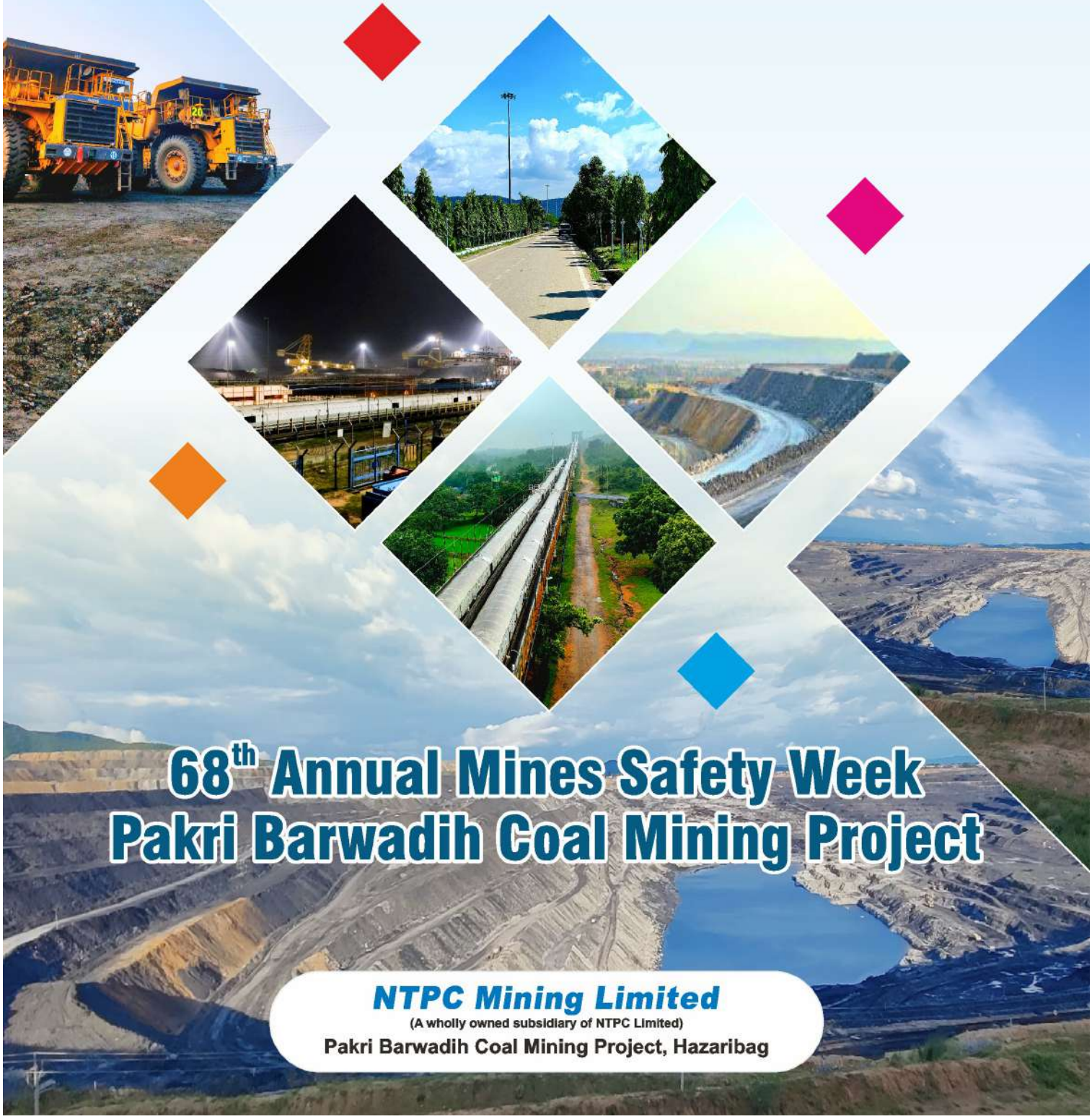
एनटीपीसी
NTPC

50 YEARS OF POWERING GROWTH

एन टी पी सी खनन
NML
NTPC Mining Limited

SOUVENIR
AMSW - 2025



68th Annual Mines Safety Week
Pakri Barwadih Coal Mining Project

NTPC Mining Limited
(A wholly owned subsidiary of NTPC Limited)
Pakri Barwadih Coal Mining Project, Hazaribag

Annual Mines Safety Week – 2025

Safety, Health & Environment Souvenir

Message

It is a privilege to address all stakeholders on the occasion of the 68th Annual Mine Safety Week – 2025. This observance is not just a reminder of compliance—it is a reaffirmation that safety is the foundation upon which the future of mining will be built. At NTPC Mining Limited, we envision a future where **every mine operates with zero incidents, zero harm, and absolute confidence in the well-being of its workforce**. Safety is not an obligation; it is our identity and our promise.

As India advances toward a clean energy future, coal will continue to play a critical role in ensuring affordable and reliable power. In this high-risk and dynamic environment, safety is the catalyst for transformation—driving productivity, innovation, and resilience. Our vision is bold: **to create mines that are not only productive and sustainable but also benchmarks of global safety excellence**. This means embedding advanced technologies, predictive analytics, and automation into our operations, while fostering a culture where every individual is empowered to act as a guardian of safety.

The celebration of Mine Safety Week under the guidance of DGMS is a powerful platform to share knowledge, recognize excellence, and inspire a collective movement toward a zero-incident future. It is an opportunity to transform awareness into action and action into impact—making safety a way of life, not just a workplace practice.

On this occasion, I extend my deepest appreciation to our officers, supervisors, workers, and safety professionals whose commitment and vigilance make safe mining possible. Let us move forward with a shared vision: **to eliminate accidents, embrace innovation, and set new global standards for mine safety**. Together, we can redefine what it means to mine responsibly and contribute to India's sustainable development goals.

"Zero Harm. Zero Incidents. Infinite Possibilities."

S. Srivastava

Shivam Srivastava
Chairman, NML
& Director (Fuel), NTPC Limited

Message

It is a matter of great pride to address all stakeholders on the occasion of the 68th Annual Mine Safety Week – 2025. This observance reminds us that safety is not merely a statutory obligation, but a fundamental organizational value that defines the way we operate. At NTPC Mining Limited, we firmly believe that sustainable growth is achievable only when the protection of human life and well-being remains our highest priority.

Mining continues to play a vital role in ensuring India's energy security, and even as the nation transitions towards cleaner energy, coal will remain a dependable source of affordable power for years to come. In such a dynamic and high-risk industry, safety is the bedrock of productivity, innovation, and operational excellence. Our vision is clear—**Zero Incidents, Zero Harm**—and we are committed to achieving this through systematic risk assessment, deployment of advanced safety technologies, rigorous training programs, and unwavering compliance with statutory provisions.

The celebration of Mine Safety Week under the guidance of DGMS is a commendable initiative that strengthens safety awareness across the mining fraternity. It fosters the exchange of best practices, recognizes outstanding safety performance, and reinforces confidence among workers that their safety and health are of paramount importance. This spirit of safety must extend beyond the workplace into every aspect of life.

I extend my heartfelt appreciation to all officers, supervisors, workers, and safety professionals across our mining projects whose dedication and discipline make safe mining possible. Let us renew our collective commitment to build a robust safety culture rooted in prevention, continuous learning, responsible behavior, and the principle of duty of care.

May the 68th Annual Mine Safety Week – 2025 inspire us to strengthen our resolve to achieve **zero accidents**, enhance operational excellence, and contribute to sustainable national development.

"Safety First, Always. Zero Incidents – Our Shared Vision."

Naveen Jain
CEO, NTPC Mining Limited
& RED-Mining, NTPC Ltd.

Annual Mines Safety Week – 2025

Safety, Health & Environment Souvenir

Message

Safety and health are the pillars of every progressive organisation, and their importance becomes even more pronounced in mining, where operations involve multiple dynamic risks. As India continues to diversify its energy portfolio, coal will remain an essential and affordable source of power for the foreseeable future.

At NTPC and NML, safety is not merely a regulatory obligation—it is a core organisational value. We believe that every incident is preventable when a strong and proactive Safety Culture is nurtured. Zero Accident is achievable through a firm "Culture of Prevention," timely and transparent "Near Miss reporting," extensive use of "technology and digital systems," continuous training and awareness, and collective compliance with statutory norms by workers, supervisors, and management.

Pakri-Barwadih, one of NTPC's flagship and nationally recognised coal mines, continues to supply quality coal to various NTPC power stations. Understanding the ever-changing operational hazards, the mine management and MDO team have consistently strengthened safety systems through improved planning, enhanced designs, robust processes, and adoption of best practices followed across leading mines. Regular safety reviews, audits, training modules, mock drills and awareness programmes have played a major role in elevating the safety standards at the project.

As we celebrate the 68th Annual Mines Safety Week–2025 under the aegis of DGMS (Ranchi, Koderma & Chaibasa Region), it is heartening to witness the active involvement of DGMS, management, employees, and contract workforce. This year's theme — "सुरक्षित खदान से विकसित भारत," — reinforces the belief that safe and responsible mining is directly linked with national growth and sustainable development.

The implementation of the new Labour Codes is another significant step forward. These codes are designed to streamline and strengthen labour welfare, social security, working conditions, and occupational safety. Their effective implementation at the mine will further reinforce our commitment to worker welfare, improve safety compliance, and enhance the overall safety ecosystem.

I am confident that in the coming period, the NTPC team and MDO team, under the guidance of DGMS, will continue to achieve targeted coal production with utmost safety. Let us collectively strive to make Pakri-Barwadih a 'Model Mine' in Production, Safety, Health, Welfare, and Environmental stewardship.

My best wishes to the entire team.

Subrat Kumar Dash
Head of Project
Pakri Barwadih Coal Mining Project,
Hazaribagh - NTPC Mining Limited.

Annual Mines Safety Week – 2025

Safety, Health & Environment Souvenir

Message

As we mark the 68th Annual Mines Safety Week–2025, NTPC Pakri-Barwadih Coal Mining Project reiterates its commitment to safe mining practices and a responsible work culture. Safety continues to be central to our operational philosophy, and this year's theme, "सुरक्षित खदान से विकसित भारत," reflects the national priority of linking safe workplaces with long-term development and energy security.

Over the past year, the project has made significant strides in enhancing its safety ecosystem. Strengthened procedures, more rigorous training modules, increased digital monitoring, and targeted safety audits have contributed to a more structured and preventive approach to risk management. These initiatives underscore our ongoing efforts to build a system where safety is integrated into planning, execution and review mechanisms across the mine.

The observance of Safety Week–2025 serves as an opportunity to evaluate our progress and identify new focus areas. During the week, various awareness programmes, field demonstrations and workforce interactions will reinforce the importance of safe behaviour, compliance with statutory norms and the collective responsibility we share in maintaining a secure work environment.

We acknowledge the collaborative role of DGMS, project leadership, MDO team and the workforce, whose consistent efforts continue to strengthen our safety standards. Their contribution is instrumental in advancing the spirit of this year's theme and ensuring that operational excellence goes hand-in-hand with workers well-being.

As we move forward, NTPC Pakri-Barwadih remains committed to adopting modern technologies, further improving safety systems and nurturing a culture where every individual prioritizes safety in thought and action. Our goal is to sustain a mining environment that reflects national aspirations and contributes meaningfully to a safer, more resilient and Viksit Bharat.

My best wishes to the whole team.

Chandra Shekhar
AGM(Mining)/Mine Agent,
Pakri Barwadih Coal Mining Project,
Hazaribagh, NTPC Mining Limited.

Annual Mines Safety Week – 2025

Safety, Health & Environment Souvenir

Message

Mining is an industry where operational excellence and safety performance go hand-in-hand. Over the past year, we have further reinforced our systems and practices with a focused commitment toward achieving Zero Incidence, while consistently striving to uphold and align with the provisions of the NTPC Health and Safety Policy.

The implementation of a robust Safety Management System (SMS) forms the foundation of workplace safety at PBCMP. Strict adherence to Safe Operating Procedures, Codes of Practice, Standing Orders and statutory schemes under CMR, along with EREP, Transport Rules and Slope Stability Studies, significantly strengthens operational control and risk management.

Building safety awareness among workers and supervisors and maintaining strong emergency preparedness remain equally important. Regular training, safety communication and mock-drills help reinforce a proactive safety mindset.

Formulation, implementation, review and audit of safety plans/SOPs play a crucial role in achieving Zero Accident. To support this, PBCMP conducts annual external audits, quarterly ISO/SHMS audits, monthly safety reviews by the Head of Project, daily safety talks, focused training for supervisors and operators, safety quizzes, small safety drills, and systematic recording of near misses, unsafe acts and unsafe conditions. These measures ensure effective implementation and continuous improvement of safety performance.

The observance of the Annual Safety Week, with the active involvement of all key pillars of mining—Mine Inspectors, Mine Management and, above all, the workforce—reflects DGMS's forward-looking approach to promoting a strong and inclusive safety culture.

The theme of this year's Safety Week — "सुरक्षित खदान से विकसित भारत," — reflects a national vision that places safety at the core of development. A safe mine not only protects the workforce but also ensures uninterrupted production, energy security, and economic progress. As Mine Manager, I firmly believe that each member of our team - workers, supervisors, engineers, and contractors & partner agencies - plays an equally important role in translating this theme into reality.

I am confident that the 68th Annual Safety Week–2025, guided by this year's theme, will play a significant role in deepening safety awareness across all stakeholders and fostering a culture where safety becomes an integral part of everyday thinking and behaviour, both for oneself and for others.

Kudlappa B Desai
DGM(Mining)/Mine Manager,
Pakri Barwadih Coal Mining Project,
Hazaribagh, NTPC Mining Limited.

Annual Mines Safety Week – 2025

Safety, Health & Environment Souvenir

Message

Mining plays a crucial role in meeting India's growing energy demands and supporting economic growth. However, progress achieved at the cost of human life or health can never be called true development. PBCMP ensures uninterrupted production, higher morale of the workforce, protection of valuable assets, and above all, the dignity and well-being of those who work in challenging conditions by upholding the spirit of NTPC Health and Safety Policy. The theme— "सुरक्षित खदान से विकसित भारत," aptly highlights that a developed nation can only be built on the foundation of safe, healthy, and sustainable mining practices.

At Pakri Barwadih Coal Mining Project, Safety has always been accorded the highest priority. Continuous efforts are being made to strengthen the safety management system through systematic risk assessment, implementation of SOPs, COPs and strict compliance with statutory provisions under the Coal Mines Regulations and other applicable laws. Regular inspections, safety audits, and monitoring of critical operations help us identify potential hazards and take timely corrective actions before accidents occur.

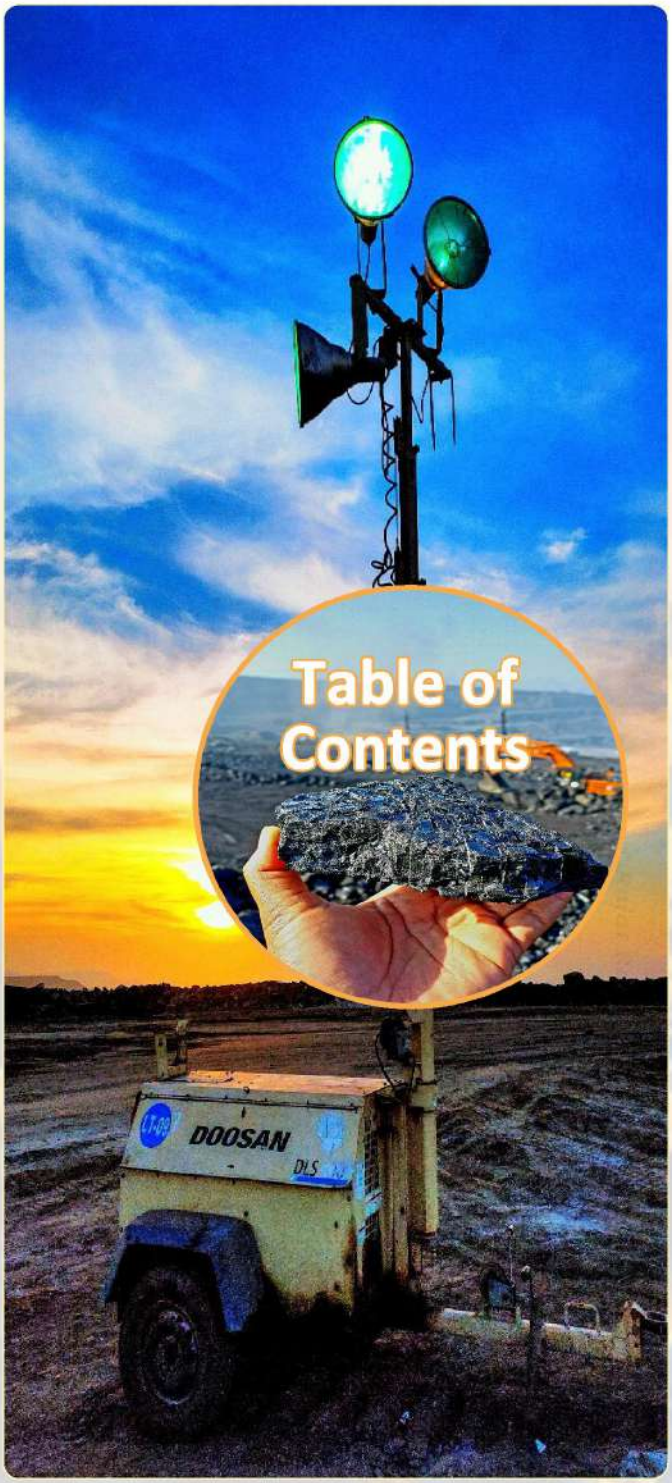
Training and awareness along with feedback are the backbone of our strong safety culture. NTPC firmly believe that a well-trained worker is a safe worker. Regular safety training programs, toolbox talks, mock drills, and on-the-job training are conducted to enhance the knowledge and skills of employees as well as MDO workers. Special emphasis is laid on induction training for new entrants, refresher training for experienced workers, and focused training for high-risk activities such as HEMM operation, blasting, electrical works, and works at height.

