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MEMORANDUM OF  
UNDERSTANDING (MOU)

BETWEEN



Mahanadi Coalfields Limited  
AND  
Indian Institute of Technology  
(Indian School of Mines)  
Dhanbad



This Memorandum of Understanding (hereinafter referred to as "MoU") entered into on this 25<sup>th</sup> day of October 2021 by and between:

Mahanadi Coalfields Limited, a company incorporated under the Companies Act, 1956, having its registered office at Mahanadi Coalfields Limited, Sambalpur-768020, Odisha, India (hereinafter referred to as 'MCL' which expression shall, unless repugnant to the context or meaning thereof be deemed to mean and include its successors and permitted assigns), of the **First Party**. Shri Awadh Kishore Pandey, HoD, Innovation Cell, MCL is representing and signing this MOU on behalf of MCL;

AND

Indian Institute of Technology (Indian School of Mines) Dhanbad based at Dhanbad-826004, Jharkhand, India (hereinafter referred to as IIT (ISM) Dhanbad which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its successors and permitted assigns), of the **Second Party**. Prof. Shalivahan, Dean(R&D), IIT (ISM) Dhanbad is representing and signing this MOU on behalf of IIT (ISM) Dhanbad;

MCL and IIT (ISM) Dhanbad are hereinafter individually referred to as the 'party' and collectively as 'parties'

**WHEREAS**

- i) Mahanadi Coalfields Limited is a premier coal mining and coal supply company in India having expertise and strength in areas such as coal mining.
- ii) Indian Institute of Technology (Indian School of Mines) Dhanbad commonly referred to as IIT (ISM) Dhanbad has been established under The Institute of Technology Act 1961 as amended by Act no.34 of 2012. It was declared as an Institute of National Importance by the Government of India, established to provide instruction and research in various branches of engineering and technology for the advancement of learning and dissemination of knowledge in such branches.
- iii) Both MCL and IIT (ISM) Dhanbad are leading premier national organizations in their respective fields and are desirous of working together to work as a team to achieve national objectives, undertaken with their best abilities and maximum mutual cooperation with intent of helping each other for "**Sustainable Business Practices in Mahanadi Coalfields Limited (MCL)**".

**NOW, THEREFORE, IT IS HEREBY AGREED BY THE PARTIES THROUGH THE INSTRUMENT OF MoU AS FOLLOWS:**

**1. INTENT AND OBJECTIVE OF THE MOU**

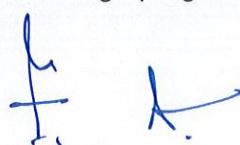
The objective of this Memorandum of Understanding is:

- a. To promote interaction between academic fraternity of IIT (ISM) Dhanbad and experienced officials of Mahanadi Coalfields Limited in mutually beneficial areas.
- b. To provide a formal basis for interaction between IIT (ISM) Dhanbad and MCL.
- c. To conduct various studies, research, pilot studies, implementation of cleaner technologies, alternate uses of by-products/waste, strategic move towards diversification and build knowledge base leading to "Sustainable Business Practices in Mahanadi Coalfields Limited (MCL)".
- d. To act as an institute-industry interface for gainful interaction and engagement between resources of IIT (ISM) Dhanbad and Mahanadi Coalfields Limited, thereby promoting and facilitating an ecosystem for Startups for promoting "Make in India". This is to be achieved through institutionalized engagement such as incubation centres, state-of-the-art facilities, etc.

**2. MODES OF COLLABORATION**

IIT (ISM) Dhanbad and MCL shall collaborate through one or more of the following:

- a. Sponsoring including funding student projects / fellowships in the areas of collaboration (as given below in Section – 3) in four-year Ph.D., two year M.Tech and four-year degree programs at IIT (ISM) Dhanbad .
- b. Training / Education of MCL employees through programmes conducted by IIT (ISM) Dhanbad in areas of interest to MCL.
- c. Training / Education including practical exposure to faculties and students of IIT (ISM) Dhanbad through programmes conducted by MCL in areas of interest to



- MCL.
- d. MCL will assist in co-teaching of courses at IIT (ISM) Dhanbad (as and when required) and sponsor an employee on sabbatical for one full semester at IIT (ISM) Dhanbad to teach a course and further research in the areas of mutual interest.
  - e. Any other appropriate mode of interaction agreed upon between IIT (ISM) Dhanbad and MCL.

