16, Kailas Business Park, Veer Savarkar Road, Vikhroli (W), Mumbai - 400079	Amit Kumar, Dr. Awanindra Pratap Singh
67	Inspection of factory of M/s F.N. Engineering, Mumbai, Maharashtra as required for the first time manufacturing of Flameproof equipment for use in hazardous area.	M/s F.N. Engineering Mohammed Shahe Alam ITT Bhatti, W.E. Highway, Goregaon East, Mumbai Maharashtra - 400063	Biswajit Modak, Dr. Awanindra Pratap Singh
68	Inspection of factory of M/s Chandra Corporation, Ahmedabad, Gujarat as required for the first time manufacturing of Flameproof equipment for use in hazardous area.	M/s Chandra Corporation Niranjan Ramshankar Raval, 20/ Prena Park, Society B/H Vijay Park Society, Jasodanagar, Chokadi, Ahmedabad, Gujarat - 380008	Manoj Kr. Vishwakarma, Dr. Awanindra Pratap Singh
69	Study of the evaluation of incendivity properties and various safety parameters of permitted electronic detonator "APEX P e-DET" (Permitted Factory Set 0-6) for use in underground coal mines of India.	M/s A P Explosives Private Limited, SY. No. 50, Bommalaramaram (V & M), Yadadri, Bhongir, Telangana - 508126	Arvind Kumar, Dr. Firoj Ali, Dr.C. Sawmliana
70	Performance evaluation of winding ropes, cage suspension gears and its components and vital parts of winders of Kharkharee Colliery.	Bharat Coking Coal Limited Kharkharee Colliery, Govindpur Area, P.O.: Sonardih, Dhanbad Jharkhand - 828125	Dr. Mousumi Mallick, Dr. Bhagirath Ahirwal
71	Study the condition of 29 mm diameter wire rope used in 425	Hindustan Copper Limited Sr. Manager (Mech.), Kendadih Mine Hindustan Copper Limited,	Dr. Mousumi Mallick, Dr. Bhagirath Ahirwal

	KW winder of Kendadih Mine of Hindustan Copper Limited.	Moubhandar Ghatsila, East Singhbhum Jharkhand - 832303	
72	Performance evaluation of winding ropes of 32mm (four nos.), 36mm (two nos.) and 44mm (two nos.) of Chasnalla Colliery, SAIL.	Steel Authority of India Ltd. BSL Collieries Division, Centralised Collieries, Contract Cell, B-1 Bungalow, CCWO Colony, Saraidhela Dhanbad Jhakhand - 828127	Dr. Mousumi Mallick, Dr. Bhagirath Ahirwal
73	Assessment of Source-rock geochemical and organo-petrographical investigation of shales	Indian Institute of Technology - Bombay Prof. Vikram Vishal Department of Earth Sciences, Powai, Mumbai Maharashtra - 400076	Dr. Bodhisatwa Hazra, Dr. Sivaji Lahiri, Dr. Prabhat Kumar Mandal
74	Assessment of the electrical safety Ex 'eb' and Non-Sparking Ex 'ec' Motor, Rated at 1450KW in Frame size: 1MA7802-2 for use in EPL Gc (Zone 2) for Gas Group IIC hazardous area of M/s. Bharat Heavy Electrical Limited, Bhopal.	Bharat Heavy Electricals Ltd. Block-II, EW, II Floor, BHEL Bhopal Madhya Pradesh - 462022	Manoj Kr. Vishwakarma, Dr. Awanindra Pratap Singh
75	Investigation on the safety and performance parameters of e-Exploder (Smartdet Blaster, Model No. SMBL 1.2) for blasting of permitted electronic detonator of M/s Solar Industries India Limited for use in underground coal mines of India.	Solar Industries India Limited Solar House 14, Kachimet, N.H.-6 Maharashtra, 440023	Dr. C. Sawmliana, Arvind Kumar, Prof. A. K. Mishra
76	Investigation on the safety and performance parameters of e-Exploder (Brand namr: ELCON-C) for blasting of permitted electronic of M/s IDEAL Detonators Pvt. Ltd., for use in underground coal mines of India.	Ideal Detonators Pvt. Ltd., Sl.No.115,2nd Floor, IDEAL Towers Opp, BHEL Enclave, Akbar Road, Tadbund Telangana, 500009	Arvind Kumar, Dr. C. Sawmliana
77	Investigation on the safety and performance parameters of cura -P) for blasting of permitted electronic detonator of M/s CDET Explosives Industries Pvt., Ltd., for use in underground coal mines of India.	CDET Explosives Industries Private Limited 3rd Floor, Chaitanyanand Heights, 78, Shivaji Nagar, Nagpur, Maharashtra - 440010	Arvind Kumar, Dr. Firoj Ali, Dr. C. Sawmliana
78	Assessment and advice on the present condition of haulage rope of detachable grip mono-cable passenger ropeway at Dongargarh, C.G	M/s. Maa Bamleshwari Mandir Trust Samity New Ropeway, Chhirpani, Dongargarh, Dist- Rajnandgaon, Chhattisgarh 491445	S. Waghmare, Dr. Debasish Basak
79	Assessment and advice on the present condition of haulage rope of Neemach Mata	Damodar Ropeway && Infra Ltd. Neemach Mata Project, Neemach Mata Ropeway, Dewall, Udaipur, Rajasthan 313004	S. Waghmare, Dr. Pankaj Kr. Mishra

	Passenger Ropeway, Udaipur, Rajasthan.		
80	Assessment and advice on the present condition of haulage rope of Hanumandhara Ropeway at Chitrakoot, Madhya Pradesh.	Damodar Ropeways and Infra Ltd. Hanumandhara, Chitrakoot, Satna Madhaya Pradesh - 485334	S. Waghmare
81	Assessment and advice on the present condition of haulage rope of DRV passenger ropeway at Darjeeling, West Bengal.	Conveyor and Ropeway Services Pvt. Ltd. 75-C Park Street, 6th Floor Kolkata West Bengal - 700016	S. Waghmare, Dr. Pankaj Kr. Mishra
82	Study on the safety parameters of electronic detonators (ELCON-D of M/s IDEAL Detonators Pvt. Ltd. and e-DET of M/s GOCL) and electric detonators of M/s CDET Explosive Industries Pvt. Ltd. received from Gangaramchak and Gangaramchak Bhaduliya coal min es of M/s WBPDCL.	The West Bengal Power Development Corporation Limited Samresh Kumar, Agent/ADDL.GM, G and GB Coal Mine, WBPDCL, WB Birbhum, West Bengal - 731125	Dr.C. Sawmliana, Arvind Kumar, Prof. A. K. Mishra
83	Assessment and advice on the present condition of haulage rope of Maa Chamunda Devi Passenger Ropeway, Dewas, M.P.	Trehan Damodar Ropeways Pvt. Ltd. 6, Station Road Dewas Madhya Pradesh - 455001	S. Waghmare, Dr. Pankaj Kr. Mishra
84	Performance evaluation of winding ropes (25mm dia., 6X7), NDT of Double drum winder, Sheave wheel, rope capple with cage suspension gears (5T) and its components and hoisting cage of Tilaboni Colliery, ECL.	JMS Mining Pvt. Ltd. Tilaboni UG Mine Bankola Area, Ukhra, Durgapur, Paschim Bardhaman, West Bengal - 713363	Dr. Mousumi Mallick, Dr. Bhagirath Ahirwal
85	Assessment of Temperature Rise Classification of FLP Transwitch Unit/Load Centre upto 2500kVA, upto 6.6KV/1140-415V, FLP VCB Panel upto 7.2KV, upto 630A and FLP Plug and Socket 600A, 1140V of M/s Prabhu Industrial Udyog Pvt. Ltd. Kolkata for use in hazardous area.	Prabhu Industrial Udyog Private Limited 1, Tarpan Ghat Road, Kolkata, West Bengal - 700053	Manoj Kr. Vishwakarma, Dr. Awanindra Pratap Singh
86	Inspection of factory M/s Safexperts Ex Private Limited, Hyderabad, Telangana as required for the first time manufacturing of Flameproof equipment for use in hazardous area.	Safexperts EX Private Limited 1st Floor, Plot No. 63, 64, Subhash Nagar, IDA, Jeedimetla, Hyderabad Telangana - 500055	Manoj Kr. Vishwakarma, Dr. Awanindra Pratap Singh
87	Laboratory Flotation Tests Using the Chemicals Supplied by Krishna Antioxidants (P) Ltd.	Krishna Antioxidants (P) Ltd.	Md. Wahid

