भारत सरकार
Government of India
श्रम एंव रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

# DGMS CIRCULARS FROM 2018 TO 2024

सत्यमेव जयते

भारत सरकार / Government of India
श्रम एवं रोजगार मंत्रालय / Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय / Directorate General of Mines Safety

आज़ादी का अमृत महोत्सव

No. DGMS (Legis.)(Exam) Circular No. 01 of 2024 Dhanbad, dated: 23/07/2024

To,
All Concerned

**Subject**: Issue of Statutory Certificates on Exemption basis and Examination basis under the Coal Mines Regulations, 2017, the Metalliferous Mines Regulations, 1961 and the Mines Act, 1952 through Online/Digital mode.

Board of Mining Examinations is issuing statutory certificates under the Coal Mines Regulations, 2017, the Metalliferous Mines Regulations, 1961 and the Mines Act, 1952 on Examination basis (CBT-2023 onwards) and Exemption basis since 15.09.2023 through Online/Digital mode.

If required, the Online/Digital certificates can be verified online through the link https://dgmsexamination.com/dgmsjun23/check_certificate.php (Examination basis) & https://dgmsexemption.com/dgmsexmjun23/check_certificate.php (Exemption basis) provided in DGMS official website.

23.07.2024
(Prabhat Kumar)
Chief Inspector of Mines &
Director General of Mines Safety

सत्यमेव जयते

आज़ादी का अमृत महोत्सव

भारतसरकार / Government of India
श्रमएवंरोजगारमंत्रालय/ Ministry of Labour & Employment
खानसुरक्षामहानिदेशालय / Directorate General of Mines Safety

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dated : 23/08/2024

**DGMS Circular No. 06 of 2024**

**To**
**The Owner/Agent/Manager of all Coal/Metal/Oil/Gas Mines**

**Subject: Training Syllabus for Electrical Engineers, Electrical supervisors and Electricians who have been engaged for operation and maintenance of electrical installations in mines and oilfields. [Regulation (118) of CEAR - 2023]**

An engineer, electrical supervisor, or electrician working in a mine must be familiar with various types of electrical installations, components, and their functions. This knowledge is crucial for efficiently supervising electrical system installation, maintenance, and repairs, while ensuring the highest safety and performance standards. Staying updated on advancements in electrical systems and technologies enables them to provide effective guidance to the personnel under their supervision.

According to regulation 118 of the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2023, significant updates were introduced over the previous CEAR 2010 regulations, specifically a new regulation has been added for training of personnel engaged for operation and maintenance of electrical installations in mines and oilfields. This syllabus aims to ensure that all personnel engaged in electrical work in mines possess the necessary knowledge and skills. The updates were enacted in the newly notified Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2023, and Directorate General of Mines Safety was bestowed with the power of formulating the guidelines regarding this.

To develop the syllabus, numerous meetings were held with stakeholders and experts from the coal, metal, and oil mining sectors, and their feedback was incorporated into the draft. Key components of the syllabus include fundamental concepts, theories, and principles; advanced electrical systems such as control systems and automation; comprehensive safety procedures, risk assessment, and mitigation; familiarization with CEAR 2023 regulations and other relevant standards; and practical training.

In accordance with sub-regulation (1) of regulation 118 of the Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2023, the following syllabus

has been developed for training electrical engineers, supervisors, and electricians involved in the operation and maintenance of electrical installations in mines and oilfields.

## TRAINING SYLLABUS FOR ELECTRICAL SUPERVISOR AND ELECTRICIANS OF MINES

**General Instructions**

1) The content of training courses and on-the-job training / practical training may be designed keeping in view the technical requirements as applicable.

2) The periodical refresher training may be customized as per the assessment and requirement.