### 3. AREAS OF COLLABORATION

Some of the areas of collaboration between IIT (ISM) Dhanbad and MCL have been set out here under:

#### (i) Research and Development

An R&D centre is to be established at MCL in collaboration with the IIT (ISM) Dhanbad. This R&D centre will be dedicated to research focused on improving the efficiency and safety of coal mining processes, mitigating the environmental impacts of its activities, transport and use of coal. As per this MoU, MCL will sponsor dedicated Research Laboratories/Centre at IIT (ISM) Dhanbad (subject to sufficiency of R&D centre established at MCL), as per the need of the collaborative R&D Projects and mutual benefit of both of IIT (ISM) Dhanbad and MCL. Similarly, IIT (ISM) Dhanbad will provide assistance to R&D Centre of MCL in the form of research scholars, specialized core facilities available at the institute and other needful resources.

In all collaborative R&D Projects between IIT (ISM) Dhanbad and MCL, main focus will be on following areas (but not limited to):

- a) Application of Industry 4.0 (Internet of things, Artificial Intelligence, Big data analytics, Cloud computing, Machine learning etc.) for machine failure analysis, predictive maintenance of HEMM, SMP (Safety Management Plan), environmental monitoring and control, coal quality analysis, auto-evaluation of tender, enhancing availability and utilization of HEMM, etc.
- b) GIS and Remote sensing in the field of survey, environment monitoring, land acquisition and R&R, asset mapping, change detection, land use and land cover mapping etc.
- c) Unmanned Aerial Systems (photogrammetric or lidar based) for mine survey, surveillance, inspection of plant and machinery, 3D terrain modelling, etc.
- d) Virtual Reality/Augmented Reality for training, remote maintenance of plant and machine, risk identification and risk assessment, performing mock rehearsals, mine simulation, etc.
- e) Robotics/unmanned autonomous machines/remote operated/semi-automated machines to reduce manual exposure to hazards and enhance safety.
- f) Occupational hazard and safety management, risk assessment, risk mitigation, safety management plans, etc.
- g) Diversifying into energy business or alternative energy sources from coal mine methane/coal bed methane/coal gasification, harnessing wind energy by installing wind mills on OB dumps, firing of washery rejects/surface miner rejects, low quality coal in CFBC boilers or other advanced combustion techniques, setting up solar panels on OB dumps/Roof tops, production of blue/green hydrogen etc.
- h) Strata control for continuous monitoring and stability analysis in both



underground and open cast mines of MCL.

- i) Integration of mine plan with machines for better quality control, enhancing productivity, etc.
- j) Development of smart gadgets for accident prevention/risk mitigation, etc.
- k) Alternative uses of by-products/wastages, e.g. segregation of sand from overburden, fly ash for road construction/back filling material, e-wastage, industrial waste recovery, etc.
- l) Development of digital/smart/connected mine, digital twin of plant and machinery.
- m) Becoming a net zero energy company, energy efficiency (product and processes), etc.
- n) Becoming a carbon neutral company, sustainable growth and development strategies vis-à-vis energy and environment.
- o) Industry specific multimedia and graphics support which shall include academic/industrial videos, animations, simulations, etc.
- p) Environment management, sustainable mining practices, treatment of mine water and effluent, dust control and mitigation, ecological restoration, reclamation, post closure utilization of mine site etc.
- q) Blast free mining of overburden, ecofriendly blasting near to hutments, etc.
- r) Clean coal technologies, coal beneficiation, etc.
- s) Bulk material handling systems/continuous mining system for reducing carbon foot print and enhanced productivity.
- t) Consultations regarding projects, project economics, cost-benefit analysis and other industrial engineering studies.
- u) Any other understanding from time to time.

### **(ii) Knowledge partnership**

In view of mutual benefit and in the interest of mineral conservation, mine productivity and advancements in clean technologies in energy sector, it is important to ensure a strong Industry-Institute Partnership between IIT (ISM) Dhanbad and MCL. In this direction, IIT (ISM) Dhanbad will serve as 'Knowledge Partner' of MCL and MCL will serve as 'Industrial Partner' of IIT (ISM) Dhanbad. This will facilitate participation of different departments of IIT (ISM) Dhanbad in need-based ongoing and future R&D Projects/scientific studies of MCL. The Dean (R&D), IIT (ISM) Dhanbad and Head of

proposed R&D Centre of MCL will act as Nodal Officers in this regard on the behalf of IIT (ISM) Dhanbad and MCL, respectively. Engagement of different departments of IIT (ISM) Dhanbad needs to be ensured by IIT (ISM) Dhanbad as per Project requirement of MCL. More thrust will be given on strengthening of interdisciplinary R&D Projects to meet future demand of energy sector.