		107-108, Raheja Plaza Opp. Yashraj Studio off. Link Road, Andheri (West), Mumbai-400053	
88	Quality evaluation of coal cores explored from Different regions of CMPDI by CIMFR, RQA, Nagpur	Central Mine Planning & Design Institute (CMPDI) RI IV, Kasturba Nagar, Jaripatka, Nagpur, 440014	Dr. Lalit Kr. Sahoo
89	Quality Evaluation of Coal Cores Explored from Different Regions of CMPDI RI-VI Phase-1 by CIMFR- RQA, Ranchi.	Central Mine Planning & Design Institute (CMPDI) Gondwana Place, Kanke Road, Ranchi-834031	Dr. Manoj Kumar Saini
90	Qualiy Evaluation of Coal Cores Explored from Different Regions of CMPDI by CIMFR, RQA, Digwadih Campus.	Central Mine Planning & Design Institute (CMPDI) Gondwana Place, Kanke Road, Ranchi-834031	Dr. Prabal Boral
91	Quality Evaluation of Coal Cores Explored from Different regions of CMPDI RI-III Phase-1 by CIMFR-RQA, Ranchi.	Central Mine Planning & Design Institute (CMPDI) Gondwana Place, Kanke Road, Ranchi-834031	Dr. Manoj Kumar Saini
92	Quality Evaluation of Coal Cores Explored from Different regions of CMPDI by CIMFR, RQA, Bilaspur.	Central Mining Planning & Design Institute (CMPDI) RI-V Sipat Road, Bilaspur -495006	Dr. Shripal Singh

MLP PROJECTS

Sl. No.	Title	Sponsor	Project Leader
1	Ex-situ Remediation of Bauxite Residue Disposal Soil through Bio-neutralization Using Microbial Consortium	In-House	Dr. Sudarshan Singh Rathore
2	Development of a light weight rock bolt for stress relief in underground mines of India	In-House	Dr. Mousumi Mallick
3	Underground Coal (and Shale) Thermal Treatment (UCTT) - A potential game changer	In-House	Dr. Bodhisatwa Hazra
4	Alternative Treatment Approach to Treat Mine Wastewater for Utilization and Valorization	In-House	Dr. Apurba Sinhamahapatra
5	An Investigation on the Efficiency and Performance of Global Navigation Satellite Systems (GNSS) in Slope Deformation and Monitoring Studies for Surface Mines	In-House	Mr. Kartik Varwade
6	A comprehensive investigation of UAV based thermal remote sensing and LiDAR technology for varied surface mining operations.	In-House	Dr. Vineeth Balakrishnan
7	Development of an organic waste (leaf, food waste) composter machine	In-House	Dr. Prem Kumar

8	Sustainable Construction Materials from Municipal Solid Waste: Collection, Processing, and Application of Green Building Solutions'	In-House	Er. Mustaque Ansari
9	Development of coal and biomass-derived nanosensor for the selective and sensitive detection of mercury in water samples.	In-House	Dr. R N Senapati
10	Estimation and removal of sulphur from coal-derived syngas	In-House	Dr. Shweta Kumari
11	Development of Certified Reference Materials (CRMs) for biomass.	In-House	Dr. R. N. Senapati Dr. Siddharth Bari
12	Studies on airborne bio-allergens in indoor environment of coal based industrial zones of Dhanbad.	In-House	Dr. Sudhir Bharti
13	Improvement of the nitride-based slow-release fertilizer prepared from coal washery rejects and fly ash for optimal use in agriculture.	In-House	Dr. R.E. Masto Mr. G.K. Bayen

PUBLICATIONS, PATENTS, DESIGNS, COPYRIGHTS & TECHNOLOGY

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11. Manjula Sharaff, Suresh Chandra Dansena and Kunwar Ambarish Singh (2024). **Koyla ke aakar ansho ke anushar rakh sanghatako ka vitaran- Ek Adhyayan**, (Rashtritya Hindi Vigyan Sammelan-2024, "Amritkal Mein Vaigyanik Chetna ka Unnayan"). 30–31 July 2024.
12. Sachchak Waghmare and D. Basak (2024). **A unique approach to Non-Destructive testing and maintenance of steel wire ropes in a Multi-Splice Aerial Ropeway Installation**. (4th International Conference and Exhibition on Non-destructive Evaluation) during 22-24 August, 2024.
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7. Dr. Ashwani Kumar Tiwari (JNU, India), Prof. T. N. Singh (IIT Patna), & Dr. Abhay Kumar Singh (CSIR-CIMFR) (2025). **Effects of Revegetation on Abandoned Man-made Slopes of Chromite Mine in Sukinda Region, India**. In Mining Impact on Soil and Water Resources (1st ed., pp. 30–42). CRC Press (Taylor & Francis), India.
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PATENTS FILED IN INDIA

Sl. No.	Title	Filed on (Date)	Names of other inventors
1.	A Dust Guard System for Vehicles to Reduce Air-Borne Dust (Application No. 202411048167)	21-Jun-2024	Prabhat Kumar Mandal, Arka Jyoti Das, Subhashish Tewari, Rana Bhattacharjee, Ranjan Kumar, Ghosh Nilabjendu
2	Method For Controlled Synthesis of Mn3O4 Nanomaterials and their Nitrogen-Rich G-C3N4 Composites for CO2 Adsorption (Application No. 202411055558)	19-Jul-2024	Mysore Sridhar Santosh, Afaq Ahmad Khan
3.	Transition Metal Catalyst Free Expedient Catechol Oxidation to Quinone via Photo-Catalysis (Application No. 202511028884)	26-Mar-2025	Keshav Raghuvanshi, Souvik Barman, Pradip Kumar Banerjee

PATENTS FILED IN FOREIGN COUNTRIES

Sl. No.	Title	Country	Filed on	Names of otherinventors
1a.	Development of Oxygen Enriched Air Blown Pressurized Fluidized Bed Pilot Scale Gasifier	US (Application No. 18/836252)	06-Aug-2024	Prakash Dhondiram Chavan, Sujan Saha, Nilesh D Dhaigude, Vishal Chauhan, Gajanan Sahu, Sudipta Datta, Pradeep Kumar Singh
1b.	Development of Oxygen Enriched Air Blown Pressurized Fluidized Bed Pilot Scale Gasifier	AU (Australia) (Application No. 2023214885)	07-Aug-2024	Prakash Dhondiram Chavan, Sujan Saha, Nilesh D Dhaigude, Vishal Chauhan, Gajanan Sahu, Sudipta Datta, Pradeep Kumar Singh
1c.	Development of Oxygen Enriched Air Blown Pressurized Fluidized Bed Pilot Scale Gasifier	CN (China) (Application No. 202380020790.7)	07-Aug-2024	Prakash Dhondiram Chavan, Sujan Saha, Nilesh D Dhaigude, Vishal Chauhan, Gajanan Sahu, Sudipta Datta, Pradeep Kumar Singh
1d.	Development of Oxygen Enriched Air Blown Pressurized Fluidized Bed Pilot Scale Gasifier	JP (Japan) (Application No. 2024-547006)	07-Aug-2024	Prakash Dhondiram Chavan, Sujan Saha, Nilesh D Dhaigude, Vishal Chauhan, Gajanan Sahu, Sudipta Datta, Pradeep Kumar Singh
1f.	Development of Oxygen Enriched Air Blown Pressurized Fluidized Bed Pilot Scale Gasifier	ZA (South Africa) (Application No. 2024/06117)	08-Aug-2024	Prakash Dhondiram Chavan, Sujan Saha, Nilesh D Dhaigude, Vishal Chauhan, Gajanan Sahu, Sudipta Datta, Pradeep Kumar Singh
2a.	Efficient Volumetric High Pressure Adsorption Isotherm Experimental Set Up	US (Application No.18/856101)	11-Oct-2024	Debadutta Mohanty, Sujoy Chattaraj
2b.	Efficient Volumetric High Pressure Adsorption Isotherm Experimental Set Up	JP (Japan) (Application No.2024-560638)	11-Oct-2024	Debadutta Mohanty, Sujoy Chattaraj
2c.	Efficient Volumetric High Pressure Adsorption Isotherm Experimental Set Up	EP (European) (Application No. 23787973.9)	11-Nov-2024	Debadutta Mohanty, Sujoy Chattaraj
2d.	Efficient Volumetric High Pressure Adsorption Isotherm Experimental Set Up	CN (China) (Application No. 202380046435.7)	11-Dec-2024	Debadutta Mohanty, Sujoy Chattaraj
3a.	A Thermogravimetric Reactor (Tgr) To Study Weight Changes Of Solids and a Process Thereof	AU (Australia) (Application No. 2022456930)	31-Oct-2024	Prakash Dhondiram Chavan, Sujan Saha, Gajanan Sahu, Sudipta Datta, Vishal Chauhan, Nilesh Dhananjay Dhaigude, Pradeep Kumar Singh
3b.	A Thermogravimetric Reactor (Tgr) To Study Weight Changes Of Solids and a Process Thereof	EP (European) (Application No. 22940802.6)	05-Nov-2024	Prakash Dhondiram Chavan, Sujan Saha, Gajanan Sahu, Sudipta Datta, Vishal Chauhan, Nilesh Dhananjay Dhaigude, Pradeep Kumar Singh
3c.	A Thermogravimetric Reactor (Tgr) To Study Weight Changes Of Solids and a Process Thereof	US (Application No. 18/863571)	06-Nov-2024	Prakash Dhondiram Chavan, Sujan Saha, Gajanan Sahu, Sudipta Datta, Vishal Chauhan, Nilesh Dhananjay Dhaigude, Pradeep Kumar Singh