3) After the lecture course is completed, the trainees are required to be taken on visit to a few modern power stations, testing labs, mechanized mine, manufacturer facilities of transformer, motors, switchgears etc.,

4) Facilities of training institute / for creation of training institute:

a) The training institute shall have devoted facilities -building, residential and recreation facilities.

b) The training institute shall have a full time Head of institute and adequate number of teaching faculty /staff. The institute may engage visiting faculty who are having experience in mining operations/OEMs/PSUs/Private Sector in order to enhance the operating skills of the trainee and for the chapters related to mining operations faculty having experience in mining operations shall be engaged.

c) The training institute shall have facilities such as, adequate number of lecture halls, seminar and conference hall/ auditorium, library, computer center, workshop, laboratories, Simulators, Virtual Reality (VR) labs, animation videos etc.,

d) The institute shall have facilities to arrange refresher courses to Electrical Persons such as Engineer, Electrical Supervisor and Electricians.

e) The institute shall fill up the Assessment form towards the performance of each participant.

5) The threshold marks for passing through the evaluation test, inclusive of written and practical test shall not be less than 50% of total marks.

Part-I

TRAINING SYLLABUS FOR ELECTRICAL SUPERVISOR OF MINES (FOR COAL OR METAL MINES)

| Sl.No | Particulars | Number of Hours |
|---|---|---|
| 1 | Electrical Machineries:<br>I. Operation, maintenance and pre-commissioning test of different types of motors (AC&DC).<br>II. Operation, maintenance and pre-commissioning test of different types of generators.<br>III. Operation, maintenance and pre-commissioning tests of different types of transformers.<br>IV. Machineries/Equipment related to renewable generating stations.<br>V. Battery operated vehicles and Locomotives. | 3 |
| 2 | Electric Drives and Control:<br>I. Operation maintenance of Different types of starters including AC Drives such as VFDs etc., DC Drives, soft starters etc.,<br>II. PLC, SCADA and DCS | 2 |
| 3 | Switchgear and protective devices:<br>I. Operation maintenance, pre-commissioning tests of different types of circuit breakers.<br>II. Different types of protective schemes/protective devices and their operation maintenance and relay co-ordination. | 2 |
| 4 | Earthing system: Requirements, types of earthing, maintenance, chemical earthing and relevant provisions of IS - 3043. | 2 |
| 5 | Neutral system of power supply:<br>I. solid neutral earthing, restricted neutral earthing, isolated neutral earthing, advantages /disadvantages.<br>II. provisions of the Regulation for suitably designed restricted neutral system of power supply including neutral-ground monitoring protection system. | 3 |
| 6 | Design and layout of sub-station, Safety in sub-station, switchyard and switchboards:<br>i. Safe working clearance.<br>ii. Guarding of live apparatus.<br>iii. Standard Operating Procedure (SOP) operation/maintenance of circuit breakers, transformers, isolators, surge arresters, instrument transformers, storage tanks etc., | 2 |
| 7 | Operation and maintenance of substations and generating stations including maintenance of storage battery and related auxiliaries. | 2 |
| 8 | Operation, maintenance of overhead lines and underground cables<br>I. Safety measures in over headlines<br>II. Types of stays, its markings, grouting, stay insulator, binding etc.,<br>III. Types of guarding and clearances, earth/neutral wire, anti- climbing devices, and their erection.<br>IV. Selection and fixing of control devices viz. Linked switches, fuses, | 3 |