Adoption of modern and advanced equipment at PBCMP in Mine planning and surveying, Slope stability and monitoring with TLS and Radar Satellite ground displacement analysis, Realtime environmental monitoring and communication facilities have significantly reduced risks associated with our operations. The most critical factor to achieving zero harm in 2025 at PBCMP is human behavior. Family counseling, behavior and cultural based awareness is essential part of it at PBCMP. Developing a strong behavioral safety culture needs commitment from top management to the bottom person at the mine face. Each individual must take ownership of safety, follow rules diligently, use PPEs correctly, reporting near-miss incidents, unsafe conditions, and hazards need to be encouraged, as prevention begins with awareness.

I extend my sincere appreciation on this 68th Annual Mines Safety Week-2025 under aegis of DGMS to all PBCMP employees, MDO counterparts, and mines safety committee members for their continued efforts and cooperation in maintaining high safety standards throughout the year. It provides an excellent platform to reinforce these values through competitions, safety campaigns, exhibitions, and interactive sessions.

सुरक्षित खदान हैं संकल्प हमारा, देश के विकास में योगदान हमारा ।

Dhirendra Sonagara
DGM(Mining)/Safety Officer,
Pakri Barwadih Coal Mining Project,
Hazaribagh, NTPC Mining Limited.



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OUR MISSION

"TO BE THE WORLD'S LEADING POWER COMPANY, ENERGIZING INDIA'S GROWTH."

"भारत के विकास को ऊर्जा प्रदान करते हुए विश्व की अग्रणी विद्युत कंपनी बनना।"

OUR VISION

""PROVIDE RELIABLE POWER AND RELATED SOLUTIONS IN AN ECONOMICAL, EFFICIENT AND ENVIRONMENT FRIENDLY MANNER, DRIVEN BY INNOVATION AND AGILITY"

"नवप्रवर्तन एवं स्फूर्ति द्वारा संचालित रहते हुए किफायती, दक्षतापूर्ण एवं पर्यावरण-हितैषी तरीके से विश्वसनीय विद्युत-ऊर्जा एवं संबद्ध सेवाएँ प्रदान करना ।"

CORE VALUES

I C O M I T

Pakri Barwadih Coal Mining Project

ABOUT NTPC

NTPC OVERVIEW:

NTPC is India's largest energy conglomerate with roots planted way back in 1975 to accelerate power development in India. Since then, it has established itself as the dominant power major with presence in the entire value chain of the power generation business. From fossil fuels it has forayed into generating electricity via hydro, nuclear and renewable energy sources. This foray will play a major role in lowering its carbon footprint by reducing green-house gas emissions. To strengthen its core business, the corporation has diversified into the fields of consultancy, power trading, training of power professionals, rural electrification, ash utilisation and coal mining as well.

NTPC became a Maharatna company in May 2010. As on date, there are 14 Maharatna CPSEs in India. NTPC is ranked No. 01 Independent Power Producer (IPP) Energy Trader globally in the S&P Global Commodity insights Top 250 Global Energy Company rankings.

Present installed capacity of NTPC Group is 84924 MW, comprising of 53 NTPC owned stations (27 coal based, 7 gas based, 1 hydro, 1 small hydro, and 17 solar PV) and 55 Joint Venture/Subsidiary stations (11 coal based, 4 gas based, 8 hydro, 1 small hydro, 25 solar PV , 5 wind and 1 energy storage). By 2032, non-fossil fuel based generation capacity shall make up nearly 50% of NTPC's portfolio.

NTPC currently holds a dominant 17% share of India's total installed power capacity and contributes 24% to the country's total power generation. This performance highlights the strength of its operations, maintenance, and asset management practices. In the financial year 2024-25, NTPC generated 438.6 billion units (BU) of electricity, reflecting a growth of approximately 4% year-on-year. The company also expanded its capacity by 3,972 MW, bringing its total installed capacity to 80 GW. This growth includes not only coal-based power plants but also renewable energy capacity, reinforcing NTPC's ability to meet India's growing energy demands with a diversified and robust portfolio.

NTPC's commitment to self-sufficiency in coal production has delivered remarkable results. In FY25, the company achieved a total coal dispatch of 44.72 million metric tons (MMT), reflecting an impressive growth of over 24% compared to the previous year. This accounts for nearly 17% of NTPC's total coal consumption. Looking ahead, NTPC is strategically planning to meet at least 25% of its coal requirements through its captive mines by FY30, further enhancing its energy security and operational sustainability.

NTPC Limited has been honoured as the "Top employer in India" award for 2025 by the globally acclaimed Top Employers Institute, at the Top Employers Certification Celebration 2025 event held on 23rd January in New Delhi. This recognition reflects the company's commitment to fostering a people-centric workplace that prioritizes innovation, inclusivity, and employee well-being. NTPC believes in putting its people first, which is exemplified by its motto of "People before PLF (Plant Load Factor)", which drives both organizational growth and enhanced employee engagement.

Pakri Barwadih Coal Mining Project

Pakri Barwadih Coal Mining Project

NTPC Mining Limited (NML):

NTPC, the prominent power generation company, established "NTPC Mining Limited (NML)" as a wholly owned subsidiary on August 29, 2019, with the sole purpose of overseeing NTPC's mining business portfolio. The vision of NML is to be the leading mineral company, contributing significantly to the energy security of the nation. The subsidiary's mission is to ensure a reliable supply of coal and other minerals in a sustainable manner, with a focus on key principles such as cost, quality, innovation, and agility. In 2023, Business Transfer Agreement (BTA) for transfer of all coal mines to the NTPC Mining Limited (NML) was approved by NTPC. This demonstrates NTPC's commitment to mine development through a focused approach and paves the way for venturing into commercial mining and exploring opportunities in non-coal mining activities as well. NML also achieved a significant milestone in 2023 by securing the North Dhadu (East) coal mine in Jharkhand through an open bidding process conducted by the Ministry of Coal. North Dhadu became the first coal block awarded to NML after its incorporation. This accomplishment stands as a major landmark for the newly established subsidiary.

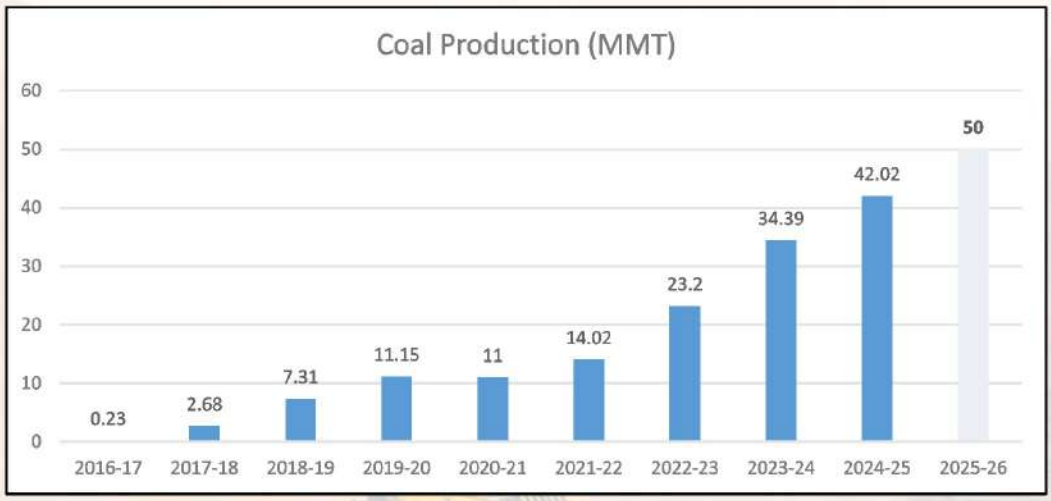
NTPC Mining Ltd. reached another significant milestone in 2025, achieving a total production of 150 million metric tons (MMT) of coal since the commencement of operations at its first coal mine, Pakri Barwadih, on January 1, 2017. Notably, the first 50 MMT was produced in 1,995 days, by June 19, 2022, while the next 50 MMT was achieved in just 617 days. Moreover, NTPC Mining has delivered stellar performance in FY 2024-25 by producing 45.72 million Metric Tonnes (MMT) of coal registering YoY growth of 33% and has dispatched 44.72 MMT of coal to NTPC's power stations with a growth of around 26% compared to last financial year. These accomplishments underscore NTPC Mining's steadfast commitment to enhancing coal production from its captive mines, playing a crucial role in ensuring NTPC's fuel security and maintaining an efficient supply to meet the energy demands of the nation. NML's commitment to sustainable mining practices is exemplified by the recent recognition of two of its mines, which have been awarded Star Ratings under the Ministry of Coal's Opencast Mines category.

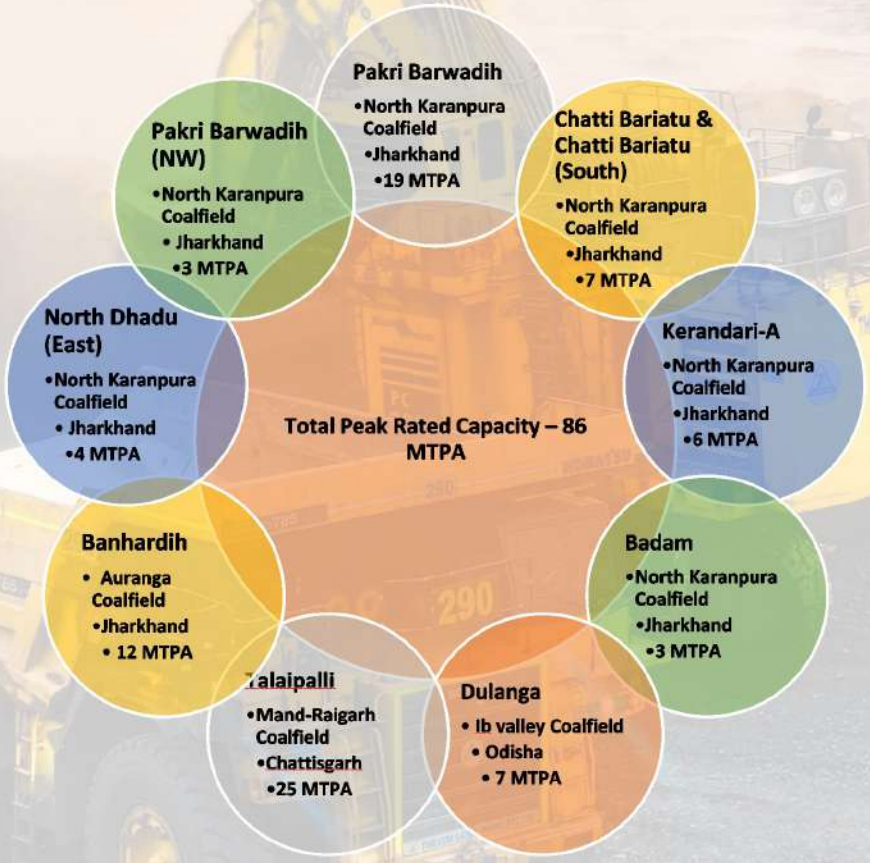
Since December 2016, NTPC's Mining unit has demonstrated remarkable performance with a cumulative coal production exceeding 173.98 million Metric Tonnes (MMT). This achievement is attributed to the operational success of five captive mines, namely Pakri Barwadih, Chatti-Bariatu and Kerendari coal mines in Jharkhand, Dulanga mine in Odisha, and Tallaipalli mine in Chhattisgarh.

As of November 15, 2025, the current fiscal year has already witnessed a surpassing of 27.89 million tonnes, and we are steadfast in our ambition to achieve a production milestone of 50 million tonnes by the year-end. With the impending operationalization of the remaining mines, we are poised to achieve our ambitious goal of producing more than 86 Million Metric Tonnes (MMT)) of coal per annum in the upcoming years.

Pakri Barwadih Coal Mining Project

Coal Production Trend Over the Year:





Pakri Barwadih Coal Mining Project

SAFETY POLICY OF NTPC:

Purpose:

The Safety Framework (SFW) is envisaged to provide a consistent conceptual structure and serve as the guidance document to the various functions and roles. It contains a set of expectations that ensure that all efforts are aligned in the form of components – Safety Policy, Safety Risk Management, Safety Assurance and Safety Promotion.

This framework also covers functional implementation expectations: what the different functions & roles must do to implement a robust system and provides essential guidance how it will be accomplished. To facilitate such guidance, where required, components are divided into smaller elements and processes.

Overview of Framework:

The framework comprises of components which covers the crux of effective safety management:

1. ***Safety Policy & Objectives:*** The objective is to clearly state Management's and the Company's policy on occupational health & safety and to publicize this on-going commitment among all staff and stakeholders.

2. ***Safety Risk Management:*** The objective is to identify and assess health & safety risks through a dynamic, formal, structured, and holistic process; facilitating effective risk reduction plans & actions, using both proactive and reactive processes.

Pakri Barwadih Coal Mining Project

3. ***Safety Assurance:*** The objective is to ensure that all business units comply with safety policy, rules, procedures, legal requirements in achieving safety targets and objectives. And, to ensure continual improvement and effectiveness of implementation of the corporate framework, through regular visits, inspections, audits, interactions and reviews.

4. ***Safety Promotion:*** Corporate Safety with support of other functions & roles, shall promote safety as a core value, with practices that facilitate & support a sound safety culture.

Pakri Barwadih Coal Mining Project

SAFETY AND HEALTH FRAMEWORK FOR COAL MINING PROJECTS:

Coal Mining Business (CMB)'s Safety and Health (SH) Framework defines NTPC's philosophy and requirements that ensure all coal mines are aligned with the doctrine of decent work and business objective of safe production. The SH Policy and framework is a management system that describes our systematic approach to the management of SH-related risks and opportunities and how this integrates with our business processes.

A 'management system' is a continual and cyclical process for supporting performance improvement.

The SH Framework supports:

- Continuous performance improvement in S&H through the proactive management of SH in our work, and measurement and evaluation of our performance to identify improvement opportunities.
- Achievement of our SH vision and objectives; and
- Consistency and efficiency in our approach to SH management across all operations.

The ***SH Framework conforms to the principle of Plan – Do – Check – Act and is auditable***. It is composed of the following six complementary elements that present the framework through which we manage our SH performance:

Leadership & People:
- Our leaders play an integral role to deliver the SH objectives and in development of safety as a habit and culture through visible and felt leadership.

Context of the organization:
- Our SH management system is appropriate for the context in which we operate and takes into cognizance all Internal & external issues as well as needs and expectation of stakeholders.

Planning:
- All work is planned comprehensively using life cycle perspective to identify all SH aspects, impact, risks and opportunities along with ensuring fulfilment of all compliance obligations.

Operation:
- All work is executed by our employees and contractors to manage our SH-related risks and opportunities in a systematic manner, and we are prepared for efficiently responding to any foreseeable emergency and planned and unplanned changes that has the potential to impact SH performance.

Performance evaluation:
- Our SH performance is measured, analysed and evaluated against its defined objectives and the SH expectations through various reviews and internal/external audits to identify opportunities for improvement.

Improvement:
- We proactively understand, and address gaps identified in our SH performance and processes.