4a.	Solar-Based Multipurpose Utility System	EP (European) (Application No.23811326.0)	26-Nov-2024	Swades Kumar Chaulya, Girendra Mohan Prasad, Sujit Kumar Mandal, Gautam Banerjee, Surajit Dey, Virendra Kumar, Naresh Kumar, Preity, Vijay Kumar Rawani, Gopaljee Saw
4b.	Solar-Based Multipurpose Utility System	US (Application No.18/869672)	26-Nov-2024	Swades Kumar Chaulya, Girendra Mohan Prasad, Sujit Kumar Mandal, Gautam Banerjee, Surajit Dey, Virendra Kumar, Naresh Kumar, Preity, Vijay Kumar Rawani, Gopaljee Saw

PATENTS GRANTED IN INDIA

Sl. No.	Title	Granted on	Names of otherinventors
1.	Local Methane Detector for Hazardous Areas (Patent No.531766)	04-Apr-2024	Swades Kumar Chaulya, Girendra Mohan Prasad, Ajay Kumar Singh
2	Self-Retractable Cover System For Dump Trucks (Patent No. 533324)	16-Apr-2024	Ranjan Kumar, Ashish Narayan, Niraj Kumar, Afzal Hussain, Gautam Banerjee
3.	A System and Method for Real-Time Monitoring of Strata Behavior in Underground and Opencast Mine (Patent No. 540403)	31-May-2024	Ranjan Kumar, Dilip Kumbhakar, Sujit Kumar Mandal, Jitendra Kumar Singh, Sandip Oraon, Gautam Banerjee
4.	A Composition and Method for Preparation Thereof for Suppression of Dust Generated in Blasting Operations (Patent no. 546763)	31-July-2024	Firoj Ali, Braj Mohan Pat Pingua, Pradeep Kumar Singh
5.	An Oven and Method for Complete Carbonization of Volatile Matter (Patent No. 558876)	28-Jan-2025	Manish Kumar, Gautam Kumar Bayen, Monalisa Gangopadhyay, Rajiv Ranjan, Tarun Pramanik, Ashish Mukharjee, Pradeep Kumar Singh
6.	Graphitization Of Heat Altered Coal Waste in the Form of Natural Coke (Patent No. 562017)	06-Mar-2025	Ashok Kumar Singh, Pradeep Kumar Singh

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Sl. No.	Ref NO	Title	Date of Filing
1	008CR2025	Geotechnical Instrumentation and Ground Monitoring Analytics (GIGMA)	24-Feb-2025
2	016CR2025	DST - Desk Space Tree for Indoor Air Purification	11-Mar-2025

DESIGNS REGISTERED: 03

Sl. No.	Ref No.	Title	Application Number	Registration Number	Date of Registration
1	033DN2022	Technical Design of Soil Sampler to Collect Soil Sample in Layers	379874-001	166671	26-Apr-2024
2	030DN2022	Technical Design for Microbial and Chemical Reduction of Hexavalent Chromium from Waterbodies	379873-001	170716	22-May-2024
3	005DN2024	Vertical Biochar Kiln	410196-001	188666	02-Jan-2025

NEW AGREEMENT/MOUS SIGNED

Sl. No	Title of the Agreement	Party Name & Address	Signing date
1	Agreement bet' CSIR-CIMFR, Dhanbad and Intech Safety Private limited, Kolkata for "Automatic Dynamic Balancing of Pressure System"	M/s. Intech Safety Private Limited, Madhurima House, 83&84, Chanditala Main Road, Kolkata- 700 053, W.B	24.05.2024
2	Agreement for Collaborative Research bet' CSIR-CIMFR, Dhanbad and Syntron Industries Pvt. Ltd., Ahmedabad for Development of Dust and Fire Suppression Products	M/s. Syntron Industries Pvt. Ltd., 411/5, Phase II, GIDC, Vatva, Ahmedabad – 382445, Gujarat	24.05.2024
4	Agreement bet' CSIR-CIMFR, Dhanbad and Syntron Industries Pvt. Ltd., Ahmedabad for Manufacturing and Marketing of "Dustron PC Coal"	M/s. Syntron Industries Pvt. Ltd., 411/5, Phase II, GIDC, Vatva, Ahmedabad – 382445, Gujarat	24.05.2024
5	MOU between CSIR-CIMFR, Dhanbad and CMPDI, Ranchi for "Quality Evaluation of Coal Cores Explored from different Regions of India"	Central Mine Planning & Design Institute (CMPDI). Gondwana Place, Kanke Road, Ranchi- 834 031, Jharkhand	21.06.2024
6	MoU for Research & Development, Collaborative work, Training and Practical exposure for the scientists/ faculties/ staffs/ students	IIT, Hyderabad	30.09.2024
7	Memorandum of Agreement for the DBT funded project titled "Graphene-reinforced silk protein-based bioplastics for sustainable packaging applications"	Department of Biotechnology, Ministry of Science & Technology, Government of India, New Delhi	10.10.2024
8	First Amendment to Memorandum of Understanding bet' CSIR-CIMFR, Dhanbad and CSIR-URDIP, Pune	CSIR-Unit for Research and Development of Information Products, NCL Campus, S. No. 113 & 114, Pashan, Pune–411008	20.03.2025

PREMIUM /ROYALTY RECEIVED FROM TECHNOLOGY TRANSFER

Sl. No	**Title**	**Party Name & Address**	**Amount (₹)**
1	Knowhow Transfer of Automatic Dynamic Balancing of Pressure System	M/s. Intech Safety Private Limited, Chanditala Main Road, Kolkata	5,00,000
2	Emulsion Explosive Emulcoal-100, Emulcoal-300	M/s. IDL Explosives Limited, Kukatpally, Post Bag No. 1, Santhnagar (IE). Hyderabad	2,23,937
3	Mine Environment Monitoring System	Jagdamba Tyre Retreading Company, Gandhi Road, Dhanbad	15,000
4	Fragalyst Software (Version 6.0)	IIT (ISM) Dhanbad	2,93,480
		Total amount	**10,32,417**

STAFF NEWS

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Chief Scientist

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Mr. Kunwar Ambarish Singh
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Mr. Saurabh Singh
Mr. Vikash Kumar
Mr. Pushpendra Patel
Mr. Abhishek Chowdhury
Mr. Pankaj Kumar
Mr. Guguloth Suresh
Mr. Abhishek Kumar Singh
Mr. Kolikipogu Nageswara Rao
Mrs. Ranu Ishwarsing Bande
Mr. Sachchak Ramesh Waghmare
Mr. Amar Prakash Kaushik
Mr. Amit Kumar
Mr. Sameer Shekhar
Mr. Manish Kumar Meena
Mr. Ritu Raj Raman
Mr. Ashish Kumar Vishwakarma
Mr. Anand Shyamji Sharma
Ms. Priety
Ms. Kumari Anjali