### **(iii) Training**

Emphasis will be given by MCL for developing training and placement infrastructure as per company policy. MCL will do preplanning for identifying live projects in advance for the B.Tech/M.Tech/Ph.D students to undertake during their summer training which will help IIT (ISM) Dhanbad in fulfilling its academic requirements. Concurrently, this will help MCL in finding better solutions for its day-to-day operational challenges. Regular interaction of experienced engineers of MCL with IIT (ISM) Dhanbad students will be ensured either through periodic guest lectures or through video conferencing.

**(iv) Holding annual events**

MCL and IIT (ISM) Dhanbad will jointly organize annual events like workshops/seminars/conferences/technical festivals/Industry-Institute sports meet etc. to keep their stakeholders updated with latest technological advancements and to boost their motivational level. This will also help in enhancing the prosperity of the nation at international platform.

**(v) Corporate Social Responsibility (CSR)**

In view of social upliftment in the region surrounding the command area of MCL, this MoU shall also engage in planning and execution of dedicated CSR/welfare projects strictly in terms of the company's CSR Policy by involving the R&D centre or sponsored/supported Startups of IIT (ISM) Dhanbad. This will not only help in generation of financial support to Incubation Cell but it will also result in effective and efficient CSR/Welfare Projects in these regions.

Other areas of interaction may also be added as per mutual agreement discussed and reviewed from time to time.

**4. CONFIDENTIALITY**

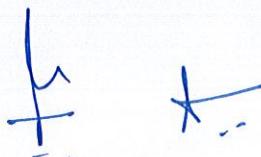
- a. During and for a period of the validity of this MOU, each party agrees to consider as confidential all information disclosed by the other party in written or tangible form or, if orally disclosed confirmed in writing within thirty days of disclosure and identified as confidential by the disclosing party.
- b. The obligations above shall not extend to any confidential information for which the receiving party can prove that this information:
  - Is in the public domain at the time of disclosure or comes within the public domain without fault of the receiving party.
  - Is already known or become known to the receiving party
  - Is received from a third party having no obligations of confidentiality to the disclosing party,
  - Is independently developed by the receiving party; or
  - Is required to be disclosed by law or court order.

**5. NON-EXCLUSIVITY**

The relationship of the parties under this MOU shall be nonexclusive and both parties, including their affiliates, subsidiaries and divisions, are free to pursue other agreements or collaborations of any kind. However, when entering into a particular research agreement, the participants may agree to limit each party's right to collaborate with others on that subject.

Both the Parties acknowledge that nothing in this MOU:

- a. is intended to create an exclusive relationship between the Parties for the purpose of undertaking any activities relating to the fields described in this MOU;
- b. will restrict either Parties individual interactions with third parties;
- c. gives either Party the authority to act on behalf of the other Party;
- d. forms a legally or financially binding arrangement between them.

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## **6. TERMS AND TERMINATION**

This MOU, unless extended by mutual written agreement of the parties, shall expire 5 years after the effective date specified in the opening paragraph. This MOU may be amended or terminated earlier by mutual written agreement of the parties at any time. Either party shall have the right to unilaterally terminate this MOU upon 60 days prior written notice to the other party. However, such early termination of this MOU, whether mutual or unilateral will incur no liability on either Parties and shall not affect the obligations of the parties under any Research Agreement, Confidentiality clause as referenced in clause 4 above, or any other agreement entered into pursuant to this MOU, which obligations shall survive any such termination.

## **7. RELATIONSHIP**

This MoU shall be construed as a statement of intent and object to promote a genuine and mutually beneficial collaboration between parties for 'Sustainable Business Practices in MCL'. Nothing in this MoU shall be construed to make party a partner, an agent or legal representative of the other party for any purpose or create any legal relationship between the parties.

## **8. ASSIGNMENT**

It is understood by the Parties herein that this MOU is based on the professional competence and expertise of each party and hence neither Party shall transfer or assign this Agreement, or rights or obligations arising hereunder, either wholly or in part, to any third party.