Pakri Barwadih Coal Mining Project

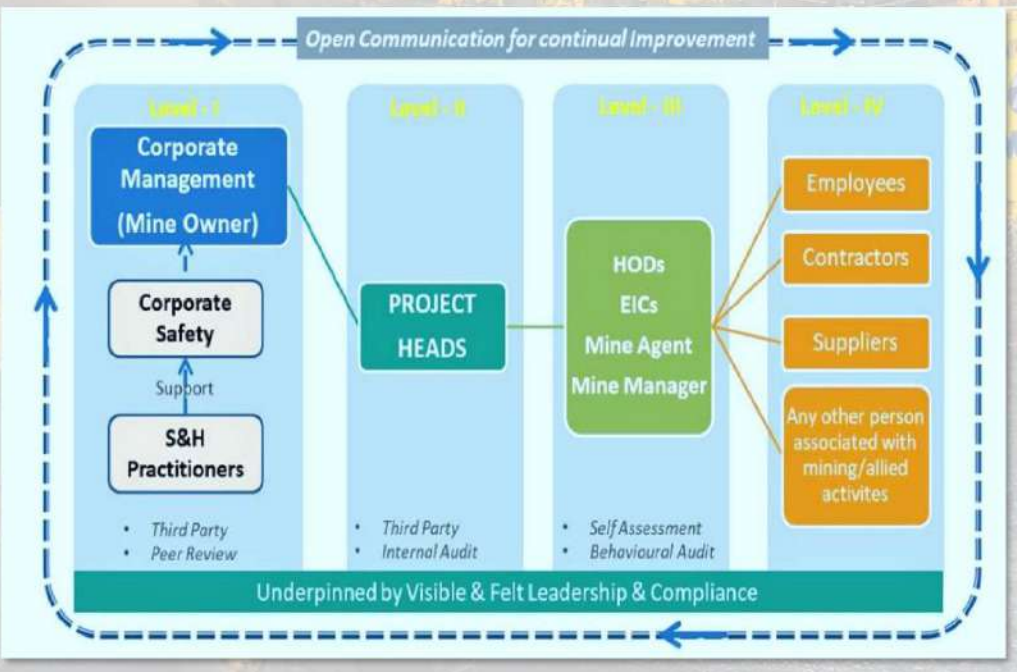
Statement of Intent:

- Safety & Health in Mines are part of our core values.
- We recognize all accidents in Mines are preventable; therefore, safety shall be at the forefront of all our activities.
- We recognize regular health surveillance of mine workers exposed to occupational health hazards specific to mine operation is integral to mine working frameworks.
- The objective is to provide safe working environment and strive for ZERO INCIDENTS and Zero Harm Potential at work.
- This policy supported by safety & health rules, guidelines and procedures are applicable for all mining business activities carried out by NTPC

Principles of Safety Policy:

- ✓ All hazards can be identified.
- ✓ Every job shall be done safely, no matter how important or urgent it is.
- ✓ Visible demonstration of responsibility and accountability for safety.
- ✓ Right procedures and actions can bring the safety and health risks under control.
- ✓ Trained and committed team can ensure incident free operations.
- ✓ Compliance to all applicable safety regulations and other legal requirements is a must.

SH Governance Framework



SAFETY MANAGEMENT IN MDO MODE:

The coal mines of NTPC are mostly planned to be operated in Mine Developer cum Operator (MDO) mode in which the entire operational obligations are outsourced to another agency for the entire life of mine. Such long-term contract provides stability so that more robust systems can be formulated regarding safety.

A project agreement is executed between NTPC and MDO so appointed which forms a governing document throughout the tenure of contract. Such Project Agreements clearly enlist obligations regarding safety including:

- General Safety
- Occupational Health and Safety Program
- Safety Management Plan formulation and auditing
- Safety Officer – appointment and responsibilities
- Responsibilities of MDO towards compliance obligations
- Notification of serious accidents and incidents
- Safety Performance reporting
- Fire Protection etc.

All required safety compliances and provisions in accordance with Coal Mines Regulations 2017 and other statutes along with recommendations of National Mines Safety Conferences are imbibed and included as an integral part of such Project Agreements executed with MDO. A gist of those is given below:

(i) Manpower Management:
   a. Employment or Termination without Owner's consent
   b. All payments through Bank only adhering to Labour Laws, PF and other Statutory compliances.
   c. Medical facility to all workers.
   d. VTC, IME and PME are compulsory for all contractual staffs.
   e. Distribution of PPEs and Identity cards to all.
   f. Maintenance of records of contractual manpower in Form B, C, D and E.

(ii) Safety Management:
   a. Appointment of Mine Operators, Safety Officer with properly laid down Duties and responsibilities.
   b. Preparation of Safety Management Plan by MDO and its approval by NTPC.
   c. Structure of Pit Safety Committee suitably modified for including representatives of OEMs along with representatives of Contractor's staffs in compliance with CMR 2017.

(iii) Sub-contracting by MDO:
   a. Sub-contracting works to be approved by NTPC with details of manpower deployed. MDO shall be responsible to ensure all statutory and safety compliance to contractual labour.
   b. Sub-contracting clauses have been set with certain qualifying criteria to weed out non-performing agencies.
   c. All hiring machinery to be approved with relevant fitness certificates and other documents. Accordingly, SOPs to be formulated and approved.

(iv) MDOs are to establish dedicated training department equipped with full-time staffs to provide training in safety including environmental compliance and Disaster Management.

ABOUT PAKRI BARWADIH

INTRODUCTION:

Pakri Barwadih Coal Mining Project (PBCMP) is the first operating coal mine of NTPC Ltd. The PB block was allocated by Ministry of Coal, Government of India for captive use of NTPC Ltd. Further, the block is divided into 3 quarries namely PB – Western quarry (WQ), PB – Eastern quarry (EQ), and PB – Northwest Quarry. Contract for mining operations of PB (WQ) has been awarded to M/s Thriveni Sainik Mining Private Limited (MDO) for development and operation. Mining operation in Pakri Barwadih Coal Mining Project started on 17.05.2016. Presently mining operations are under progress in PBCMP-West quarry. The peak rated capacity of mine of WQ has been enhanced to 19 MTPA from 15 MTPA. Total project area of Pakri Barwadih as per revised mine plan is 4695 Ha.

LOCATION:

Pakri Barwadih block has been divided in two quarries. Sub-divisions are based on natural boundaries marked by three prominent nallas of the block flowing almost north to south. The northern boundary of these sectors is marked by the Karharbari/Barakar contact with the metamorphic, while the south-eastern and eastern boundary is marked by Sanrhnala and Barakar / Karharbari contact with Metamorphic. The southern boundary is a major fault separating Barakars with Raniganj Formations and an arbitrary line parallel to Barkagaon –Tandwa-Khalari State highway up to Khoranala. The western boundary of the block is demarcated by Khoranala which separates Kerendari block "C" with PakriBarwadih block.

GEOLOGY OF THE AREA:

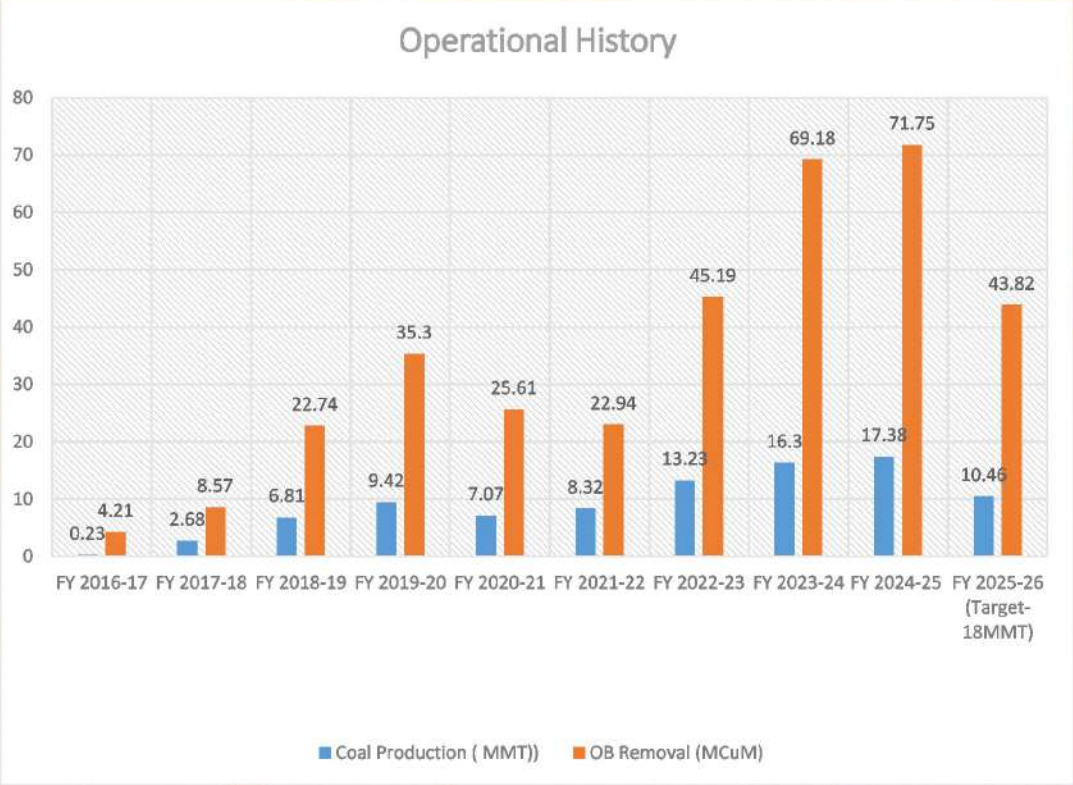
Nineteen faults have been interpreted on the basis of surface and sub-surface data. In general, the faults are curvilinear in nature with low to moderate throw. The throw of the faults in major cases is towards north. The eastern block boundary is marked by a major fault (F15), where Raniganj and Barakar formations have come in direct juxtaposition with each other. The block is moderately disturbed by the faults. There are four faults in East Quarry. Nineteen faults with throw ranging up to 150m have been deciphered based on exploration carried out in the block. The throw of most of the faults ranges from 10-40m. The fault F5 which is of distinctive nature has been considered as the boundary for division of the block into Western & Eastern Quarry.

Pakri Barwadih Coal Mining Project

GENERAL INFORMATION OF THE MINE:

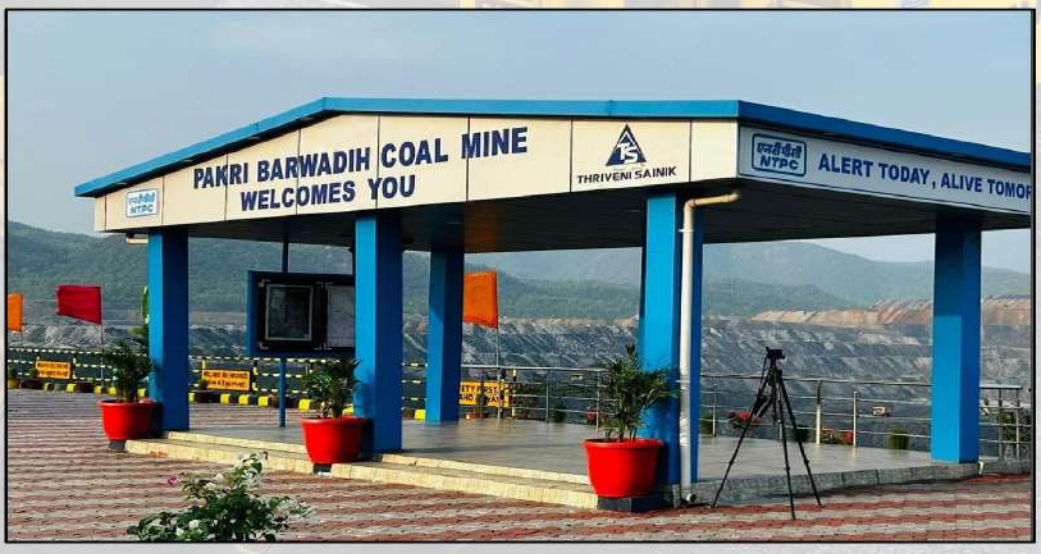
S. No.	PARTICULAR	DESCRIPTION
1.	**Name of the coal block & Location**	Block: Pakri Barwadih Coal Block Coalfield: North-Eastern part of North Karanpura Coalfield, bounded by longitudes 85° 9' 19" to 85° 15' 0" and latitude 23°51'30" to 23°55'40" Taluka-Barkagaon, Hazaribagh, Jharkhand
2.	**Proximity of Public Road/Railway Line**	The entire block falls in the Hazaribagh dist. of Jharkhand. The Hazaribagh-khalari-Ranchi state highway passes through the eastern part of the block touching Barkagaon and Tandwa villages. The nearest township is Hazaribagh located at a distance of around 25 km. from Barkagaon in the northern part of the block. The nearest rail stations are Hazaribagh (32km) and Ranchi Road around 70-75 kms from the block.
4.	**End Use of Coal**	For Generation of Power at NTPC Power Stations.
5.	**Peak rated Coal Production of PBCMP**	19 MTPA
6.	**Proposed year of achieving Targeted Production level**	17th year of Operation
7.	**Life of Mine (WQ and EQ)**	36 Years
8.	**Geological Structure**	Structurally the North Karanpura coalfield is a major broad syncline with its axis trending east to west and plunging towards east. The southern boundary of the eastern sector is marked by a major fault of about 250m throw towards South. This has resulted in bringing the Barakar Formations in Juxtaposition with Raniganj formation. Nineteen faults with throw ranging upto 170 have been deciphered based on exploration. Throw of most faults ranges from 10-40m.
9.	**Total Geological Reserve**	<table><tr><th></th><th>Reserves</th><th>PBCMP</th></tr><tr><td>1.</td><td>Net Geological</td><td>1436</td></tr><tr><td>2.</td><td>Amenable for Open Cast</td><td>707</td></tr><tr><td>3.</td><td>Mineable Reserve</td><td>503</td></tr></table> Reserves up to 300m depth have been considered for Open cast mining.
10.	**Mineable Reserve**	503 Mt
11.	**Total Coal Seams**	Barakar Formation contains 5 persistent coal seams numbered Seam-I to Seam-V in ascending order are splitted into 12 sections.

		Karharbari formations underlie the Barakar formation and contain on-workable coal seams namely K1 to K5. The thickness of these seams is less than 1m.
12.	**Dip of Strata**	10^0-20^0 but generally 10^0-15^0 towards south-west
13.	**Specific Gravity of Coal**	1.68 T/Cum
14.	**Total no. of Faults in West pit**	11
15.	**Strike of Coal Seam**	NW-SE
16.	**No. of Coal Horizons**	Barakar:- 5 Persistent coal Horizons Karharbari : 5 Thin Coal Horizons Local :- 1 coal Horizon
17.	**Mean Thickness of Coal Seam**	Max Thickness of Individual Coal Seam- 28.67m SEAM-II Min Thickness of Individual seam-1m – SEAM-III (bottom)
18.	**Grade**	GCV Ranges from 2491 (G-16) to 6280 (G-4) CCO Approved Grade 2024-25: G-10



Major Milestones:

- Allocation of Coal Block •11.10.2004 → Environment Clearance /Forest Clearance •19.05.2009/17.09.2010 → MDO Appointment •30.09.2015
- Start of Mining Operation •17.05.2016 → Start of Coal Production •01.01.2017 → First Rake Dispatched 16.02.2017
- Achieved 1 Million MT Coal Production 11.11.2017 → Commercial Operation of PBCMP declared 01.04.2019 → CHP Commissioning (A Stream/B Stream) 20.02.2022/30.11.2022
- Achieved 50 Million MT Coal Production 21.05.2023 → Achieved 90 Million MT Coal Production •27.10.2025 → 2000th Rake through RLS Dispatched •07.11.2025



Pakri Barwadih Coal Mining Project

Technical Papers:

Pakri Barwadih Coal Mining Project participated in the various National Conventions, seminars & Conventions organised by different institutes and organisations involved in mining sector. The project executives team enthusiastically involved and present the different technical papers on these platforms.

1. 35th National Convention of Mining Engineers and the National Seminar on "Mining and Environment – Quo Vadis 2070" at IIT (ISM), Dhanbad: A research paper on the green transition of PBCMP.
2. A Conclave on Women in Mining was held in Ranchi on 26 November 2025, organized by TATA Steel under the aegis of DGMS with the theme "Transforming Today, Redefining Tomorrow.": Pakri Barwadih Coal Mining Project marked strong participation, reaffirming its commitment to women's inclusion in mining.
3. Three (03) research paper from NTPC Pakri Barwadih Coal Mining Project Mining Department has been Published in the Companion Volume of the 11th Asian Mining Congress (AMC 2025) held at Kolkata.
4. NTPC Mining Limited had participated at THE MINING SHOW 2025 which is the most recognised and the largest mining exhibition/conference in the Middle East and North region. It was the 18th edition held in Dubai from 17-18 Nov. 2025.

Pakri Barwadih Coal Mining Project

New Labour Code: A Government of India Initiative

PBCMP officials along with DGMS dignitaries conducted a Mass Awareness Session on the implementation of the Four Labour Codes as part of new era for the nations workforce. All workers were briefed on the key provision, processes and benefits of the new Labour codes, ensuring widespread understanding and effective implementation.

EMERGENCY RESPONSE AND EVACUATION PLAN

Pakri Barwadih Mining Project has a well-defined Emergency Response and Evacuation Plan formulated to deal with emergencies. ERP has been framed as per Regulation No 252 of Coal Mines Regulation 2017 with the objective to have a comprehensive program in place to respond to any injury, accident or emergency that may occur in mine including foreseeable industrial and natural disasters.

OBJECTIVE:

1. To provide guidelines for maximum and efficient utilization of all resources during disaster/emergency.
2. To have a comprehensive program in place to respond to any injury, accident or emergency that may occur in mine including foreseeable industrial and natural disasters which includes immediate communication to all concerned, identification of and establishing clear responsibilities of concerned officials, clear action to be taken by each authority, first aid treatment, medical treatment, transportation and evacuation of injured persons and to make arrangements for the rescue of persons incapacitated or trapped in mines.

SCOPE:

1. Identification of Natural and Industrial Emergency Situations
2. Establishment of individual responsibilities for administering actions identified to implement an emergency response.
3. Establishment of emergency communication systems, procedures and individual responsibilities for carrying out emergency communications.
4. A system in place to provide immediate notification to all persons affected by the emergency including alarms in place which shall be capable of being heard by everyone affected.
5. A procedure to allow for the safe, orderly and immediate withdrawal of persons from the mine or area of danger, including training on emergency escape routes and procedures;
6. Preparedness and response procedures. Periodically conducting Scenario planning and Hypothesis testing exercise.