Technical Assistant

Dr. Ranjeet Kumar Singh
Mrs. Priya Kumari
Mr. Abhishek Mahato
Mr. Amar Kumar Singh
Mr. Aditya Kumar
Mr. Subodh Kumbhkar
Mr. Vivek Singh
Mr. Prince Kumar
Mrs. Savita Kumari
Mr. Neeraj Kumar Sharma
Mr. Nilesh Dhananjay Dhaigude
Mr. Saikat Banerjee
Mrs. Arshi Perween
Mr. Md. Wahid
Mr. Sanjivan Kumar
Smt. Prerna Jaiswal
Mr. Banti Kumar Dhar
Mr. Ranjit Siddharth Rangari
Mr. Jagdeepa Oraon
Mr. Muddassar Raja
Mrs. Jyoti Sharma
Mr. Reddi Ganesh
Mr. Siddharth Bari
Mrs. Munmun Maji
Dr. Om Prakash Kumar
Mr. Debi Prasad Paikaray
Mr. Abdur Rahman
Mr. Subhay Kr Prasad
Mr. Shiva Kumar Saw
Mr. Rakesh Kumar Rawani
Mr. Jagapthal Vinod Kumar
Mr. Anand Kumar Singh
Mrs. Sumitra Giri
Mrs. Swati Singh
Mr. Mayuresh Dash

Senior Technician (2)

Mr. Kameshwar Ram
Mr. Braj Kishore Jaina
Mr. S.K. Mondal
Mr. Pradip Kr. Sharma
Mr. Sajjit Minz
Mr. Tapas Kumar Thakur
Mr. Bisheswar Soren

Senior Technician (1)

Dr. Shankhjit Mitra

Technician

Mr. Sanjeev Kumar Verma
Mr. Shubham Nigam
Mr. Sunil Hawsilal Rahangdale
Mr. Dhannanjay Pratap Singh
Mr. Simanta Sinha
Mr. Sameer Kumar
Mr. Guatam Gorai
Mr. Avinash Sharma
Mr. Suraj Kumar
Mr. Vijay Kumar Rawani
Mr. Swapan Mahato
Mr. Sushobhan Das
Mr. Deep Narayan Sharma
Mr. Rishikesh Saroj
Mr. Harshal Rajendra Wakade
Mr. Pradeep Kumar

Laboratory Assistant

Mr. Sakti Pada Mandal
Mr. Padambir Shah
Mr. Binod Kr. Singh
Mr. Deb Das Roy
Mr. Bhupen Singh
Mr. Uma Shankar Ganguly
Mr. Sudhir Kr. Ojha
Mr. Debabrata Sikdar
Mr. Kaleshwar Besra
Mr. Ganesh Paswan
Mr. Nishi Bhusan Jha
Mr. Tetru Mahato
Mr. Somra Oraon
Mr. Tulsi Rajwar
Mr. Birendra Dusad
Mr. Soma Munda
Mr. Mridul Kanti Sarkar
Mr. Saroj Kr. Singh
Mr. Joy Das
Mr. Duryodhan Hari
Mr. Rajib Chandra Acharyya
Mr. Bishtu Manjhi
Mr. Suresh Ram
Mr. Arun Kr. Singh
Mr. Dinesh Ramdas Shinde
Mr. Arjun Besra
Mr. Abadh Kishore Bharti
Mr. Goutam Goswami
Mr. Sanatan Hembram
Mr. Bailun Rabidas
Mr. Shashi Kant Roy
Mr. Pawan Hari
Mr. Resham Lal Mandrey

Laboratory Attendant

Mr. P.G. Prasad Dagore

Controller of Administration
Mr. Alok Sharma
Mr. Shambhu Sharan Mandal

Private Secretary
Mr. Dipak Kumar Singh
Mr. Patit Pawan Mandal
Mrs. Anjali R. Jaipilley

Hindi Officer
Ms. Sahana Chaudhuri
Mrs. Anima Kumari Mahato

Section Officer (Adm.)
Mr. Rakesh Kumar
Mr. Keshri Kumar
Mr. Sunil Kumar
Mr. Ranu Kumar
Mrs. Rita Dutta
Mr. Amod Kumar

Assistant Section Officer (Gen.)
Mr. Rajesh Kumar Sahu
Mr. Bhagawan Singh
Mr. Mithu Hari
Mr. Shyamal Mukherjee
Mr. Sanjib Dasgupta
Mr. Dharmendra Kr. Singh
Mr. Sunil Kumar Mondal
Mr. Md. Kashif Kamal
Mr. Abhishek Kumar
Mr. Ram Kanai Mondal
Mr. Sumit Kumar Singh
Mr. Vinod Prakash
Mr. Pratesh Kumar
Mr. Tannu Rani
Mr. Nisha Chikara
Mr. Kishan Kumar

Senior Stenographer
Mr. Manoj Kumar Mandal
Mr. Vivek Singh
Mrs. Shubhangi Kumari

Junior Stenographer
Mr. Abhishek Kumar Pandey

Junior Secretariat Assistant (Gen.)
Mr. Baiju Kumar
Mr. Amit Kumar Mahto
Mr. Sujeet Kumar
Mr. Panchanand Bauri
Mrs. Juhi Priya
Mr. Abhishek Anand
Mr. Sunny Murmu
Mr. Sunil Soreng
Mr. Somendra Mohanty
Mr. Vijay Kishor Hansda
Mr. Pritam Wamanrao Meshram
Mr. Hemant Kumar
Mr. Anant Kumar Prasad
Mr. Debarun Chatterjee
Mr. Marshal Topno

Controller of Finance & Accounts
Mr. Anuj Mohan Pradhan

Finance & Accounts Officer
Mr. Priyam Mukherjee

Section Officer (F&A)
Mr. Amrit Kumar
Mr. Shoubhik Sarkar
Mr. Ajay Kumar Das
Mr. Arun Kumar Gupta

Assistant Section Officer (F&A)
Mr. Santosh Kumar
Mr. Ranjan Kumar Sinha
Mr. Murselim Khan
Mr. Dinesh Kumar

Senior Secretariat Assistant (F&A)
Mr. Ranjit Kumar Mandal

Junior Secretariat Assistant (F & A)
Mrs. Sanskriti Kumari
Mr. Guru Gopal
Mr. Rahul Mandal
Mr. Krishna Sonar

Controller of Stores and Purchase
Mr. Nalin Kumar Singh

Stores and Purchase Officer
Mr. Naveen Kumar Sharma

Section Officer (S&P)
Mr. Akshay Kumar Das
Mr. Bikash Kumar Goswami

Assistant Section Officer (S & P)
Mr. Nalin Kumar
Mr. Mohan Kumar Tudu
Mr. Diwakar Aloke Srivastava
Ms. Madhu Kasana

Junior Secretariat Assistant (S&P)
Mr. Rakesh Kumar Singh
Mr. Rameshwar Murmu
Mr. Pradeep Kumar Uthwal
Mr. Pintu Kumar Bhomick

AWARDS & HONOURS

AWARDS:

1. Dr. J. K. Pandey, Chief Scientist has been conferred with the *National Geoscience Award*-2024.
2. Dr Harsh Kumar Verma, Senior Principal Scientist received *National Geoscience Award*-2023 by Hon'ble President Smt. Droupudi Murmu on 20.08.2024 at Rashtrapati Bhawan, New Delhi.
3. Dr. Narayan Kr. Bhagat, Sr. Technical Officer (2) received *MEAI-SCCL Coal Award-2023* for mining engineer on 19th July 2024.
4. Dr. Vivek Kumar Himanshu, Sr. Scientist received *Dainik Bhaskar Khanik Samman* on 6th October 2024.
5. Dr Santosh Behera has been conferred with "*IEI Young Engineers Award 2024-25*" in Mining Engineering by The Institution of Engineers (India) at Neyveli, Tamil Nadu.
6. K K Karan, R E Masto and H Agarwalla awarded with *1st Prize in Poster Presentation Category* on *Influence of Ashing Temperatures on the Concentration and Distribution of Critical Elements in Coal Ash.* Innovations in Coal & Mineral Characterisations for Sustainable Resource Utilization (ICMCS 2025), Fairfield by Marriott, Kolkata held on 30-31 Jan 2025.
7. KK Karan, RE Masto, H Agarwalla, V Singh, RN Senapati, Manish Kumar and S Bari awarded with *Outstanding Poster* on *Critical Elements in Combustion Residues* at AICMRH's Symposium & Workshop on Critical Minerals, 2-4 January 2025, IIT Hyderabad
8. Dr. R. E. Masto & Mr. Rupesh Singh were the *1st Prize Winner* in the Hackathon on Coal Gasification-2024 for providing conceptual solution on Problem Statement-5 "Utilization of by-product produced in gasification process"
9. The Gasification Research Group received *1st Runner-up* in "Hackathon on Coal Gasification" for Problem Statement of "Alternatives Technologies", organized by CMPDI, CIL, GoI.
10. Dr. Arka Jyoti Das has received the *Young Associate Award 2024* from the Indian National Academy of Engineering (INAE).
11. Dr. Arka Jyoti Das has received *Khanik Samman 2024* by the Bharat Coking Coal Limited (BCCL).
12. Dr. Ranjan Kumar received the *Best Paper Award* from IEI (India), Jharkhand State Centre, 2024.
13. Dr. Ranjan Kumar was awarded with *Chevening Research, Science and Innovation Leadership Fellowship*, FCDO, United Kingdom & Oxford University, 2025.
14. CSIR-CIMFR received Best Exhibition Award in the field of R&D in Mining & Fuel Research for Outstanding Participation in *RADIANT JHARKHAND Exhibition* at Jamshedpur.
15. Mr. Abhishek Pandey Bharat, AcSIR Research Scholar in Group WRM received *Best Paper Award* at IAH Meeting in Jaipur.
16. Ms Dikchha Singh, Research Scholar got the *Best Paper Presentation (Oral) Award* in the National Symposium on Biochemistry and Nanotechnology for the Environment, organized by Central University of Gujrat, Vadodara.
17. Dr M S Santosh, Sr. Scientist and Ms Amrita Tripathy, Research Scholar won the *Best Poster Award* at CSIR - IMMT as part of the National Conference on Sustainable Science and Technology for Viksit Bharat.

18. Mr. Suraj Kumar, Technical Officer, REE Research Group received the *Certificate and Award in the Best Video Category* at 14th Symposium of FRAGBLAST at Antalya, Turkey.

19. Dr. K M P Singh of CMP Research Group, won *2nd Runner-Up Award* in the Hackathon for R&D under Problem Statement 5: "Technology for efficient management of Coal Grade Monitoring system".

20. CSIR-CIMFR Team comprising Dr. P. K. Mandal, Dr. Arka Jyoti Das and Prashant was the *1st Prize Winner* of the Hackathon on R&D 2025 in the Problem Statement 6: "Indigenous Development of Suitable Pastefill Material for Use in Underground and Highwall Mining".

21. Ms. Shweta Kumari, Research Scholar has won a *Best Poster Prize* in the conference on Green Steel Production via Decarbonization for Sustainable and Circular Economy (GSP-2024) held at IIT-ISM.

22. Team consisting of Dr. Vivek Kumar Himanshu and Mr. Nilabjendu Ghosh got the *First Prize* in the MEAI National Quiz -2024 held on 5th November 2024.

HONOURS:

1. Dr. Shripal Singh, Chief Scientist is appointed as a Member of the Board of Study of Chemistry in Govt. E. Raghvendra Rao PG Science College, Bilaspur (Chhattisgarh); as a Member of the Board of Study of Chemistry in Govt. Bilasa Girls PG College, Bilaspur (Chhattisgarh) and as a Member of the IQAC of Govt. Bilasa Girls PG College, Bilaspur (Chhattisgarh) and attended meetings.

2. Dr. Shripal Singh, Chief Scientist was nominated as a Chairman of NABL PCD (7)- subcommittee "Chemical analysis of coal" and Revised BIS 1350 (part 5): 2017, Determination of special impurities (carbon present as carbonate, chlorine and phosphorus).

3. Dr. Shripal Singh, Chief Scientist was invited as a Chief Guest in Bilasa Girls PG college, Bilaspur on 27th Feb 2025 io the occasion of National Science Day celebrations and delivered a lecture on "Importance of science in the growth of the country". He was also invited as Chief Guest in SCI-TCH 2 event organized by Choukse College of Science and Commerce, Bilaspur (C.G.) on 28th Feb.2025 on the occasion of National Science Day and delivered a lecture.

4. Dr Harsh Kumar Verma, Senior Principal Scientist was nominated as a Jury Member of Grand Finale of Smart India Hackathon 2024 at Amity University Chhattisgarh, Raipur during 11-12 Dec 2024. He delivered an invited SCIENCE Day Lecture on Empowering Indian Youth for Global Leadership in Science & Innovation for Viksit Bharat" at Central University Bilaspur (CG) on 28.02.2025.

5. Dr. Aditya Rana, Saikat Banerjee, Gaurav Kumar and Dr. C. Sawmliana received an Appreciation Letter from AEE (Civil)/OOC 114 RCC, BRO, Ladakh for safely execution with faster progress of road widening works using controlled blasting at the critical road stretches of Nimmu-Padam-Darcha Road, Ladakh.

6. Dr. Santosh Kumar Ray, Chief Scientist and HOS, and Dr. Debasish Mishra, Senior Scientist were invited as expert members for the Generation of Question Bank for Computer Based Test (CBT) for Manager's, Certificate of Competency under the CMR, 2017& MMR, 1961 at DGMS, Dhanbad.

7. Two expert lectures were delivered by Dr. Santosh Kumar Ray, Chief Scientist and HOS in a training program on "Fire Fighting Practices in Mining Industry" during 3rd to 6th December 2024 at National Institute of Technology, Rourkela.

8. Dr. Debashish Mishra, Senior Scientist delivered online lecture in Department of Mining Engineering, Rai University, Ranchi on the occasion of National Technology Day.

9. Dr. Santosh Kumar Ray, Chief Scientist was nominated as expert member in a committee to explore the possibilities of indigenous manufacturing of Rescue apparatus & equipment under Make in India concept. Meeting was held twice in Bhubaneswar. He also organized a high level meeting with Sri Manoj

Kumar, Director Technical UCIL at Jaduguda. 10 Scientists of CSIR-CIMFR Dhanbad and four officials of UCIL, Jaduguda attended the meeting at Jaduguda.

10. Dr. Jai Krishna Pandey, Chief Scientist participated in several meetings conducted by MoEFCC, New Delhi and Board of Mining Examinations, DGMS, Dhanbad.
11. Dr. P. K. Mandal was nominated as Editor of Mining, Geological and Metallurgical Institute of India (MGMI) for the MGMI publications of MGMI Transactions and MGMI News Journal. He was also nominated as one of the Editors of the Proceedings Volume of the 11th Asian Mining Congress.
12. Dr. Santosh Kumar Behera, Sr. Scientist has been selected as a member of the Technical/Scientific Committee for MINEFILL 2026, the premier International Conference on Mine Backfill and Paste Fill technology.
13. Dr M. S. Santosh, Sr. Scientist has been selected as a Member of the Global Young Academy.
14. Dr. Narayan Kumar Bhagat, Sr. Technical Officer have been selected as a member of the International Advisory Committee for 5th International Conference on Information Technology in Geo-Engineering to be organised at Colorado School of Mines during August 05-08, 2024.
15. Dr. Ashish Kumar Vishwakarma received SERB International Travel Grant for presenting a paper at 50th ISEE conference at Savannah, Georgia, United States of America.

ATTAINMENT OF QUALIFICATION

1. Dr. Ashish Kumar Vishwakarma was awarded PhD Degree on 08.10.2024 from IIT-Kharagpur.
2. Dr. Pavan Kumar Gupta received the PhD on 17th December, 2024 from the Department of Chemical Engineering, IIT (ISM) Dhanbad."
3. Dr. Om Prakash Kumar has been awarded PhD from IIT-BHU.
4. Dr. Asfar Mobin Khan is awarded with PhD from AcSIR.
5. Dr. Priyanka Kumari Ujala, Awarded PhD from AcSIR, in October 2023.