## **9. GOVERNING LAW**

All matters relating to this MoU shall be construed and controlled by the laws in force in India. The provisions of this MoU are without prejudice to the requirement of the prevailing rules and regulations of the Parties.

## **10. AMENDMENT**

No amendment or change hereof or addition hereto shall be effective or binding upon any of the Parties hereto unless the same is reduced in writing and executed by the Parties hereto.

## **11. WAIVER**

Failure of either Party to enforce compliance with any term or condition of this collaboration shall not constitute a waiver of such term or condition or the right to subsequently enforce such term or condition in the future. No waiver, by either Party, of any provision of this collaboration shall, in any event, become effective unless the

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same shall be in writing and such waiver shall be effective only in the specific instance described and for the purpose that the waiver is given.

## **12. SEVERABILITY**

If any Government or administrative body of competent jurisdiction shall find any provision of this collaboration / programme (to be invalid or unenforceable), the invalidity or un-enforceability of such provision shall not affect the other provisions and all provisions not affected by such invalidity or unenforceability shall remain in full force and effect. The parties hereby agree to attempt to substitute for any invalid or unenforceable provision with a valid or enforceable provision, which achieves to the greatest extent possible the economic, legal and commercial objectives of the invalid or unenforceable provision.

## **13. NOTICES**

All Notices, permitted or required to be made under this MoU shall be in writing and signed by the authorized representatives of the party giving such notices and shall be delivered personally against acknowledgement or by fax or registered mail to the other party at its address set forth herein below or at such addresses, as the other party may subsequently notify.

## **14. INDEMNITIES:**

Both the parties will comply with the provisions of all statutes, ordinances, rules and regulations applicable to this MoU and shall obtain all necessary registrations, licenses, approvals and sanction under the laws applicable including all labour and allied legislations. Both the parties shall indemnify, defend and hold each other and its respective officials, directors, employees, successors and assigns harmless from and against any claims, expenses, damages and all losses incurred by each party (including reasonable attorney fees), arising from or in connection with this MOU.

## **15. PROGRAM ADMINISTRATION**

A joint Program Committee shall steer the said coordination program. A Program Committee will be formed consisting of a nominee of MCL, Campus Programs & Industry Engagement IIT (ISM) Dhanbad as Chairman, and two nominees each from MCL and IIT (ISM) Dhanbad

## **16. FORCE MAJEURE**

Neither Party shall be held responsible for non-fulfillment of their respective obligations under this collaboration due to the exigency of one or more of the force majeure events. The Party affected by Force Majeure shall give a written notice to the other Party within One (1) month of such occurrence of cessation. If the force majeure conditions continue beyond Six (6) months, the Parties shall mutually decide about the future course of action.

Force Majeure means any of the following events or circumstances, whether occurring anywhere in India or specifically in the State of Odisha, or any combination of such events or circumstances, which are beyond the reasonable control of the



affected Party, which could not have been prevented by Good industry practice or by the exercise of reasonable skill and care, and which, or any consequences of which, have a material and adverse effect upon the performance by the affected Party of its obligations under the MoU :-

- (a) Strikes, lock-outs or other, industrial action or labour disputes which are not primarily motivated by the desire to influence the actions of an enterprise so as to preserve or improve conditions of employment;
- (b) act of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, blockade, embargo, revolution, riot, bombs, religious strife, insurrection or civil commotion;
- (c) sabotage, terrorism or the threat of such acts;
- (d) except to the extent that they constitute remedies or sanctions lawfully exercised by a Competent Authority as a result of any breach by the affected Party, its sub-Service Provider, servants or agents of Indian law or any Directive in effect on the date of the MoU, any act of state or other exercise of a sovereign, judicial or executive prerogative by GOI, Government of Odisha, or any Competent Authority (including expropriation, nationalization or compulsory acquisition and acts claimed to be justified by executive necessity);
- (e) explosions, chemical or radioactive contamination or ionizing radiation (excluding circumstances where the source or cause of the explosion or contamination or radiation is brought or has been brought onto or near the Site by the affected Party or those employed or engaged by the affected Party unless it is or was essential for the Work);
- (f) lightning, earthquake, tempest, flooding, fire, cyclone, hurricane, typhoon, tidal waves, whirlwind, storm and other unusual or extreme adverse weather or environmental conditions or action of the elements (excluding, unless exceptionally adverse, the monsoon), meteorites;
- (g) epidemic or plague;
- (h) act of God; and
- (i) Any event or circumstances of a nature analogous to the foregoing.