EMERGENCY RESPONSE AND EVACUATION PLAN INCLUDES:

Identification of Natural and Industrial Emergency Situations –

- Accident due to any reason resulting into fatality or serious body injury to one or more persons or significant loss of property (Loss to the tune of more than Rs 50 lakhs)
- Danger of Inundation:
- Danger of Fire:
- Danger of Dump/Pit Slope Failure:
- Emergency related to Explosive Transportation and Magazine.
- Social Unrest arising out of any emergency/ accident or any other event.

Duties during Emergency Situations

Emergency Contact Numbers

Emergency Control Room

Ensuring Emergency Preparedness and TARP

Emergency Response Plan for Inundation

Emergency Response Plan for Fire

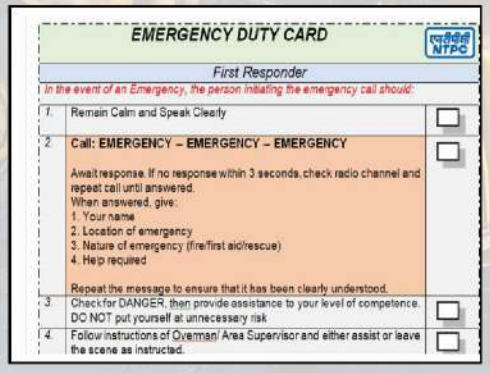
Emergency Response Plan for Slope Failure

Emergency Response Plan for Explosion

Emergency Evacuation Route, Emergency Action Plans and Communication Flow chart

Annexures

- Duties & Disaster Management Plan for Medical
- Emergency contact list for Time keeper office
- Contact numbers of NTPC shift In-charges & TSMPL Shift In-charges
- Relay wise list of First Aider
- Fire Scheme
- SOP for Prevention and mitigation of spontaneous
- combustion

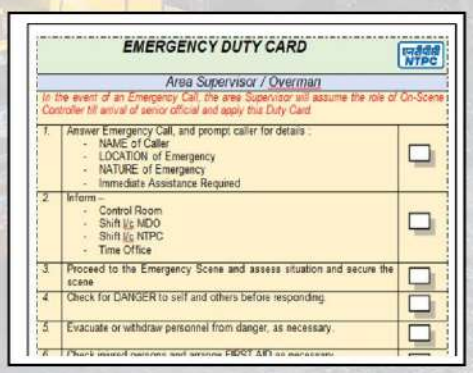


EMERGENCY DUTY CARD

First Responder

In the event of an Emergency, the person initiating the emergency call should:

1.	Remain Calm and Speak Clearly	☐
2.	**Call: EMERGENCY – EMERGENCY – EMERGENCY** Await response. If no response within 3 seconds, check radio channel and repeat call until answered. When answered, give: 1. Your name 2. Location of emergency 3. Nature of emergency (fire/first aid/rescue) 4. Help required Repeat the message to ensure that it has been clearly understood.	☐
3.	Check for DANGER, then provide assistance to your level of competence. DO NOT put yourself at unnecessary risk	☐
4.	Follow instructions of Overman/ Area Supervisor and either assist or leave the scene as instructed.	☐



EMERGENCY DUTY CARD

Area Supervisor / Overman

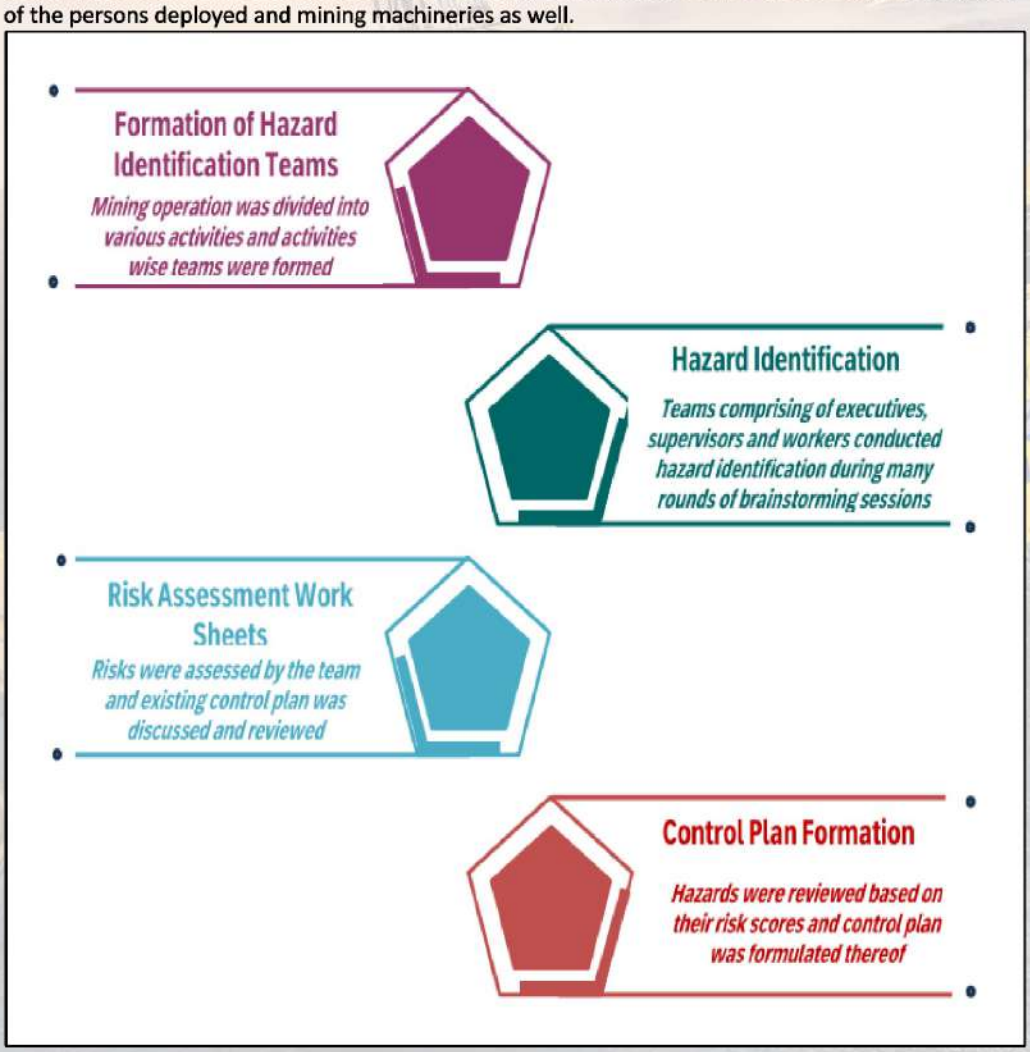
In the event of an Emergency Call, the area Supervisor will assume the role of On-Scene Controller till arrival of senior official and apply this Duty Card

1.	Answer Emergency Call, and prompt caller for details : - NAME of Caller - LOCATION of Emergency - NATURE of Emergency - Immediate Assistance Required	☐
2.	Inform – - Control Room - Shift I/c NDO - Shift I/c NTPC - Time Office	☐
3.	Proceed to the Emergency Scene and assess situation and secure the scene	☐
4.	Check for DANGER to self and others before responding	☐
5.	Evacuate or withdraw personnel from danger, as necessary.	☐

SAFETY & RISK MANAGEMENT

First Safety Management Plan for PBCMP was submitted in Aug 2018 to DGMS, SEZ-Ranchi for approval. Subsequent to implementation, various suggestions were incorporated and SMP was revised and submitted again after internal approval from ISO. Accordingly, earlier submitted SMP was revised and 1st revision of SMP was prepared in October 2018 and submitted to DGMS. There were three further revisions of SMP, i.e., Rev-02, Rev-03 & Rev-04 in March 2020, October 2021 and November 2024 respectively.

The Safety Management Plan is working document, which outlines all the actions to be carried out to ensure the safety and health at the workplace. This document is a fundamental basis, guideline, and a comprehensive strategy for Mine management to control and monitor safety and occupational health of persons deployed in mine as well all that of all the machineries with the help and involvement of Mine Safety Committee, its members, and other statutory units like workmen inspectors etc. It also takes in to account the framing and implementing of SOPs, COPs and different work plans for effective control measures to manage, control, and monitor the health and safety risks of the persons deployed and mining machineries as well.



Identification of all hazards associated with the mine (PBCMP- O/C)

- Assessment of risks using guidelines given by DGMS (Tech) Circular no. 13 of 2002.
- Risk of any hazard is dependent upon the chance of occurrence.
- RISK SCORE = CONSEQUENCE X LIKELIHOOD
- RISK SCORE = CONSEQUENCE X (EXPOSURE X PROBABILITY)

SMP formulation at PBCMP:

Area Identification:
- Entire mining operation at PBCMP was divided into 24 work areas

Identification of Hazard Categories
- Mazor Hazardous Events and source (Total 122 Nos.) in each work area were identified

Identification of Different Mechanism of each Hazard Category:
- Different Mechanisms (Total 275 Nos.) which can lead to hazardous events and conditions were identified

Risk Assessment:
- Risk of all hazards were assessed on the basis of probability of occurrence of mechanism, severity of consequences and exposure

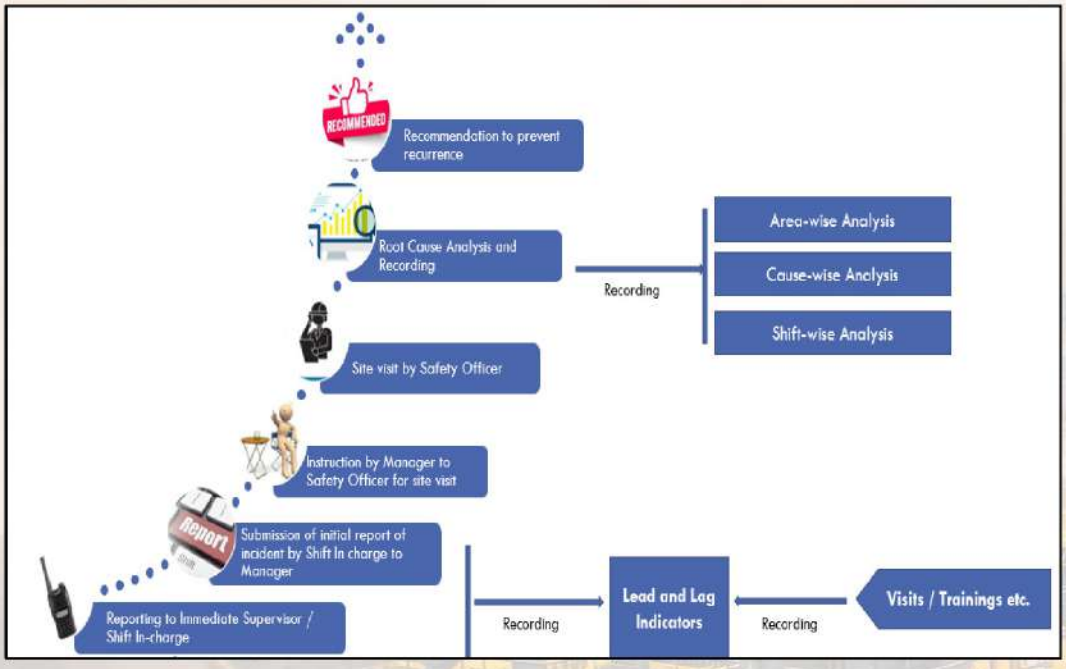
Categorization of Risk
- Principal Hazards (Risk Rating of Mechanisms >= 70): 7 Nos.
- Moderate Hazards (Risk Rating of Mechanisms 20-70): 91 Nos.
- Minor Hazards (Risk Rating of Mechanisms < 20): 177 Nos.

Risk Control
- Individual Control Plans for each mechanism which can lead to hazardous event or condition formulated

Control Procedure
- Regular Control – Np pf SOPs – 110, No of COPs- 38
- Workplans identified for mitigation – 8 Nos.

Pakri Barwadih Coal Mining Project

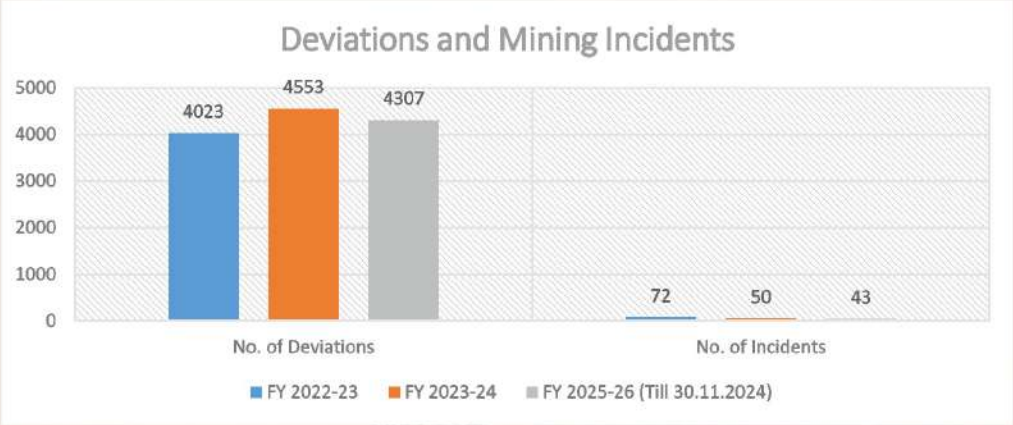
Incident Reporting and Analysis:

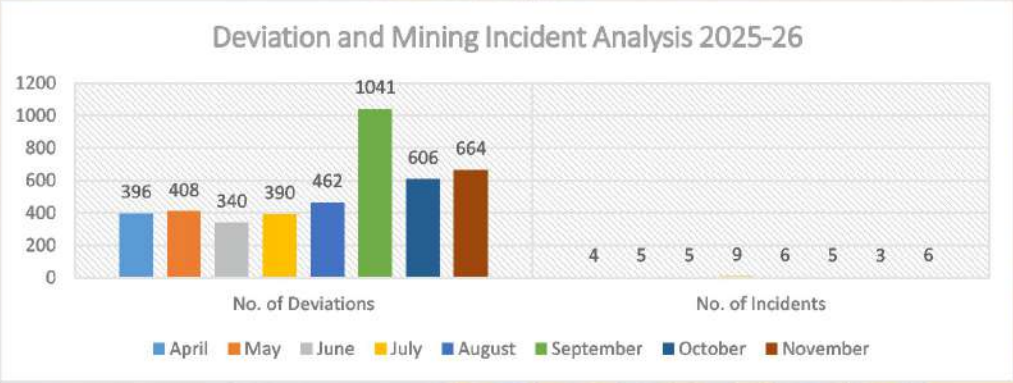


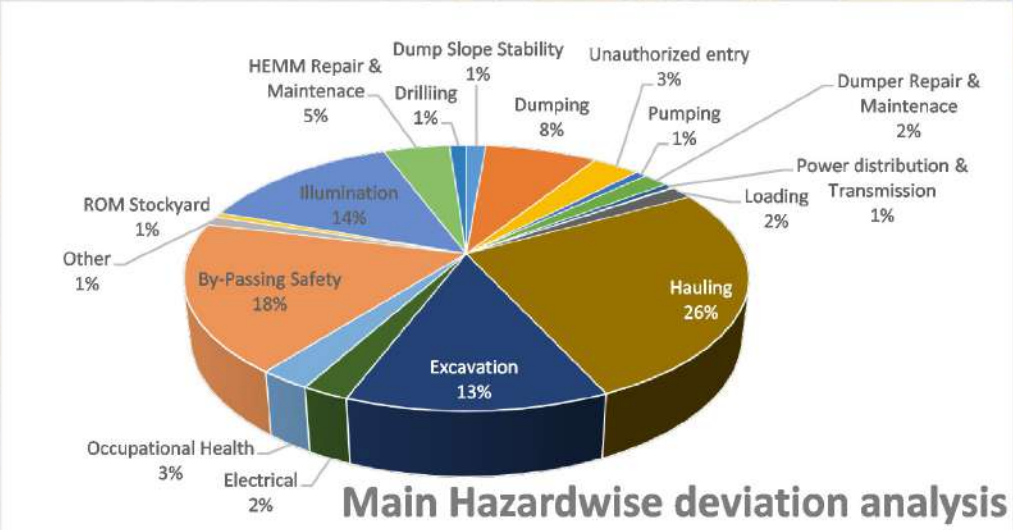
Lag Indicators:

Lag Indicators	2024	2025
Fatal Accident	NIL	NIL
Serious Injury	NIL	NIL
Reportable Injury	NIL	NIL
Severity Index {=(50F+S) *100000/H}	0	0
Lost Time Injury Frequency Rate {=(F+S+R) *1000000/H}	0	0
Injury Frequency Rate (Production-wise) {=(F+S+R)/P}	0	0
Injury Frequency Rate (Employment-wise){=(F+S+R)*100000*3/D}	0	0

Lead Indicators:







Pakri Barwadih Coal Mining Project

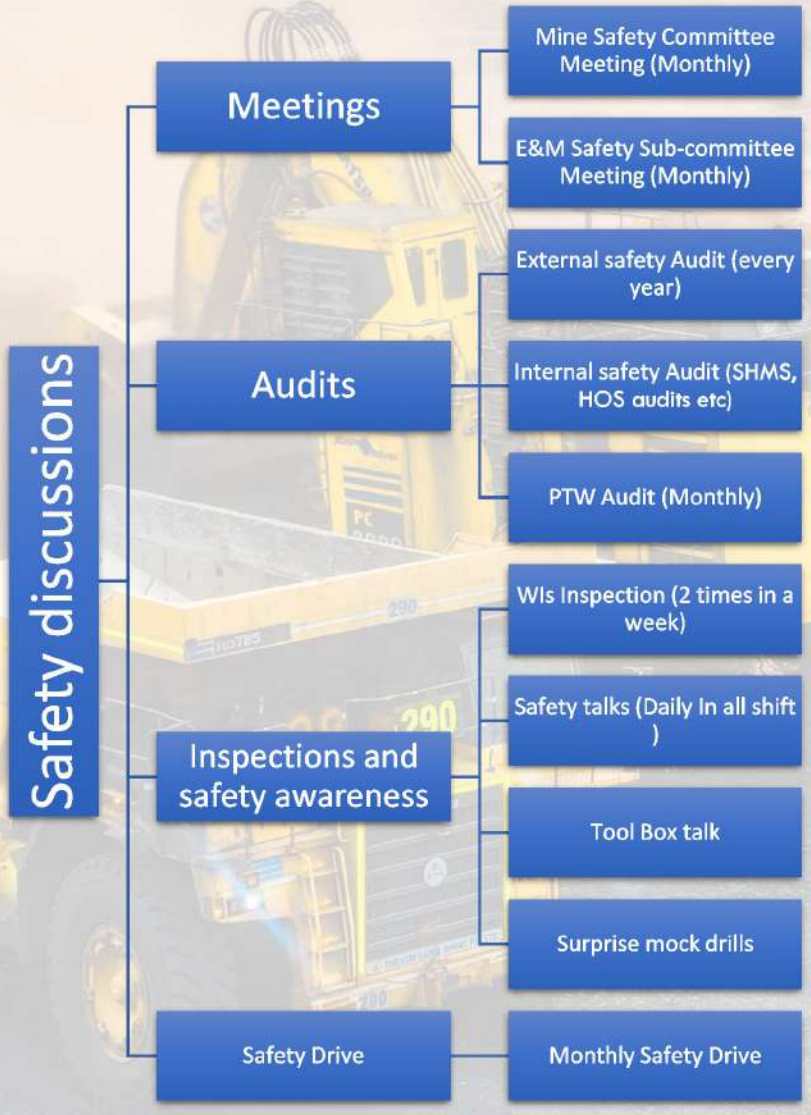
SI No.	Lead Indicators		FY 2025-26
1.	Training	Basic	751
		Refresher	271
		Others	5162
2.	Safety Talks		1874
3.	TBT (batches)		3828
4.	Spot Appreciation/Rewards		184

Training to operators by DGMS official:

Pakri Barwadih Coal Mining Project

Safety at PBCMP

At PBCMP, safety inspections, training, drives, and drills are integral components of a robust safety program aimed at ensuring the well-being of workers. This year, in alignment with the theme of the safety week "Progress Through Security" (सुरक्षा से उन्नति), the project emphasizes the importance of proactive safety measures to safeguard not only the physical health of workers but also the continued growth and success of the organization. Through regular inspections, comprehensive safety drives, and realistic mock drills, PBCMP fosters a culture of accident prevention and emergency preparedness. This approach not only prioritizes immediate safety but also supports long-term stability and resilience, reflecting a commitment to ongoing improvement. By implementing these practices, PBCMP demonstrates a dedication to risk reduction, enhanced safety protocols, and the overall satisfaction and well-being of its workforce. Ultimately, these initiatives contribute to the overall safety, health, and satisfaction of the workforce while enhancing the company's reputation and resilience.



Pakri Barwadih Coal Mining Project

Mine Safety Committee Meeting:

- Formation of Mine Safety Committee
- Site Inspection by MSC
- Review of Previous MSC meeting and discussion on new points
- Selection of Safety Star of the Month
- Preparation and circulation of MoM
- Compliance of observations

Monthly Mine Safety Committee Meetings

Pakri Barwadih Coal Mining Project

Inspections:

Mine Inspection by Higher Officials (DGMS, CERC and other officials)

Audits:

External Safety Audits

PTW audit- Monthly basis

Safety Talks/Pep Talks/Safety Pledge:

- Acquaintance of SOPs in layman language.
- Briefing about recent UA/UC/NM.
- Measures to be taken to deter such occurrence in future.
- Briefing about recent accidents of other mines.
- Possible root causes of such occurrences.

Pakri Barwadih Coal Mining Project

Mock Drills and Trainings:

Mock drills are an essential part of emergency preparedness, conducted regularly to evaluate the effectiveness of response plans during an emergency or accident. These drills are held monthly in collaboration with the MDO to ensure operational readiness, while NTPC organizes quarterly drills to further assess the preparedness and coordination among teams. Regular mock drills help identify potential gaps, refine procedures, and ensure a swift, coordinated response in case of an actual emergency.

Training to Operators for AFDSS / Semi-AFSS:

Fire-fighting Training:

Pakri Barwadih Coal Mining Project

Safety Drive

Monthly Safety Awareness Drives

Every month, a special safety drive campaign is organized around a specific theme to raise awareness and promote safe practices among all personnel working at the mine. By focusing on different themes each month, the initiative helps to reinforce safety protocols and encourages a culture of alertness and responsibility across the workforce.

Pakri Barwadih Coal Mining Project

Special Trainings Sessions:

Training by DGMS Officials

Special session was organized where following DGMS officials delivered a lecture at our training center:

- Sh. Ajit Kumar (DMS, Mining, SEZ, Ranchi Region) on "Practical risk assessment exercise on Emergency response".
- Sh. Hanumanta Rao (DDMS, Mining, SEZ, Ranchi Region) on "Monsoon preparation and precaution against danger of inundation from surface waters"

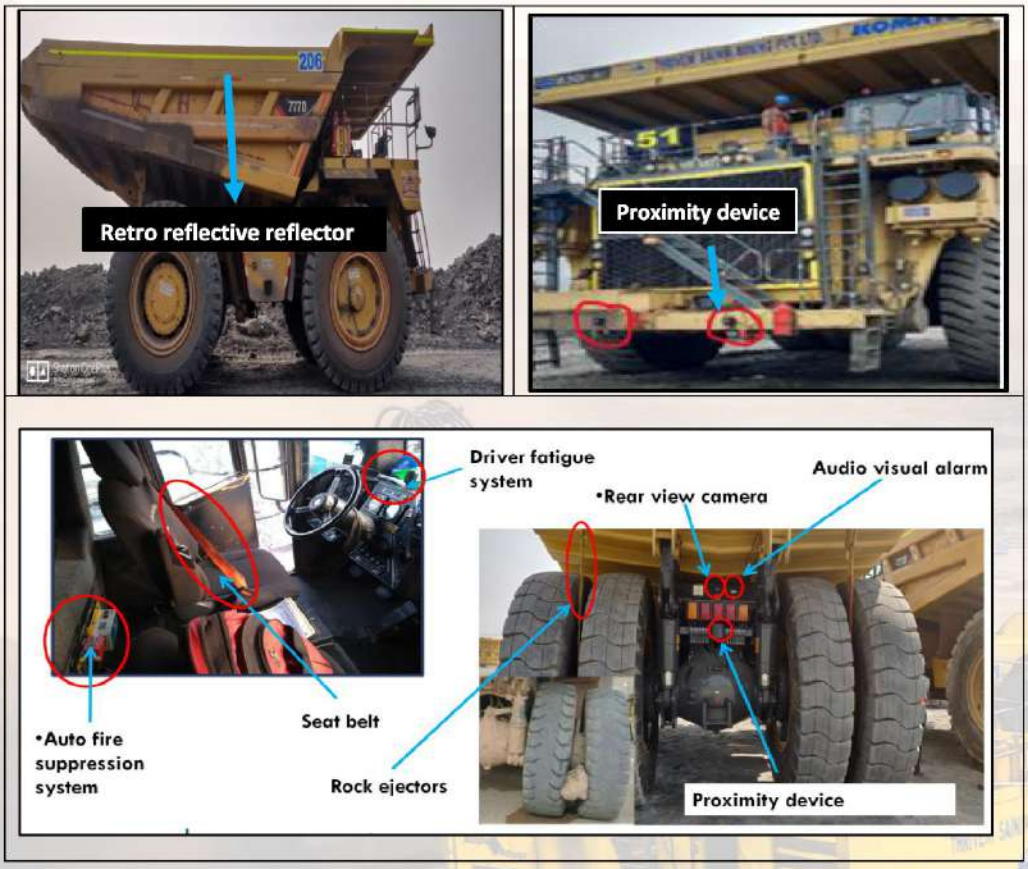
"The sessions were organized at EDC (PBCMP) and other projects of NTPC were connected through MS Teams"

Special Trainings:

05 Days residential training at CMPDIL (Ranchi) for PBCMP executives on "Opencast Mine Planning & Design" in two batches under guidance of CMPDIL experts to get proper exposure & opportunities in mining field.

Training on "Minex software" for PBCMP executives & "Advance Excel" for all coal mining projects at RLI Coal Mining for 07 & 04 days respectively through Dassault system & Microsoft excel experts.

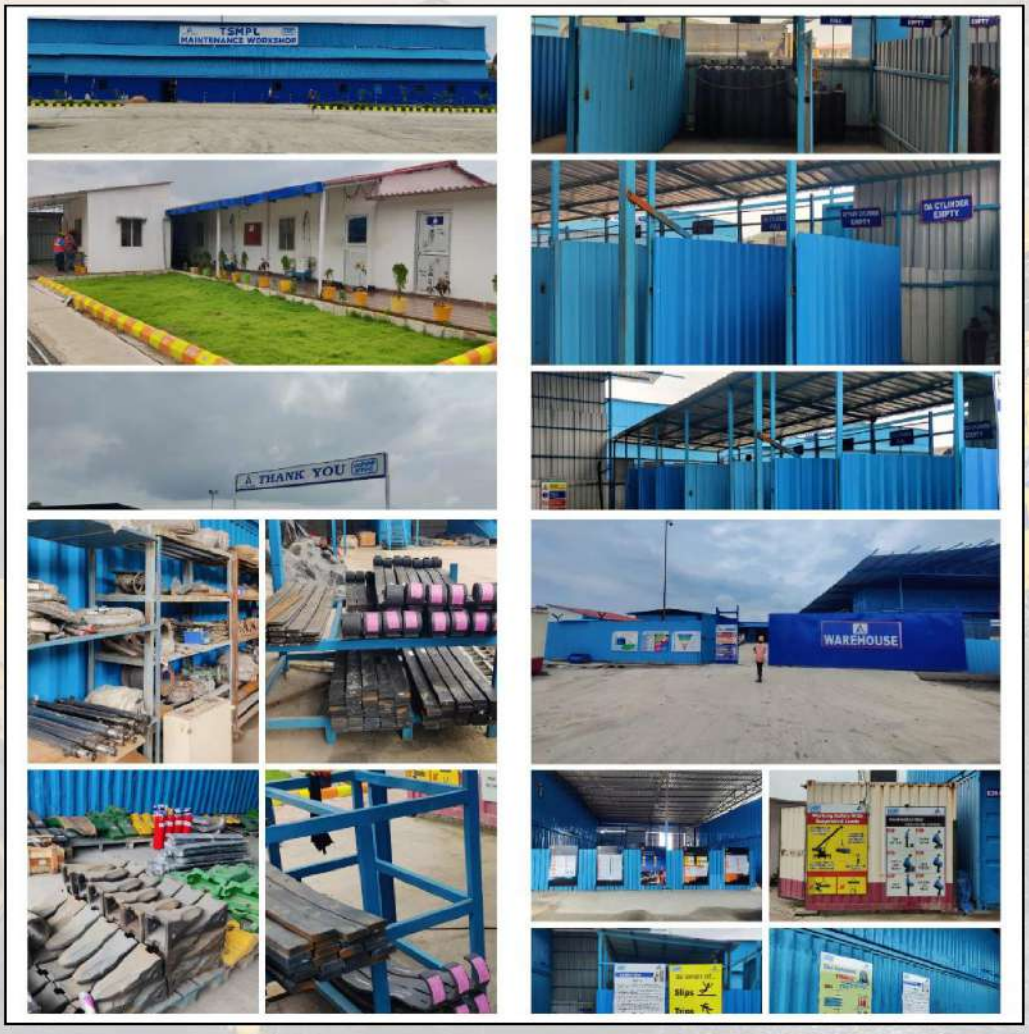
Safety Features in Dumpers:



Pakri Barwadih Coal Mining Project

HEMM Workshop:

PBCMP boasts a state-of-the-art workshop designed to meet all the essential requirements for the safe and efficient maintenance of a wide range of machinery. The workshop is equipped with optimal lighting, proper ventilation, and ergonomic workspaces, all of which contribute to a secure and productive environment. It also features well-organized storage areas for tools and parts, along with clearly defined pathways and safety zones, ensuring that maintenance tasks are performed smoothly and without unnecessary risks. This well-equipped workshop not only boosts the safety and efficiency of maintenance operations but also plays a key role in extending the longevity of the machinery by ensuring that all maintenance activities are carried out properly and on time.



Safe Practices in Workshop and Maintenance:

Tyre Inflation Guard	**Bolting Instrument**
Tyre Fitter	**Tyre Stand**

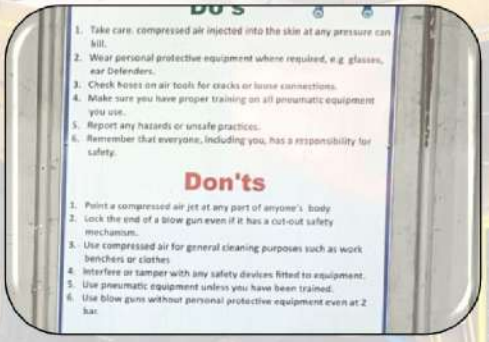
Use of Sleipners for equipment's marching and Implementation of LOTO in HEMM Maintenance

Safe Maintenance Practices:

Safe maintenance practices are prioritized through the implementation of Standard Operating Procedures (SOPs). Machinery is thoroughly washed before scheduled maintenance to ensure cleanliness and safety. Maintenance work is carried out with proper barricading, and wheel stoppers and mechanical locks are used as necessary to enhance safety. Additionally, SOPs are prominently displayed, along with safety signage, to reinforce safety protocols and ensure a secure working environment. The implementation of a Permit to Work (PTW) system further strengthens safety during the maintenance of HEMM, ensuring that all activities are carried out with the highest standards of safety and control

Washing of Vehicle

Proper Barricading



Safety Signage Board

Use of Wheel Stopper

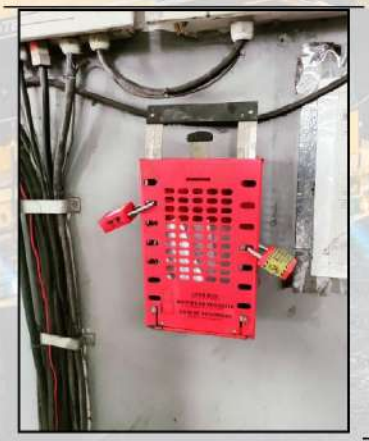
Welding & Cutting:

Safe practices for welding and cutting include the use of proper Personal Protective Equipment (PPE), a Hot Work Permit, and adherence to safety precautions. Flashback arrestors are installed at two locations in the cutting set to prevent backfires. Safety signage and SOPs, outlining essential Do's and Don'ts, are prominently displayed to reinforce safety protocols and ensure a secure working environment.

Proper Layout of HEMM Workshop:

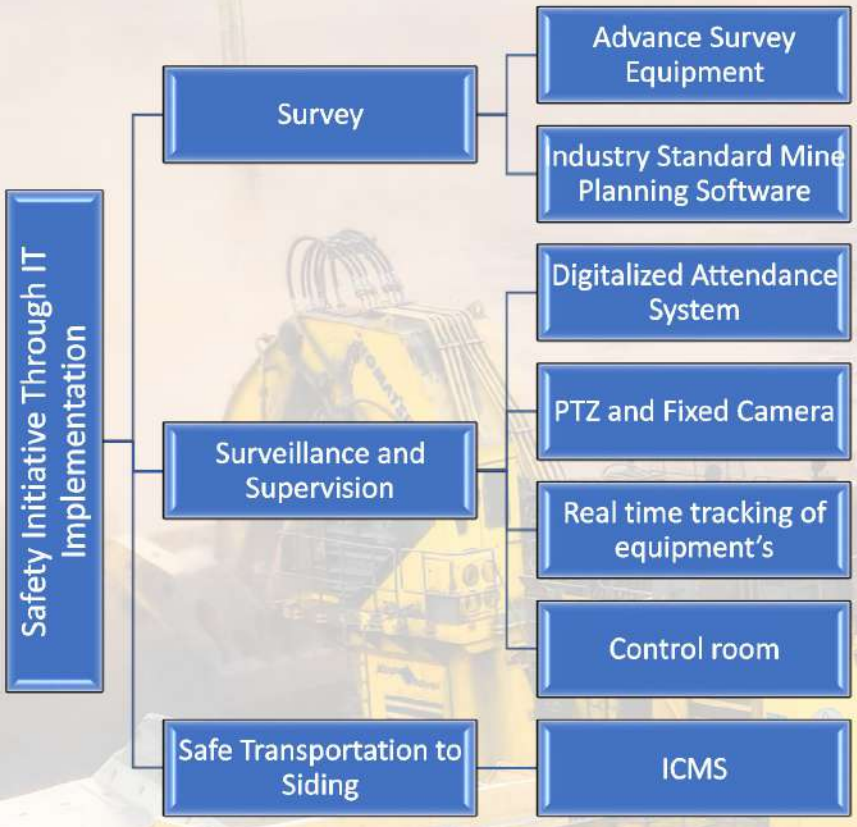
ELECTRICAL SAFETY

- Periodical Inspection of Electrical installations, Earth pits and Panels.
- Use of Lighting transformer as per DGMS guidelines.
- Inspection of E-Houses is being done on a monthly basis during PTW audit.
- LOTO & PTW system.
- Mine Illumination by mobile lighting towers, high mast lights, streetlights and monthly survey of Lux level.
- Deployment of licensed supervisor and electricians as per guidelines.
- SOP for electrical works, installations and machinery have been framed and strictly adhered to.
- COP for electrical shovel has been prepared SOP for assembly, operation and maintenance of electrical shovel.