VISITS ABROAD

- Dr. C. Savamliana, Chief Scientist; Dr. Aditya Rana Senior Scientist and Shri Saikat Banerjee, Technical Assistant visited Bhutan in May 2024 for site visit and technical discussions with Border Roads Organisation (BRO) for safe demolition of damaged bridge.

- Dr. Vivek Kumar Himanshu, Senior Scientist and Dr. Narayan Kumar Bhagat Senior Technical Officer (2) visited USA to attend and present research papers in the “5th International Conference on Information Technology in Geo-engineering” held at Colorado, USA during 5th to 8th August 2024.

- Dr. V.A. Mendhe, Chief Scientist visited Mongolia to attend the 40th Annual Meeting of Society for Organic Petrology (TSOP) held at Ulaanbaatar, Mongolia from 14th to 22nd September 2024 and present research papers in the International Conference organized under this meeting.

- Dr. Bhagirath Ahirwal, Senior Principal Scientist and Dr. (Mrs.) Mousami Mallick, Principal Scientist visited Kirkel-Limbach, Germany from 16-22 December 2024 for factory visit for inspection of wire rope.

- Dr. M. S. Santosh, Senior Scientist visited University of Connecticut, USA from 06-17 March 2025 in connection with USISTEF funded GAP project on “Hydrogen separation from coal-derived synthetic gas using new membrane compositions: An opportunity for commercialization in the near future”.

COLLOQUIA ORGANISED

TRAINING PROGRAMS/WORKSHOPS/SEMINARS/CONFERENCES

• SKILL DEVELOPMENT / EXECUTIVE DEVELOPMENT PROGRAMS

Under CSIR Integrated Skill Initiative, the following training programs were organised:

- A Skill Development Program on "**Clean Coal Technologies - Theory and Practies**" was organised from 27 May to 24 June, 2024 at the CSIR-CIMFR, Barwa Road, Dhanbad. The course was attended by 49 students of B. Tech. Chemical Engineering from BIT Sindri, Dhanbad and BIT Mesra, Ranchi.



Clean Coal Technologies - Theory and Practies

- A Skill Development Program on "**Quality Monitoring of Water and Waste Water: Laboratory Analysis, Data Interpretation and Quality Assurance**" was organised from 09-16 July, 2024 at the CSIR-CIMFR, Barwa Road, Dhanbad. The course was attended by 17 students from Binod Bihari Mahto Koyalanchal University, Dhanbad and 04 research scholars from CSIR-CIMFR.



Quality Monitoring of Water and Waste Water: Laboratory Analysis, Data Interpretation and Quality Assurance

- A 3-Days Skill Development Program on "**Foundational Skills to Meet the Demands of Modern Scientific Research**" was organised during 12 – 14 November 2024 Under CSIR Integrated Skill Initiative at the CSIR-CIMFR, Digwadih Campus, Dhanbad. The course was attended by 28 research scholars, project fellows/assistants from CSIR-CIMFR.



Foundational Skills to Meet the Demands of Modern Scientific Research

- A 2-Days Skill Development Program on "**Fundamentals on Coal and Hydrocarbon Geosciences**" from 16th to 17th December, 2024 at CSIR-CIMFR, Barwa Road and Digwadih Campus. The course was attended by 28 students of M.Sc./PhD students from Ranchi University, Vinoba Bhave University and IIT(ISM), Dhanbad.


Fundamentals on Coal and Hydrocarbon Geosciences

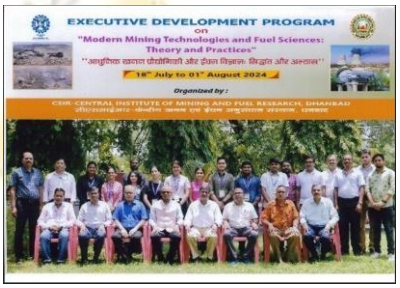
- A Skill Development Program on “Analytical Chemistry and its Application in Soil and Water Analysis" was organised from 03-07 March, 2025 at the CSIR-CIMFR, Digwadih Campus. The course was attended by 21 students from M.Sc. Chemistry and Environmental Science from Binod Bihari Mahato Koylanchal University and Vinoba Bhave University.



Analytical Chemistry and its Application in Soil and Water Analysis

- An Executive Development Program on “**Modern Mining Technology and Fuel Science: Theory and Practices**” for 12 no. of GETs from M/s Hindalco Industries Ltd. had been organized from 18th July – 01st August, 2024.





Modern Mining Technology and Fuel Science: Theory and Practices

• WORKSHOPS

- A workshop on "**Recent Advances in Underground Metal Mining**" (RAUMM-24) was organized by CSIR-CIMFR, Nagpur Research Centre, on Dec 23-24, 2024, which brought together 94 experts from top mining organizations. Sponsored by MOIL Ltd. & Hindustan Copper Ltd., it featured 12 technical sessions on mining innovation.



Recent Advances in Underground Metal Mining (RAUMM-24)

- One-Day Workshop & ASNT India NDT Network Program on "**Advances in Non-Destructive Evaluation of Steel Wire Ropes in Mining and Aerial Installation: Theory and Practices**" was organised by CSIR-CIMFR in association with ASNT on 10.01.2025 at CSIR-CIMR, Barwa Road, Dhanbad which was attended by 40 participants from different organisations. The workshop was graced by Mr. D. B. Naik, Deputy Director General (Mech.) of DGMS as the Chief Guest and Mr. Prakash Gokulanadam, Director & General Manager of ASNT India Pvt Ltd as the Guest of Honour.



Advances in Non-Destructive Evaluation of Steel Wire Ropes in Mining and Aerial Installation: Theory and Practices

- A workshop on "**Sustainability in Coal Beneficiation: Challenges and Opportunities**" was organised on 29th January, 2025 at CIMFR, Digwadih Campus, Dhanbad. The event was attended by 133 participants. Sri. Samiran Dutta, CMD, BCCL inaugurated the workshop as Chief Guest. Prof. D. D. Misra, Chairman, Research Council, CSIR-CIMFR presided over the Inaugural function.


Sustainability in Coal Beneficiation: Challenges and opportunities

- Two-Day National Workshop on "**Rock Blasting Innovations for Safety & Efficiency**" (RISE-25) during 14-15 March 2025 at NITK, Surathkal organized jointly by Department of Mining Engineering NIT, Karnataka, CSIR-CIMFR, Dhanbad and Department of Mining Engg. Anna University, Chennai.

Rock Blasting Innovations for Safety & Efficiency (RISE-25)

- Two-Day National Workshop on "**Challenges and Opportunities in Gasification"** (CARING 2024) was organized at the Digwadih Campus of the Institute. Shri Anandji Prasad, Project Advisor, Ministry of Coal graced the Inaugural session on 26.06.2024 as the Chief Guest. Sri Sanjay Singh, Director Technical (OP), BCCL and Mr. Ayush Raj Sinha from Ministry of Steel graced the Valedictory session of CARING 2024 on 27.06.2024.

Shri Anandji Prasad, Project Advisor, Ministry of Coal inaugurating the workshop on "Challenges And oppoRtunities IN Gasification (CARING) 2024" on 26.06.2024 as the Chief Guest

• SEMINAR

- CSIR-CIMFR, Dhanbad and the Mining Geological and Metallurgical Institute of India, Dhanbad Chapter, jointly organized a two-days National Seminar on "**Technological Advancements for Sustainable Mining and Exploration**" on 31st January & 1st February, 2025 at CSIR-CIMFR, Dhanbad with more than 250 participants from 36 different industries, research organisations and academic institutions.

Shri P.M. Prasad, CMD, CIL gracing the Inaugural Session of TASME 2025 as Chief Guest

Shri D. B. Sundara Ramam, Vice President - Raw Material, Tata Steel gracing the Inaugural Session of TASME 2025 as Guest of Honour.