## **17. SUSPENSION OF OBLIGATIONS IN THE EVENT OF FORCE MAJEURE**

Without prejudice to the provisions there under for the adjustment of the Guaranteed Completion Date and the Contract Price in the event of Force Majeure, if either Party is prevented or delayed from or in performing any of its obligations under the collaboration by an event of Force Majeure, then it may notify the other Party of the circumstances constituting the Force Majeure and of the obligations performance of which is thereby delayed or prevented, and the Party giving the notice shall thereupon be excused the performance or punctual performance, as the case may be, of such obligations for so long as the circumstances of prevention or delay may continue. The Parties shall upon the occurrence of a Force Majeure event, agree upon a mutually acceptable extension to the Guaranteed Completion Date, in the manner specified.

## **18. PERFORMANCE TO CONTINUE**

Upon the occurrence of any circumstances of Force Majeure, both the parties shall use all reasonable endeavors to continue to perform its obligations and to minimize



the adverse effects of such circumstances. Both the parties shall notify each other of the steps it proposes to take including any reasonable alternative means for performance.

## **19. ALTERNATIVE DISPUTE RESOLUTION**

All disputes or differences which may arise between the parties shall be endeavored to be settled by mutual negotiations, failing which all disputes and differences which may arise between the parties hereto as to the meaning, construction, the rights or claims of either party or effect of any of the terms or provisions of this collaboration / MoU or as to the rights or claims of either party shall be referred to the sole arbitrator, mutually agreed by the parties and the decision of such arbitrator shall be binding on all the parties. The arbitration proceedings will be governed by the provisions of The Arbitration and Conciliation Act, 1996, or of any amendments thereto or any re-enactment thereto for the time being in force.

## **20. RESEARCH PROJECTS**

The Parties agree for participation in research and development projects of mutual interest, which are both of high priority for industry and higher academic value. Unless otherwise agreed upon between the Parties the cost and expenses incurred in conducting the research and development activities shall be solely borne by MCL.

## **21. INTELLECTUAL PROPERTY**

Both the parties shall be the absolute owner of the intellectual property (IP) of projects or activities contemplated by this MoU. The detailed terms and conditions of commercialization of intellectual property so generated under the MoU shall be finalized as per mutual consent.

### **Addresses:**

#### **On behalf of MCL:**

Director (Technical/Project & Planning)  
Mahanadi Coalfields Limited  
Sambalpur (768020), Odisha, India  
Phone No: 0663-2542772  
Email: dt-pp.mcl@coalindia.in

#### **On behalf of IIT (ISM) Dhanbad:**

Director, IIT (ISM) Dhanbad  
Dhanbad (826004), Jharkhand, India  
Phone No: 0326-2235201  
Email: director@iitism.ac.in

The coordinators identified for the project activities and for day-to-day correspondence are as following:

**On behalf of MCL:**

Shri Awadh Kishore Pandey  
Dy. GM(Min)/HoD, Innovation Cell  
Mahanadi Coalfields Limited  
Sambalpur (768020), Odisha, India  
Mobile No: 9438493466  
Email: mcl.innovationcell@coalindia.in

**On behalf of IIT (ISM) Dhanbad:**

Prof. B S Choudhary  
Department of Mining Engineering  
IIT(ISM) Dhanbad  
Dhanbad (826004), Jharkhand, India  
Mobile No: 9471191374  
Email: bhanwarschoudhary@iitism.ac.in

BY SIGNING BELOW, the parties, acting by their duly authorized officers, have caused this Memorandum of Understanding to be executed, effective as of the day and year first above written.

This MoU has been drawn up in 02 (Two) original sets in the language as mutually agreed by both the parties i.e. English, each party receiving one duly signed original set.

For and on behalf of IIT (ISM) Dhanbad

Name : Prof. Shalivahan

Title : Dean (R&D)

Date :

Witness:

1. Prof. A K Mishra

2. Prof. R M Bhattacharjee 25/10/2021

For and on behalf of MCL, Sambalpur

Name : Shri Awadh Kishore Pandey

Title : HoD, Innovation Cell

Date :

Witness:

1. Y. Kamleshwar Singh

2. Nalamasa Sukesh