Lock Out Tag Out (LOTO) System

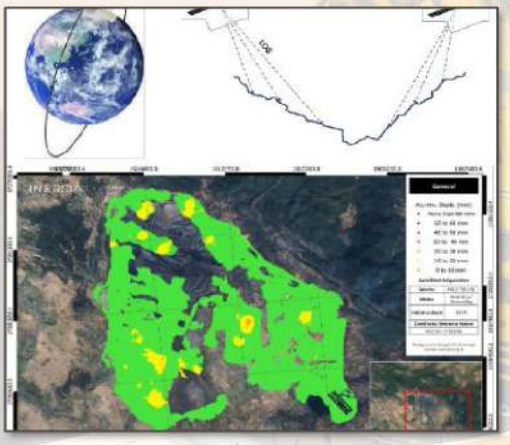
Safety Initiative Through IT Implementation



Design conformance and corrections of deviations: At PBCMP, a robust strategy is in place for the design conformance and correction of deviations in the mine pit/dump slope. The initiative prioritizes the highest safety standards and ensures that mining pit and dump progression aligns with specified scientific mining parameters. Key components of this strategy include the use of advanced surveying equipment for precise measurements and continuous monitoring. It also integrates advanced mine planning tools (Minex, Point Studio, Lis-cad, AutoCAD, Civil3D etc.), geospatial analysis, and real-time monitoring for adherence to scientific mining parameters. Technology is leveraged through advanced surveying equipment's like TLS, Drones, Total Stations supported by a centralized data management system.

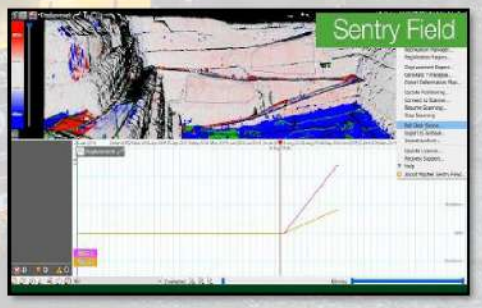
Advance Survey Equipment for enhanced accuracy and time savings:

- Drone Survey
- Radar Setellite analysis
- Terrestrial Laser Scanner
- DGPS Survey



Radar Satellite Ground Displacement Analysis

Drone Survey

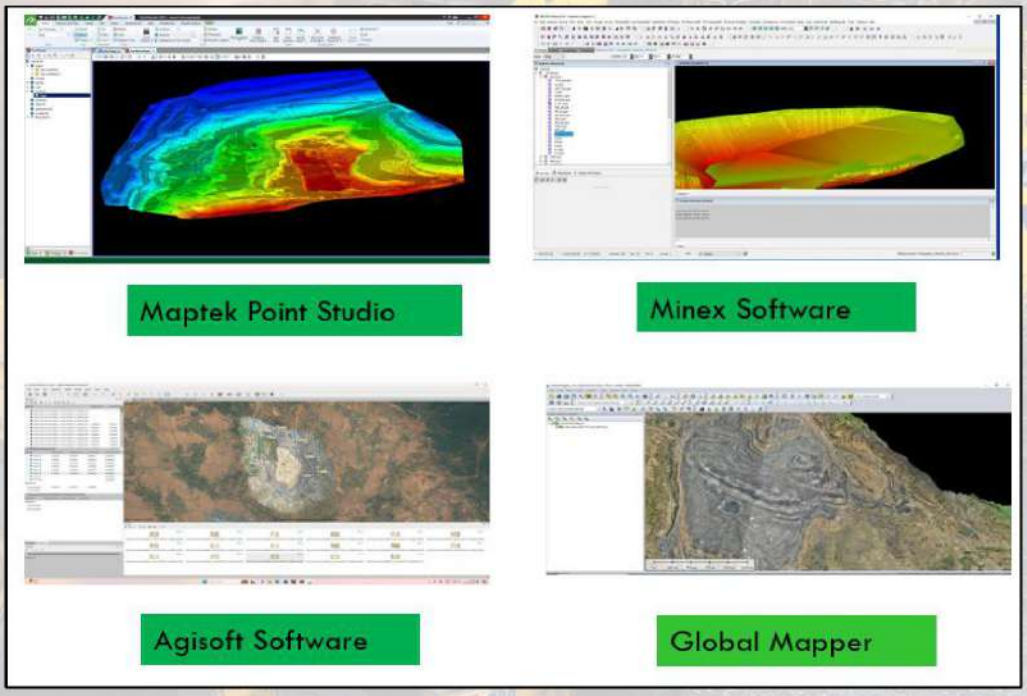


Pakri Barwadih Coal Mining Project

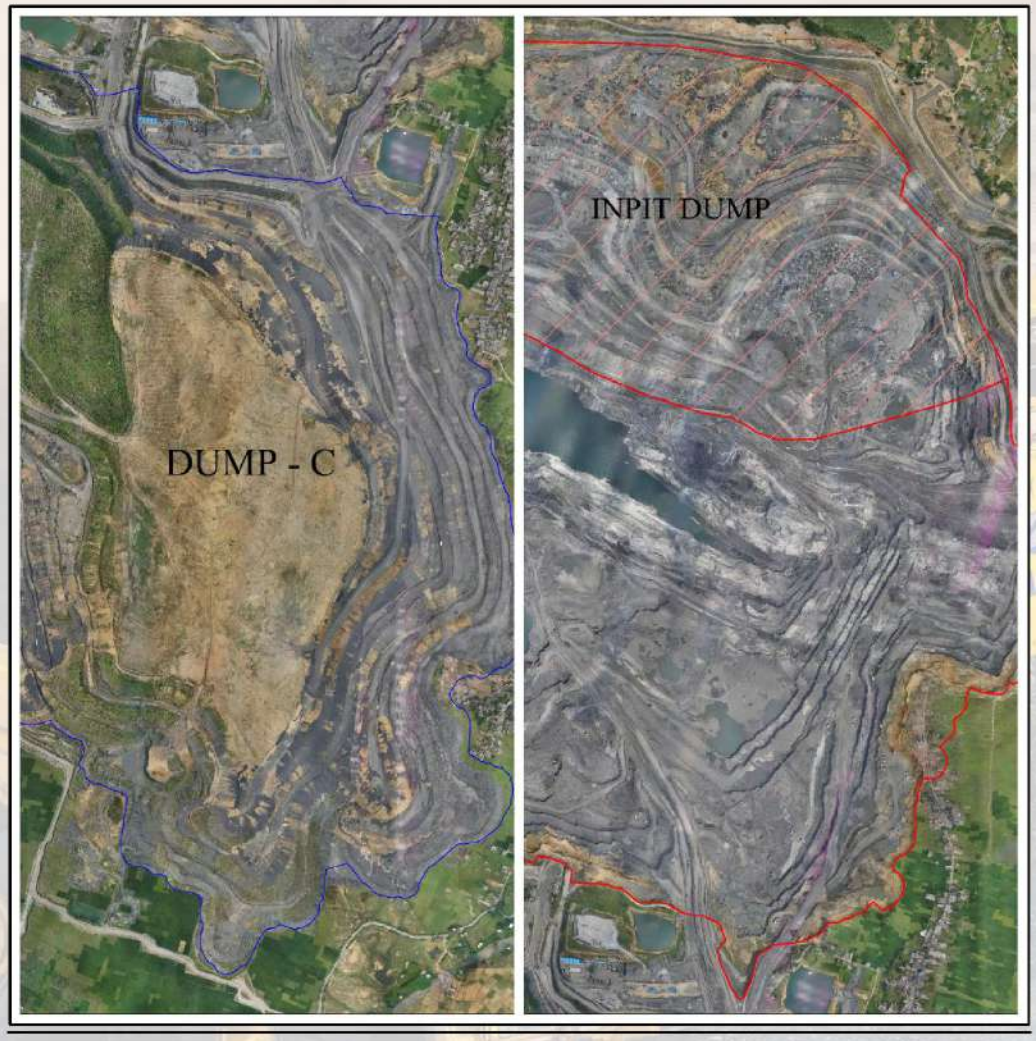
Pit and Dump Slope monitoring using TLS and Sentry

Advance Mine Planning software being used at PBCMP:

- **Minex Software:** Modelling and Schedule
- Autocad Civil 3-D: Drafting and Designing
- Maptek Point Studio:Point Cloud data processing software for TLS
- Agisoft: Drone Data Processing
- Global Mapper: Point Cloud data Visualization



Monitoring and surveying using drones: In a commitment to advanced mining practices, our integration of drone surveying technology aims to optimize operations, improve safety, and contribute to sustainable resource management. Drones are employed for monitoring pit and dump extents, rehabilitation planning in nearby areas, and assessing surface features, providing real-time, detailed data. This technology enables accurate topographical mapping, and progress tracking in mining pits. Additionally, they facilitate infrastructure inspection and water management, offering a cost-effective, time-efficient, and safe approach to mining site monitoring.



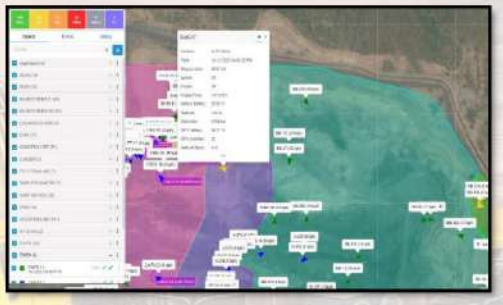
Monitoring of pit and dump extents using drones

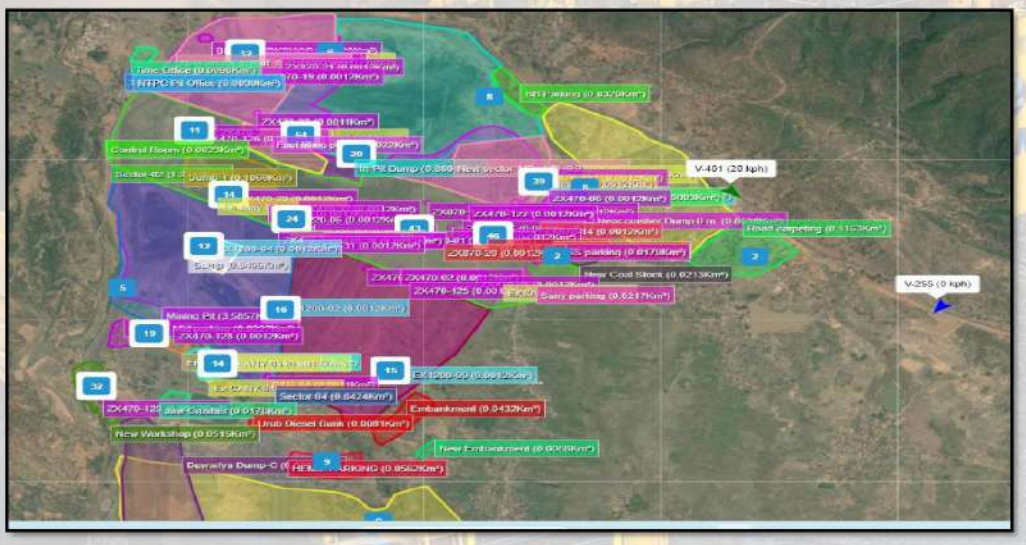
Pakri Barwadih Coal Mining Project

Realtime Tracking of Equipment's:

have been implemented to monitor the location, movement, and route of each deployed equipment, ensuring efficient operations, preventing downtime, and optimizing resource allocation. This implementation aids in optimizing logistics, ensuring that equipment is deployed where it is most needed.

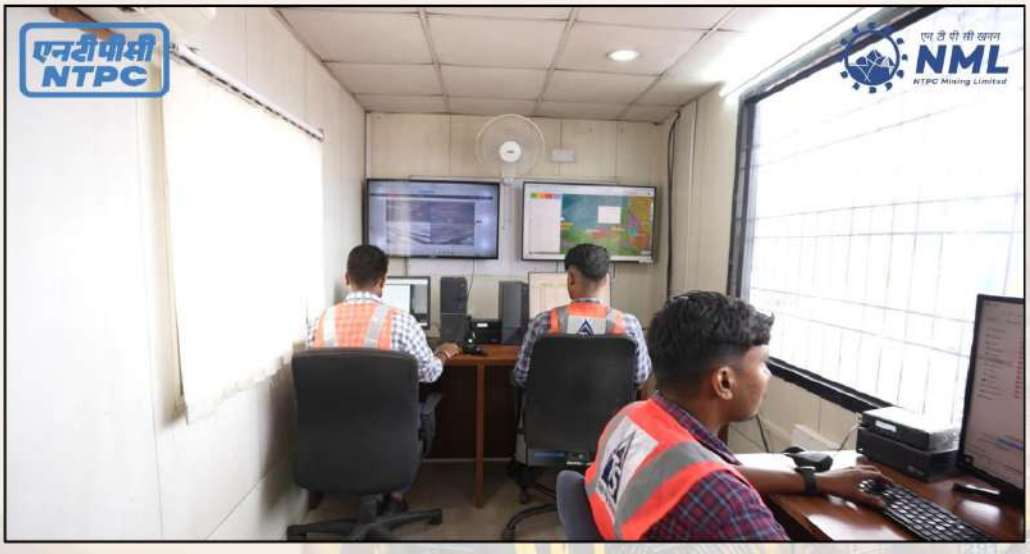
Automated alert systems are in place to notify operators or maintenance teams in real-time when certain thresholds or anomalies are detected. A quick response to these alerts can prevent equipment failures and ensure uninterrupted operations. Additionally, visualization dashboards provide a real-time overview of equipment status, usage patterns, and potential issues.





Realtime Tracking of Deployed equipment's.

Control room: Control room is acting like a centralized monitoring station. From there in-charge can monitor the working face condition, Performance of equipment, status of OB dump & stocks, Haul Road condition etc. In-charge from control room can communicate to any excavator operator, Mining overman / sirdar and rectify the issue / pass on the message.



PTZ and Fixed Cameras: The entire mining facility is equipped with a total of 55 CCTV cameras strategically placed throughout the site. These cameras are monitored and controlled from a central control room, allowing for real-time surveillance, and ensuring the safety and security of the entire operation.

Camera Type	Numbers
PTZ (Pan tilt zoom)	14
Fixed	41
Total	**55**

Biometric Attendance System: Attendance is being captured using biometric attendance system at multiple locations across the facility. This advanced technology ensures accurate and efficient tracking of personnel, providing a secure and automated method for recording attendance at various entry and exit points.

ICMS: The Dispatch Management System (ICMS) has been implemented at PCMP to automate the dispatch process and prevent pilferage. This system ensures the safe and efficient transportation of coal by streamlining operations, minimizing human error through the elimination of manual entries, preventing unauthorized driver access using face recognition technology, and enhancing overall control with the integration of RFID and GPS tracking systems.

Stacker and Reclaimer at PBCMP:

Cross Country Conveyor (20KMs) for Coal Transportation from Mines to Banadag Siding

Pakri Barwadih Coal Mining Project

Solar Blinkers for Junctions:

Solar-powered blinkers have been strategically installed at critical junctions throughout the mine to enhance visibility and alert operators to potential hazards. These blinkers serve as warning signals, ensuring that drivers of heavy machinery and vehicles are aware of the critical zones they are approaching. This proactive safety measure helps operators navigate the mine more safely, contributing to a smoother and more secure workflow.

QR Code for Employee Details:

As part of compliance with the recommendation of the 12th NSC, every person employed in the mine should be issued a smart digital token containing his/her complete details. A trial for this was conducted at PBCMP. The QR code is affixed to the employee's helmet, allowing anyone to retrieve their data by simply scanning the QR code using a smartphone, or a similar device connected to the internet. This implementation ensures quick access to essential details about personnel involved in mining activities

Online Deviation Reporting System:

To enhance safety and streamline communication, QR codes have been strategically placed at prominent locations throughout the mine. These codes provide a quick and efficient way for workers to report unsafe acts, hazardous conditions, near misses, and mine-related incidents. This system is not just about convenience; it enables immediate corrective action by instantly highlighting deviations to higher management, allowing for swift responses to ensure a safer workplace.