Shri Satish Jha, CMD, (ECL), gracing the valedictory session of TASME 2025 as Chief Guest

Shri Manoj Kumar Agarwal, Director (Technical) P&P, graced the valedictory session of TASME 2025 as Guest of Honour

• VOCATIONAL/DISSERTATION TRAINING

During the said period, vocational/dissertation training were organised for postgraduate (PG) and undergraduate (UG) engineering and science students as per their academic requirement. Students from various colleges/universities like: Dr. S.P. Mukherjee University; Tripura University; Visva-Bharati University; NIT, Patna; Vellore Institute of Technology; Techno India University, West Bengal; BIT Sindri, Dhanbad, Banasthali Vidyapeeth, Rajasthan etc. A total of **59** (34 PG Science /Engineering, **53** UG Science/Engineering) of various streams like B.Tech. (Computer Science & Engineering), M.Sc. (Geology), B. E. / B. Tech. (Mining Engineering), M.Tech. (Civil Engineering), M.Sc. (Microbiology), B.Tech. Chemical Engineering/Biotechnology/ECE etc. were benefited from the vocational/project trainings.

For the purpose of Knowledge Sharing & Knowledge management, **403** scientists, technical officers and staff of this Institute were facilitated to participate in various national and international conferences/ seminars/ workshops.

JIGYASA: STUDENT-SCIENTIST CONNECT PROGRAMS

The following events were organized under the **CSIR-Jigyasa : Student-Scientist Connect program** during the year 2024-25:

i) A One-Day Workshop on the themes "**An App Based Interactive Mineral Map of India**" and "**Microscope: A Journey to a Curious Exploration**" was organized on 26.04.2024. **30** students from three various schools, along with their teachers from Kasturba Gandhi Balika Vidhyalaya, Jharia; Utkramit Uchh Vidyalaya, Kashiyatand and Sanskriti Vidhaya Mandir, Digwadih participated.



ii) 5-Days **Summer Camp** was conducted during 27-31 May 2024 at CSIR-CIMFR Dhanbad to Inculcate Scientific Temperament and Innovative Thinking amongst students on the following topics:

- Artificial Intelligence and Machine Learning: Their role in Academic Excellence
- 3D Printing: The Modern Manufacturing Option.
- Microscope: Unraveling the Unseen world of Microbes.
- DIY projects using Science Kit
- Intellectual Property Right
- Strengthening Knowledge about Mineral Treasure of India

40 nos. of students from different school of Dhanbad district participated in the camp.



iii) A Program on "**Artificial intelligence and its Role in Academic Excellence: The Beginning of New Era**" was organized at Utkramit Madhya Vidyalaya, Dhanbad on 21.06.2024 for **53** students of class 04th to 08th.


iv) 3-Days Workshop was organised during 03-05 July, 2024 at CSIR-CIMFR, Dhanbad for the **36** nos. of students of Credo World School, Dhanbad on the following topics:

- Artificial Intelligence: Their role in Academic Excellence
- Machine Learning: A new pattern of Erudition
- Augmented Reality and Virtual Reality: Emerging Tools for Technological Breakthroughs



v) CSIR-CIMFR organized the "**One Health**" campaign under the CSIR-Jigyasa program:

- At Utkramit Uchh Vidyalaya, Dhanbad, on September 11, 2024 to educate 54 students and 2 teachers.
- At Eklavaya Madhyamik Vidyalaya, Sahraj, Dhanbad, on September 13, 2024, to educate 61 students and 02 teachers.
- At Kasturba Gandhi Balika Vidyalaya, Dhanbad, on September 20, 2024 to educate 50 students and 02 teachers.

The sessions covered topics like zoonotic diseases, AMR, pandemics, adulteration hazards and nutrition.


vi) CSIR-CIMFR organized the "**One Health**" campaign under the CSIR-Jigyasa program at PM-SHRI School Jawahar Navodaya Vidyalaya, Benagoria, Nirsa, Dhanbad on October 07, 2024 to educate 40 students. The session covered topic on interconnections between human, animal, and environmental health.


vii) CSIR-CIMFR organized a "**Quiz competition**" at Utkramit Uchh Vidyalaya, Kashiyatand on October 16, 2024 for promoting cleanliness and hygiene among 102 students as part of the "**Swachhta Hi Sewa**" campaign, conducted by the CSIR-CIMFR Jigyasa Group.



viii) CSIR-CIMFR Dhanbad hosted the **Vidyarthi Vigyan Manthan** (VVM) State Level Camp on 15.12.2024 bringing together 101 students from across Jharkhand after an intense selection process. The event celebrated their knowledge and enthusiasm through an engaging exam and an inspiring awards ceremony. Prof. Sukumar Mishra, Director, IIT(ISM) Dhanbad graced the above occasion as the chief guest and Mr. Ashok Kumar, State Coordiator, VVM as the guest of honour.



Vidyarthi Vigyan Manthan

ix) A 2-days Teacher Training Workshop during 17-18 December 2024 was organised at CSIR-CIMFR, Dhanbad under the CSIR-Jigyasa program in collaboration with the Royal Society of Chemistry.



A 2-days Teacher Training

x) CSIR-CIMFR conducted a hands-on training session on the "**DIY Science Kit**" on 17.02.2025 under the Jigyasa Program for the Students of Utkramit +2 Uchh Vidyalaya, Virajpur, Dhanbad. A total of 54 students and 04 teachers from the school took part in this program.



xi) CSIR-CIMFR welcomed students from Kendriya Vidyalaya Gomoh for a **Lab Visit** under the PM Shri Scheme under CSIR-Jigyasa Program on 27.02.2025.



xii) CSIR-CIMFR Organized the Program "**One Health: Integrating Human, Animal and Environmental Health for Diseases Prevention**" under the CSIR-Jigyasa at Board Madhya Vidyalaya, Mugma on March 11, 2025 to educate 64 students and 02 teachers.

MAJOR EVENTS

- "**National Technology Day**" was celebrated on 13.05.2024. Shri D. B. Sundara Ramam, Vice President, Raw Material Division, Tata Steel graced the occasion as the Chief Guest.

"National Technology Day-2024"

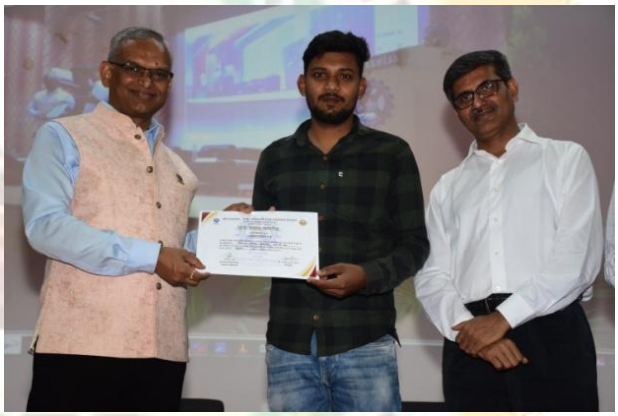
- Sri Prabhat Kumar, Director General, DGMS & Sri Sanjay Kumar Singh, Director Technical (OP) BCCL visited CSIR-CIMFR as Distinguished guests on the occasion of "**World Environment Day"** on 05.06.2024 for promoting awareness and sustainable solutions for facing environmental challenges.

"World Environment Day-2024"

- Honourable Shri Dhullu Mahato, MP, Dhanbad graced the "**International Yoga Day 2024**" on 21.06.2024 as the Chief Guest at CSIR-CIMFR, Barwa Road Stadium.

"International Yoga Day-2024"

- **Hindi week** was successfully organized from 02 September to 09 September. The event was inaugurated by Prof. Ram Kumar Singh, VC, BBMKU, Dhanbad. During Hindi week, ten CIMFR members who did the maximum work in Hindi throughout the year were honored.



"Hindi Week – 2024"

- Prof. Budaraju Srinivasa Murty Director, IIT, Hyderabad graced on the occasion of **83rd CSIR Foundation Day** on 30.09.2024, as the Chief Guest and Shri Ravindra Kumar, Director (Operations), NTPC was the Guest of Honour.

"83rd CSIR Foundation Day"

Prize Distribution on the occasion of 83rd CSIR Foundation Day

- CSIR-CIMFR celebrated the "**9th Ayurveda Day"** on 29.10.2024. Dr. Ashok Kumar Sinha, Research Officer (Ayurveda), Regional Ayurveda Research Institute, Patna, delivered a Talk on "Ayurveda Innovation for Global Health".

"9th Ayurveda Day"

- CSIR-CIMFR hosted the "**Curtain Raiser for IISF 2024"** on 11.11.2024, unveiling the theme "Transforming India into an S&T-driven Global Manufacturing Hub." The event featured 162 students, with Chief Guest Prof. Arvind Choubey, Director, NIT Durgapur.

The curtain raiser for IISF 2024 unveiling the theme "Transforming India into an S&T-driven Global Manufacturing Hub."

- CSIR-CIMFR, Dhanbad celebrated its "**78th Foundation Day"** on 17th November, 2024. Prof. Sukumar Mishra Director, IIT (ISM) Dhanbad graced on the occasion of the above as the Chief Guest. Prof. D. D. Misra, Chairman, Research Council, CSIR-CIMFR, Dhanbad was the Honoured Guest during the event.


"78th Foundation Day of CSIR-CIMFR"

- The "**Vigilance Awareness Campaign, 2024**" was organized at CSIR-CIMFR, Dhanbad on 14th November, 2024.



"Vigilance Awareness Campaign, 2024"

- The "**Indian Mining Day-2024**" was celebrated on 27.12.2024. Shri Ajay Kumar, Director (Technical/Planning & Design), CMPDIL, Ranchi graced this occasion as chief guest of this celebration and also delivered the Indian Mining Day lecture on this program.


"Indian Mining Day, 2024"

- CSIR-CIMFR celebrated "**International Women's Day-2025**" on 07.03.2025 with empowering address from Chief Guest, Ms. Madhvi Mishra, Deputy Commissioner of Dhanbad.


"International Women's Day-2025"

- **"National Science Day – 2025"** was celebrated on 28th February 2025 featuring an Online Interactive Session with Dr. Manu Prakash, Associate Professor, Stanford University on "Foldscope & Frugal Science". Students assembled the Foldscope to see tiny things like onion cells, curd, dust, and insect wings – things they had never seen before.


"National Science Day 2025"

- Nagpur Research Centre of CSIR-CIMFR organised an interactive event with Nagpur based NGO, Nisargvedh on 14th July 2025. "Nisargvedh" is working in the field of afforestation, education, rural welfare, water conservation and urban awareness. A talk was delivered by Shri Sukesh Gandhi, Founder of the Nisargvedh highlighting the activities of the organisation. Miss Shruti Jain, Conservationist and Project Head- Nisargavedh highlighted contribution of the organisation through a short film.


An Interative Event at Nagpur Research Centre

- Shri Raviraj Sharma, Municipal Commissioner, Dhanbad Municipal Corporation, Dhanbad graced the occasion as the Chief Guest on the occasion of closing ceremony of **"Swachhata Pakhwada"** on 17.05.2024.


"Swachhata Pakhwada"

IMPORTANT VISITORS

- Dr. N. Kalaiselvi, DG, CSIR & Secretary DSIR visted CSIR-CIMFR on 23rd and 24th May 2024 for exploring groundbreaking research in coal beneficiation and inaugurating innovative facilities, fostering collaboration and emphasizing sustainability.

Inauguration of 1000 Ton Horizontal Tensile Testing Facility by Dr. N. Kalaiselvi, DG CSIR

Inauguration of AcSIR centre at CSIR-CIMFR by Dr. N. Kalaiselvi, DG CSIR

Dr. Brajesh Pandey, Executive Director, Indian National Science Academy, New Delhi visited CSIR-CIMFR Barwa Road on 03.08.2024 and delivered a talk on "Connecting Science with Society".

Dr. P. K. Satyawalli, Director, DRDO-DGRE alomg with a team visited CSIR-CIMFR on 9th January 2025

An interactive session with Shri Prabhat Kumar, Former Director General of Mines Safety (DGMS)

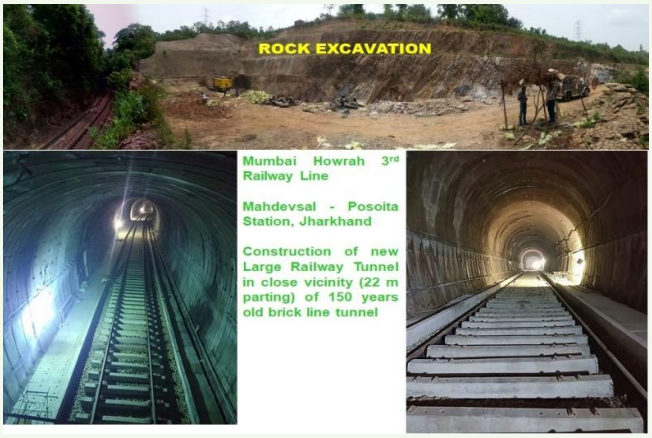
Dr. Hirak Ranjan Das, Director AICTE visited CSIR-CIMFR on 25.03.2025 and interacted with Scientists and Technical Staff.

A visit by Sri Arun Misra, CEO, HZL to CSIR-CIMFR Dhanbad on 8th January 2025

सीएसआईआर- केन्द्रीय खनन एवं ईंधन अनुसंधान संस्थान, धनबाद

विज्ञान एवं प्रोद्योगिकी मंत्रालय, भारत सरकार, नई दिल्ली के अंतर्गत सीएसआईआर की एक अंगीभूत प्रयोगशाला

CSIR-CENTRAL INSTITUTE OF MINING AND FUEL RESEARCH (CIMFR), DHANBAD, a constituent laboratory under the aegis of Council of Scientific and Industrial Research (CSIR), New Delhi aims to provide R&D inputs for the entire coal-energy chain encompassing exploration, mining and utilization with the Vision "To be an internationally acclaimed mining and fuel research organization"



Major Contributions of CSIR-CIMFR are:

- Development of Safe Methods and Assessment of Stability of Mine Workings
- Design of Backfilling Systems for Stabilization of Mine Workings
- Design of Safe Blasting Patterns of Mines
- Assessment of Subsidence and Ground Movement due to Mining
- Design of Environmental Management Plan for Eco-Friendly Mining and Coal Based Industries
- Investigations on Methane Emission due to Mining and GHG Inventories
- Resource Evaluation and Reservoir Modeling of Coal bed Methane
- Evolution of Methods to Control Mine Fire
- Design of Support Systems for Mines
- Design & Development of Equipment, Instruments and Components for Safe Mining
- Coal Quality Assessment
- Basic Studies on Coal Science
- Coal Preparation
- Coal Carbonization
- Coal Liquefaction – Direct and Indirect routes
- Coal Gasification
- Coal Combustion
- Non Fuel Uses of Coal/ Value Added Chemicals
- Fly Ash Utilization

CSIR-CIMFR also extends testing, evaluation, calibration and consultancy services for explosives and accessories, mine ventilation and safety equipment, roof supports, personnel protection equipment, flameproof and intrinsically safe equipment, electrical cables, mining and allied industrial components, wire ropes, cage and suspension gear components, aerial ropeways, etc., for their safe use. All facilities for conventional & instrumental analysis of coal & coke, coal washing pilot plant, pilot coke oven by electrical heating & non-recovery type, XRF, XRD, FTIR, FETR, DTF, TGA, Surface Area Analyser, Porosimeter, coal water emulsion, GTL, PTGA-MS, HPLC, CPT, IPT, etc; EIA & monitoring of air, water, noise & soil pollution, GC, particle size analyzer, washability investigations on coals for cleaning potentialities, various laboratory tests on coal preparation, coal washing pilot plant for coarse and fine coal beneficiation.

For Further Information Please Contact:

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CSIR-Central Institute of Mining and Fuel Research (CIMFR), Dhanbad, a constituent laboratory under the aegis of Council of Scientific and Industrial Research (CSIR), New Delhi aims to provide R&D inputs for the entire coal-energy chain encompassing exploration, mining and utilization. The laboratory also strives to develop mineral based industries to reach the targeted production for country's energy security and growth with high standards of safety, economy and cleaner environment. In view of the National Missions declared by the Government of India, CIMFR has re-aligned its vision, missions and policies and also redefined targets for short and long terms. This would promote rapid sustainable national techno-economic growth with equal emphasis on self-sustenance. CSIR-CIMFR is located in the town of Dhanbad, known as coal capital of India of Jharkhand state of India. It is strategically situated in the Damodar basin of Eastern part of the country which is endowed with rich coal deposits and hosts several large mineral based industries.