Employee Details Encoded SOPs Booklet:

A unique booklet containing the Standard Operating Procedures (SOPs) for blasting and drilling operations has been formulated distributed to relevant personnel, along with an awareness campaign. The SOPs are written in Hindi and provided in a convenient pocket-sized format. The back of the booklet features a QR code that encodes employee details, making the booklet serve not only as an SOP guide but also as an ID card.

Vehicle Mounted Luxmeter for Illumination Survey:

Instead of manually measuring illumination at various points—an approach that is both time-consuming and labour-intensive—the vehicle-mounted device provides automated, continuous assessment, saving both time and resources. As the vehicle moves, the device continuously measures illumination levels, offering real-time data across different locations and changing conditions. This is especially valuable for large-scale operations like mining, where lighting conditions can vary significantly

Display Boards in Hindi:

Safety signage boards have been installed at various locations throughout the mine to raise awareness among all personnel. In addition to standard safety signs, several boards featuring messages in Hindi have been strategically placed at prominent locations, ensuring that all workers, regardless of language proficiency, are informed about safety protocols. To further reinforce safe practices, 'Dos and Don'ts' boards have been installed in the workshop area, clearly outlining essential safety guidelines and behaviours for all workers to follow.

Counselling of Family Members:

As an initiative to spread awareness among the family members regarding the hazards and risks associated with the job of their loved ones, they are called and the same is shown to them from Mine Viewpoint. The counselling session aims to familiarize the site conditions and dangers related to their job so that they could take care of them even at home for better discharge of their job at mines.

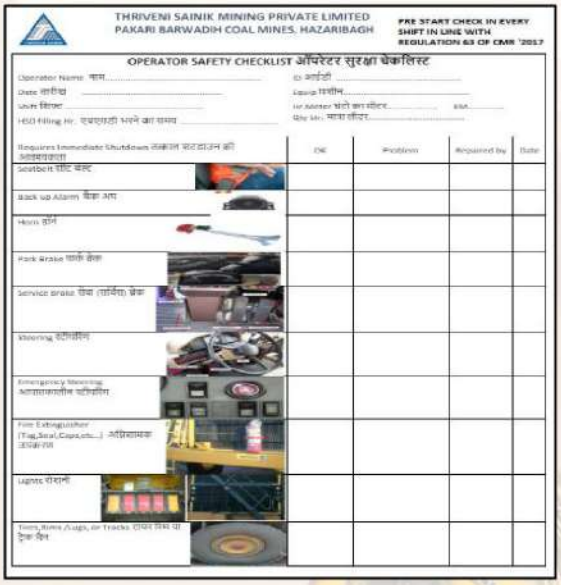
Underground cable detector:

As a safety measure to prevent damage to underground cables, an underground cable detector has been procured to detect both live and dead cables buried below ground.

Vertigo test:

All workers who are required to work at height must pass a vertigo test as a mandatory safety measure. This test is designed to assess their ability to safely perform tasks at elevated positions, ensuring that they do not experience dizziness or disorientation that could lead to accidents. By conducting the vertigo test, we prioritize the well-being of workers and minimize the risks associated with working at height.

Pictorial Check List:


THRIVENI SAINIK MINING PRIVATE LIMITED
PAKARI BARWADIH COAL MINES, HAZARIBAGH

PRE START CHECK IN EVERY SHIFT IN LINE WITH REGULATION 63 OF CMR '2017

OPERATOR SAFETY CHECKLIST ऑपरेटर सुरक्षा चेकलिस्ट

Operator Name नाम..... ID आईडी .....
Date तारीख ..... Group समीन.....
Unit विभाग ..... Hr Meter घंटे का मीटर..... KM.....
HSD Filling Hr. एचएसडी भरने का समय ..... Day Hr. भरा लीटर.....

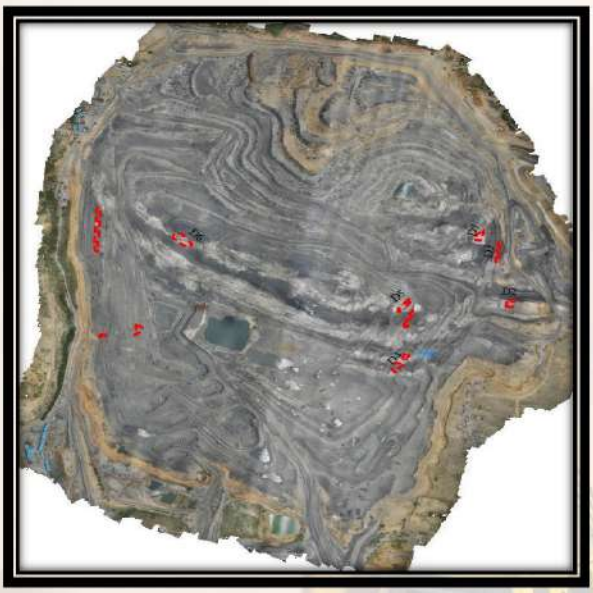
Requires Immediate Shutdown तत्काल शटडाउन की आवश्यकता	OK	Problem	Required by	Date
Seatbelt सीट बेल्ट				
Back up Alarm बैक अप				
Horn हॉर्न				
Park Brake पार्क ब्रेक				
Service brake सेवा (कार्यरत) ब्रेक				
Steering स्टीयरिंग				
Emergency Steering आपातकालीन स्टीयरिंग				
Fire Extinguisher (Tag,Seal,Capacity...) अग्निशामक यंत्र				
Lights रोशनी				
Tyres, Rims /Lugs, or Tracks टायर रिम या ट्रैक चैन				

A pictorial checklist has been created for operators with limited educational qualifications or those who are not proficient in Hindi or English. This visual tool ensures that all operators, regardless of their language or literacy level, can easily understand and follow safety protocols and operational procedures.

On Spot Appreciation for Workers:

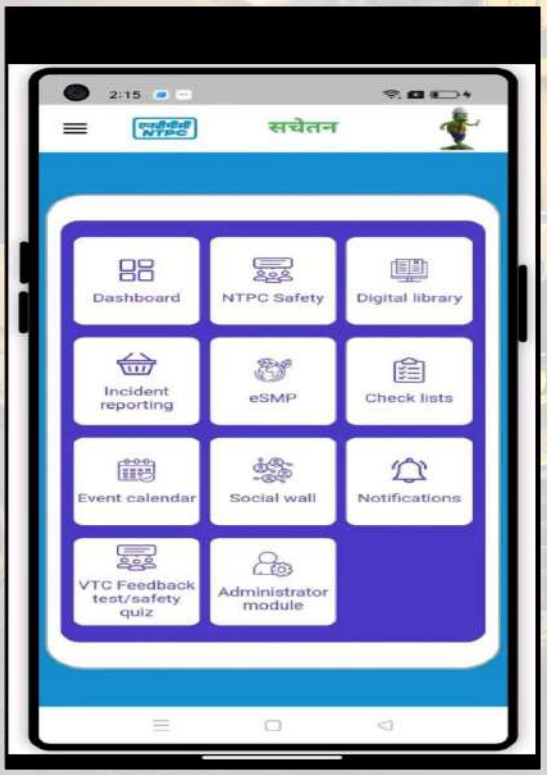
On-the-spot appreciation is given to workers and supervisors by shift personnel for their valuable contributions to safety enhancement. This immediate recognition helps motivate staff, fosters a culture of safety, and reinforces the importance of adhering to safety protocols. By acknowledging efforts in real-time, the organization encourages continuous improvement in safety practices and boosts morale among employees

Use of Drone Image for Blasting Zone Demarcation:



Using drone Image for better coordination with shift personnel, safety zone demarcation and identification of risk prone areas. By utilizing advanced technologies like drone imagery, the initiative ensures that safety zones are accurately demarcated, potential hazards are identified early, and personnel are better informed about the conditions of the site

Sachetan App:



The Sachetan app, an in-house initiative, has been established to enhance safety measures at NTPC's coal mining projects. This innovative app offers a range of features to users:-

1. Integration of E-SMP Module: Incorporated the complete E-SMP into the application, including all activities, associated risk scores, control plans, and respective SOPs. This will ensure easy and quick access for all users, improving compliance and safety awareness.
2. Real-Time Incident Alerts: Introduced an alert/notification system for any incident occurring within the mine.
3. Social Wall Enhancement: Improved the existing Social Wall by enabling better interface, structured posts (safety messages, recognitions, events, etc.).

Safety Park and Safety Kiosk:

Safety Park is an initiative by Pakri Barwadih Coal Mining project which has been established at the pit office. It has proper seating facilities, inhouse TV, fully air conditioned and other facilities for training of persons employed in the mines for all-round development of workers. Workers are made aware regularly about the different hazards present in general and work-related hazard present in the mine. Different instruments are placed in the safety park for training of employees with a safety Mannequin to show the importance of wearing PPEs in the mines.

Safety Kiosk have proved to be an important tool in safety for training and competency testing of persons employed in the mines. It is fully connected with in house internet which is widely being used for showing safety videos and lectures during training. It is also being used for awareness about different hazard present in mines which has been helping a lot in accident prevention. It is also being used for online competency test after training of individuals. Persons getting more than 75% marks are passed and scoring less than 75% are sent for re-training.

Joint Inspection before induction of new machinery:

Joint inspections are conducted collaboratively by the Safety Officer, the Electrical and Mechanical (E&M) Department of NTPC, and TSMPL prior to the induction of any new machinery. These inspections ensure that all safety features and systems are thoroughly checked and in proper working order, in accordance with established safety guidelines. Machinery is permitted to be put into operation only once it has been confirmed that all safety measures are fully functional and compliant with the relevant safety standards.

Route Familiarization of Ambulance:

Dump-C: 85m

WP-3

In-Pit Dump 425RL

Fault Zone

Route familiarization for ambulance drivers is conducted to ensure that they are thoroughly acquainted with access routes to various locations, as well as any recent changes to these routes. This training aims to make them proficient in understanding the right way and other safety rules, thereby ensuring safer and more efficient travel. Additionally, it focuses on improving the response time of ambulances when reporting to the site of an incident, ultimately enhancing the overall effectiveness of emergency response.

Supervisor's Platform and Parking Station:

The Supervisor's Platform and Parking Station are designed to provide effective isolation of the supervisor from mobile HEMM (Heavy Earth Moving Machinery), as well as to isolate Light Motor Vehicles (LMVs) from HEMM. Additionally, the raised platform enhances the supervisor's ability to oversee operations more effectively. These initiatives contribute significantly to improving safety standards by ensuring complete isolation between personnel and machinery, thereby reducing the risk of accidents, and enhancing overall operational safety.

Dump-C: 60m

Preparation of Supervisor's Platform

LMV Parking Station

Reverse Parking

Pitching of haul roads with stone chips:

Pitching of haul roads with stone chips helps create weather-resistant haul roads that require less grading and generate less dust. This approach also supports sustained coal production during rainy conditions, ensuring smoother operations and minimizing disruptions caused by weather-related challenges.

Hard sandstone patch

Production of stone chips and fines

Layering of Chips and fines

Stone Chips pitched road

Low lighting System for Better Illumination:

A low lighting system provides better illumination on haul roads, ensuring adequate visibility for dumper operators. This system helps reduce glare, enhancing the health and safety of operators, while also supporting compliance with regulatory lighting standards.

LMV Management:

LMV Management at PBCMP

- Mine Manager's scheme for LMV management.
- 10 ft raised flag pole with reflector tape in all LMVs
- Baecon lights in all the LMVs.
- Separate roads for LMVs.
- LMV parking stations (100mtr away from HEMM).
- Rules for crossing laid down in Mine Manager's Scheme.
- Awareness drive for LMV operators.
- Monthly Inspection for fitness of LMVs.

Separate LMV Road:

TRAINING FACILITIES

Certificate of Affiliation

Thriveni Earthmovers Pvt. Ltd.
is affiliated "Training Partner" of
Skill Council for Mining Sector

A state-of-the-art training facility has been set up at Pakri Barwadih Coal Mining Project of NTPC Limited through MDO. We are proud to state that our MDO has been affiliated as a "Training Partner" of Skill Council for Mining Sector under the NSDC (National Skill Development Corporation).

To provide modern training in-line with the current pace of digitalisation and Internet of Things, we have a set-up of simulators available at our training facilities since the inception of Mining activities. We, at Pakri Barwadih have foreseen the requirements for such modern methods well before the recommendations of 12th National Safety Conference.

Available Simulators:

- *Immersive Pro-3 (S-350) **
  - *For 240Te Dumpers*
  - *Terex RH 340 Dumper*
  - *Terex RH 200 Dumper*
- *Immersive (S-124) **
- **Doron Volvo FM 550**
- **Doron LMV Simulator PRND21**
- *Atlas Copco Flexi Roc-D**
  - *Atlas Copco L8 (Crawler Drill)*

**** Available at separate facility of Mine Operator located in Jamshedpur***

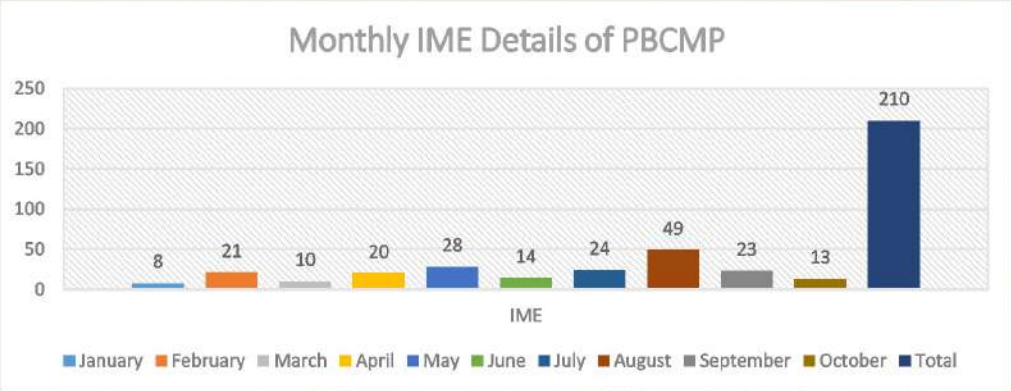
Specialized Trainings

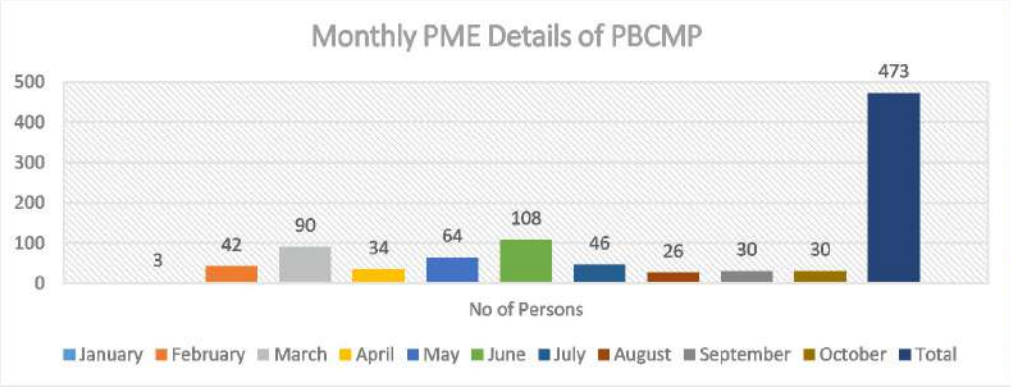
- Training for Instructors and Trainers
- Training through OEMs
- Fire demonstration and training
- PTW Training
- Training for working at heights
- Training on Emergency Response Plan
- Training on confined space working
- Training on hot works

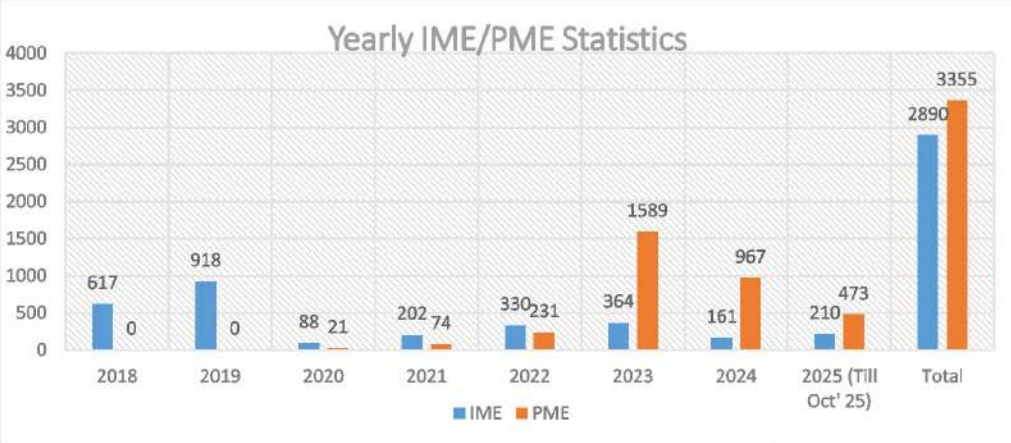
OCCUPATIONAL HEALTH

We have a first aid room near HEMM workshop in mine and fully equipped hospital at NTPC site office Sikri & Medical Clinic at Langatu with Pathology, X ray, ECG facilities under the charge of qualified Medical Officer. IME/PME is carried out to all our employees as per Mines Rule 1952.

All workers/operators of outsourcing contractors are also carried out IME/PME as per statute.







PBCMP Site Office Hospital - Sikri

Medical Center at Langatu

Mines First - Aid Room

X-ray machine in the dispensary to facilitate orthopedic

BPL ECG Machine

Diagnostic Audiometer

Medico centrifuge machine is used for urine testing blood

Biochemistry analyzer is suitable for Glucose test, Lipid Profile, Kidney Function test, Liver function Test etc

CBC Hematology Analyzer

Ambulance (Advanced Life Support):

- Ambulance Cot
- Scoop Stretcher
- Spine Board
- Wheelchair
- Bi-Phasic Defibrillator cum Cardiac Monitor with recorder
- Transport ventilator
- Oxygen flow meter with humidifier, Suction Pump
- Self-inflatable resuscitation bags
- Mouth to mask ventilation device
- Oxygen cylinder (portable) with O2 pressure reducer
- Oxygen administration equipment
- Laryngoscope with blades
- Volumetric and Syringe Infusion Pumps
- Foetal Doppler
- Glucometers
- Pneumatic Splints, Cervical Collars, Roller splints

First Aid Training Centre – Pakri Barwadih CMP:

Last year, the PBCMP Stabilization Centre received approval from the Directorate General of Mines Safety (DGMS) to conduct First Aid training and issue competency certificates. Several batches have since completed the training, equipping participants with essential first aid skills to effectively manage medical emergencies. The program covers both theoretical knowledge and practical application. Those who meet the competency standards are awarded First Aid certificates, ensuring that the workforce is well-prepared to respond to emergency situations at the site.

Provision of Drinking Water and Rest Shelters in Mine:

6 portable hook-type skid-mounted rest shelters with better stability, equipped with drinking water and toilet facilities

49 additional shelters with water arrangements provided at various mine locations, bringing the total to 55 shelters

Each shelter equipped with water jars or earthen pots with taps for easy access to drinking water

6 water coolers installed at key locations including the time office, canteen, pit office, and workshop

Canteen building with facilities for food storage, raw material storage, cleaning, drinking water, and toilets to cater to employees

Female Rest Shelter & Room

Pakri Barwadih Coal Mining Project

ENVIRONMENT MANAGEMENT

In this project, NTPC and the MDO are implementing an Environmental Management System in full compliance with all applicable statutory rules and regulations. A systematic program schedule has been developed for the implementation and monitoring of various control measures, ensuring continuous surveillance of environmental quality parameters in the area. Monitoring schedules are established to track these parameters at prescribed intervals, ensuring that they consistently meet the standards set by the Ministry of Environment, Forests and Climate Change (MoEF&CC), State Pollution Control Board, DGMS, and other relevant authorities

The environmental management system includes following aspects to achieve eco-friendly operations.

- Air Quality
- Water Quality
- Solid Waste
- Hazardous Waste
- Carbon Capturing

Air Quality

For assessing the air quality in the project site and its surrounding environ, Ambient Air Quality Monitoring for both Core Zone & Buffer zone is being done at eight (8) locations by NABL & MoEF&CC Accredited Laboratory based on the metrological data, topographical features and in consultation with the State Pollution Control Board. Particulate matter (PM10), Particulate matter (PM2.5), Sulphur dioxide (SO2), Oxides of Nitrogen (NO2). Besides, other parameters as per the NAAQ guidelines are carried out.

Continuous Ambient Air Quality Monitoring

Continuous PM10 Analyzer

Dust Control Measures:

Fixed Sprinklers

Water Tankers- 32 Nos.

Use of wet drilling

Fog Cannon at crusher unloading point

Use of DUSTRON PC chemical chemical in ratio of 1:2500 in water sprinklers.

Use of stone chips for preparation of haul roads to minimize generation of dust

I. **Use of Mobile Water Tankers:**

II. Wet Drilling practices and Controlled Blasting methods

III. Fog Canon at crusher unloading point

Pakri Barwadih Coal Mining Project

IV. **Fixed water sprinklers**

Water Quality Management:

I. Water Quality Monitoring

Ground water Level monitoring and sampling: - Monitoring of groundwater quality is being monitored through M/s Global Enviro Laboratories (NABL Accredited lab) and ground water levels are being carried out by establishing 16 nos. of Piezometers around mining lease. Apart from manual monitoring of water level six nos. of automated Piezometers have been installed.

Water samples being taken to monitor surface and ground water quality | Flow meter For capturing the Ground water Usages | Piezometer – Ground Water Monitoring

II. Effluent Treatment Plants

a. Electro-Mechanical ETP:200 KLD capacity with oil and grease trap with sedimentation pit for treatment of workshop effluent

b. 25 KLD MBBR technology STP at Langatu site office for treatment of the sewage generated at Offices

c. STP of 300 KLD capacity of MBBR technology MDO Colony, Sikri.

d. 1.5 MLD STP at R&R Colony, Dhenga

III. Water Conservation Methods:

a. **Check Dams:** 12 Nos. of Check dams have been constructed in Pakwa and Khora Nala to meet water requirements and to augment the groundwater of the area around PBCMP. The estimated cumulative storage capacity of the Check dams is 16.18 lakh cum, and estimated groundwater recharge potential of approx. 340.52 lakh m3/year.

b. **Rooftop rainwater** structures constructed, and nearby ponds rejuvenated to improve groundwater. Approximately 1.49 lakh m^3/year ground water recharge potential.

Pakri Barwadih Coal Mining Project

Solid Waste Management:

I. **Dump Management:** The solid waste generated from this working mine consists of topsoil and overburden/interburden. Topsoil is dumped separately, while the waste material is disposed of in Dump 'C' and Dump 'A'. The topsoil is being stacked on available suitable land and is used for spreading over the completed portion of the overburden (OB) dump to help develop a green belt.

To prevent erosion of the topsoil dumps, coir mats have been laid on the slopes. Additionally, catch drains and siltation pond have been constructed along the topsoil dump. To further combat soil erosion, plantation activities have been carried out using a mixed variety of grass seeds and root shoots of vetiver grass, along with coir matting.

More than 2.14 lakh tree saplings have already been planted, with dense plantation covering the closed portion of OB Dump-C. Over 1.92 lakh saplings have been planted along the slope of Dump-A, and more than 20,000 saplings have been planted along OB Dump-D and the vacant part of the eastern quarry.

Plantation on finished dumping area

Plantation on embankment area

Plantation along the road

Pakri Barwadih Coal Mining Project

Topsoil Management with the provision of Retaining wall, garland drain, coir mating and Mixed Grass Seeding

II. **Nursery at Mine Premises:** The project has developed a captive nursery of 2.00 Lakh saplings for its plantation program in & around the project area.

Pakri Barwadih Coal Mining Project

III. **Hazardous Waste Management:** Generation of hazardous waste from our operation is stored in earmarked area with proper protections & measures with guideline of Hazardous waste management rules & regulations.

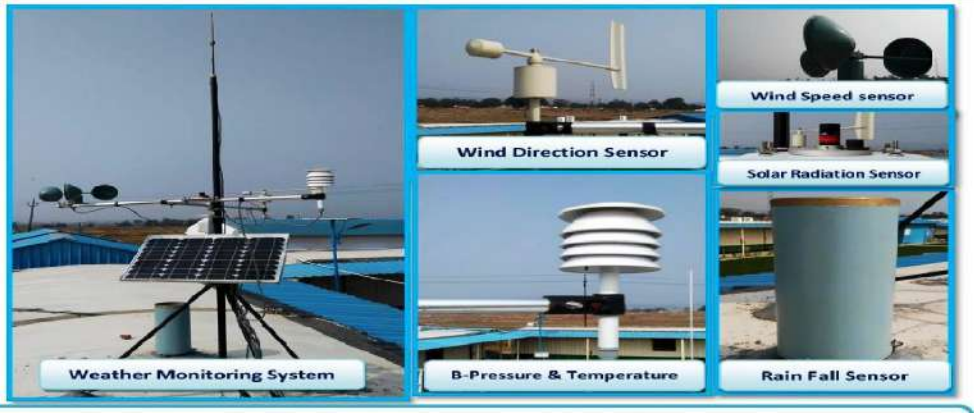
E-WASTE STORAGE YARD

COTTON WASTE STORAGE YARD

BATTERY STORAGE YARD

USED OIL STORAGE YARD

METROLOGICAL STATION: - As per condition of Jharkhand pollution control board Pakri Barwadih Coal Mining Project has established meteorological station at Langatu Site office, through which Temperature, win d direction, wind speed, relative humidity, Rainfall data, Biometric pressure is being monitored.



At Langatu (Site Office) site we installed permanent weather monitoring Station.

Carbon Capturing:

CO_2 Storage Well: NTPC Limited has marked an important milestone in the nation's clean energy transition by commencing drilling for the country's first-ever CO_2 Injection Borewell at its Pakri Barwadih Coal Mine, Jharkhand. This pioneering move, led by the company's R&D arm, NETRA (NTPC Energy Technology Research Alliance), is a decisive step toward fulfilling India's Carbon Capture, Utilization and Storage (CCUS) roadmap and its Net-Zero commitment by 2070.

The CO_2 borewell is being drilled to an approximate depth of 1,200 meters. Its primary purpose is to secure crucial geological and reservoir data required for establishing a safe and effective CO_2 storage process. This includes extensive core, methane, and water sampling, alongside seismic monitoring and detailed simulation studies to assess the rock formations' ability to permanently store carbon dioxide. This first-of-its-kind project is a critical component of NTPC's broader Carbon Capture, Utilization & Storage (CCUS) program. The initiative aims to rapidly develop indigenous CCS capability tailored specifically for deployment across India's vast power and industrial sectors, solidifying NTPC's leadership in sustainable energy solutions.

NTPC Drills India's first geological CO2 Storage Well at Pakri Barwadih

Pakri Barwadih Coal Mining Project

Women Empowerment:

1. **Women Dumper Operators:**

- The Pakri Barwadih Coal Mining Project is the **first mine in India** having **women operators** for operating large size dump trucks.
- **Facilities for Women Operators:**
  - Adequate security arrangement, CCTV camera,
  - Separate rest rooms,
  - Separate washrooms,
  - Creche room etc.
- **Training to Women Operators:**
  - Simulator training
  - On job Practical Training
  - VTC Training
  - Refresher Training
  - SCMC Certification
- Training to men regarding dignity of women, etc. have been ensured at workplace to make them feel safe.

2. **Women Security Guards:**

- Local female from project affected families (PAPs) have been hired and trained as security guards promoting the women empowerment and local employment around the area.

GREEN INITIATIVES

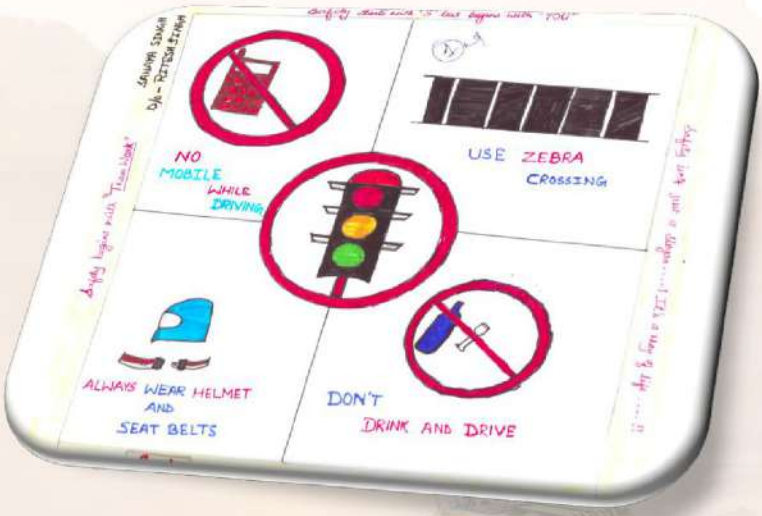
Two Solar Trees to Mine and Sikri Colony

Electric Vehicle hired to Reduce Project Carbon Footprints

Water Management System and Bio Methanation Plant

Pakri Barwadih Coal Mining Project

Employee's Contribution



By: - Sanaya Singh
D/o Ritesh Singh

By: - Adwitiya Demodak
D/o Gurupada Demodak

By: Harshwardhan Sonagara
S/o Dhirendra Sonagara

Pakri Barwadih Coal Mining Project

Title: Revolutionizing Mining with Drone Technology

The mining industry, traditionally associated with complex and hazardous operations, is undergoing a technological transformation. Among the most impactful innovations is **drone technology**, which is redefining exploration, production, and safety standards.

Enhanced Exploration and Surveying

Drones equipped with **high-resolution cameras, LiDAR, and advanced sensors** enable rapid, accurate data collection over large areas. This technology delivers detailed topographical maps, 3D models, and volumetric calculations - significantly reducing costs and improving decision-making speed compared to traditional manual surveys.

At the **Pakri Barwadih Coal Mining Project**, monthly drone surveys provide base maps, **Digital Surface Models (DSM), Digital Terrain Models (DTM), topographic maps, and contour maps**. These outputs support planning, asset relocation, and construction visualization directly on digital platforms. Ortho-mosaic imagery offers true-to-life terrain views with high accuracy - Ground Sampling Distance (GSD) ensures positional errors within **±6 cm (X, Y)** and **±9 cm (Z)**

Operational Efficiency

Drones streamline operations beyond exploration. They monitor site activities, inspect infrastructure, and track stockpiles with 90–95% accuracy. Advanced imaging and thermal cameras detect equipment issues early, reducing downtime and maintenance costs. At **PBCMP**, drone data integrates with mine plans (AutoCAD) for real-time updates and future planning.

Safety and Environmental Compliance

Safety is paramount in mining. Drones minimize human exposure to hazardous zones by performing inspections remotely. They also support environmental monitoring - tracking vegetation, water bodies, and air quality to ensure compliance and mitigate ecological impact.

Cost Reduction and Data-Driven Decisions

By automating repetitive tasks like mapping and inspections, drones shorten project timelines and reduce operational costs. The data they generate enables predictive maintenance, optimized resource allocation, and improved production planning.

Future Outlook

While challenges such as regulatory compliance and data management remain, collaboration among stakeholders will drive standardization and ethical use. The integration of **AI and machine learning** promises even greater advancements - enabling autonomous data analysis, anomaly detection, and intelligent decision-making.

MCL Introduces Drone Technology for Smarter Mining

Mahanadi Coalfields Ltd (MCL), a leading CPSE under the Ministry of Coal, has taken a major step toward digitalizing mining operations by introducing drone technology through its web-based portal **VIHANGAM**. This innovative system combines drones with a ground control station, enabling authorized users to access real-time aerial video from mine sites via a secure 40 Mbps internet lease line.

The control station operates the drone, and the entire system can be managed remotely through the portal, offering flexibility and efficiency. Currently, this pilot project is operational at **Bhubaneswari** and **Lingraj** opencast mines in Talcher Coalfields.

MCL leverages drone technology for **environmental monitoring**, **volume measurement**, and **photogrammetric mapping**, marking a significant move toward the digital transformation of mining processes.

Conclusion:

Drone technology is revolutionizing mining by improving efficiency, safety, and sustainability. As adoption grows and technology evolves, drones will play a pivotal role in shaping the future of mining operations worldwide.

Irfan Ali Siddique
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PBCMP, NTPC Limited

अच्छे कर्मी की क्या पहचान? सुरक्षा का जो रखता ध्यान |
काम से जो ना लेता तनिक तनाव , काम सुनकर जिसे आता नहीं ताव
ऐसे व्यक्ति की हो पहचान, सुरक्षा का जो रखता ध्यान |
बिना नशे के ड्यूटी पर आता, नियम कायदो को हैं अपनाता
काम के तरीको से उसके, बनता रहता काम आसान
सौ मे से वो एक महान, सुरक्षा का जो रखता ध्यान |
अपने काम का जिम्मा लेता, एस ओ पी का पालन करता
अपने कौशल का धनी वही हैं, कठिन काम से जो ना डरता
अपने दायित्वों का उसी को भान, जिससे सिस्टम बनेगा महान
ऐसे कर्मी का हो सम्मान, सुरक्षा का जो रखता ध्यान |

Jitendra Kumar Nagar
(Engineer-Mining)
PBCMP

"Make safety a daily choice, so you return home with a happy voice"

"No hurry, no worry — safety keeps your life steady, not blurry"

By: - Akash Kapse
PBCMP

"Safety isn't a game or show — it's the shield that helps you grow"

By: - Shravan Rohit
PBCMP

"One small mistake can cause big pain, Work with care again and again"

बढ़ाना है जीवन की गति ,
तो न करे सुरक्षा समानों की क्षति।

स्वयं सुरक्षा के साथ आइए,
दूसरों को भी सुरक्षित करके जाइए ।

दिन हो या रात ,
करो सुरक्षा की बात।

Submitted By:-

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Jr. Engineer (Mining)
PBCMP
NTPC Mining Limited

"Dig deep for minerals, but dig deeper for safety"

"Gold and coal can wait- your life cannot"

Pakri Barwadih Coal Mining

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