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| | isolators, earthing switches and lightning arrestors/surge diverters etc.<br>V. SOPs for safe working on over headlines.<br>VI. Cables and conductors, their classification, construction, insulation types, laying, mining type cables and the related standards, cable jointing techniques, terminations and junction boxes | |
| 9 | Electrical apparatus and machinery for mine installation (as applicable for a particular type of mine Oil/Coal/Metal)<br>I. Winders, man riding system, cranes, EOTs etc.,<br>II. Electrically operated HEMM, portable transportable machinery, dragline, bucket wheel excavator, SDL, LHD, Road header, shearer, continuous miner, UDMs etc.,<br>III. Salient features of explosion proof protections like, Flameproof, intrinsically safe, increased safety, pressurized enclosure apparatus etc., for use in hazardous atmosphere of mine (coal/Oil) and relevant provisions of the IS/IEC 60079 series of standards, operation and maintenance of the flameproof and intrinsically safe apparatus.<br>IV. Use of RF Electrical equipment in hazardous areas.<br>V. LMD, Environment monitoring system<br>VI. Circuit diagram of Drill control panel, GEB, different types of circuit breakers, starters, Lighting & Signaling unit.<br>VII. Safety requirement of belt conveyor system installed in the belowground mine, OCP.<br>VIII. Safety requirements of Drilling Rig in oil mine<br>IX. Any other special type of Electrical machinery / apparatus used in mines(coal/oil/metal) | 5 |
| 10 | General safety:<br>I. Procedure for obtaining permission to work for carrying out operations and maintenance of electrical equipment (permit to work as per**IS:5216)**.<br>II. Safety in electrical workshop<br>III. Firefighting equipment, their type, use and periodical maintenance, indicators, recorders etc.<br>IV. First aid training, resuscitation of persons suffering from electric shock etc.,<br>V. Various Lightning protections. | 3 |
| 11 | Legislation/statutes as amended from time to time:<br>I. Provisions of Central Electricity Authority (Measures relating to safety and electric supply), Regulations 2023.<br>II. Provisions of ElectricityAct,2003<br>III. Relevant provisions of the mines Act,1952<br>IV. Relevant provisions of the Coal MinesRegulation,2017.<br>V. Relevant provisions of Metalliferous Mines Regulation,1961 | 3 |

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| 12 | On-Site emergency management plan in case of contingency related to electricity:<br>I. Emergency response procedure including response to off-site emergency management plan and crisis and disaster management plan; | 2 |
| | II. Risk assessment information giving possible nature of incidents and events giving rise to emergency conditions, risk analysis and impact assessment; | |
| 13 | Testing and Record keeping<br>I. Maintenance of Supervisors log sheet<br>II. Register of designated persons<br>III. History sheets of the electrical equipment/apparatus with regard to the repair/maintenance<br>IV. Preparation, Maintaining and updating the circuit diagram/Electrical Plan of the installations and electrical apparatus like breakers, starters etc.<br>V. Testing and recording of CTs, relays using primary and secondary injection kit.<br>VI. Register for maintenance of flameproof and intrinsically safe apparatus (coal/Oil mine).<br>VII. Testing and recording of Earthing system.<br>VIII. Measurement of Insulation Resistance, earth electrode resistance<br>IX. Maintenance of Battery bank | 4 |
| 14 | On Job training/ Practical/Laboratory Training<br>I. Practical tests (type, routine) of transformer, motors, cables, switchgears etc.,<br>II. Testing of CTs and relays through primary and secondary injection kits.<br>III. First aid training<br>IV. Operation of different types of fire extinguishers. | 4 |
| 15 | Case studies related to Electrical accidents | 1 |
| 16 | Field Visit | 6 |
| 17 | Written Examination to evaluate performance, feedback on training | 1 |
| Duration of the training course in hours | | 48 |

## PART-II

## TRAINING SYLLABUS FOR ELECTRICAL SUPERVISOR OF MINES (FOR OIL MINES)

| Sl. No. | Particulars | Number of Hours |
|---|---|---|
| 1 | Brief introduction of AC/DC Motors, alternators, transformers and their application, operation and maintenance. | 3 |
| 2 | Brief Introduction of Switchgear, Protection techniques, operation and maintenance. | 3 |
| 3 | I. Earthing system: Requirements, types of earthing, maintenance, chemical earthing and relevant provisions of IS -3043.<br><br>II. Neutral system of power supply: Solid neutral earthing, restricted neutral earthing, isolated neutral earthing, advantages/ disadvantages; | 4 |
| 4 | Hazardous area classification and selection of equipment for hazardous area. Salient features of Flameproof and intrinsically safe apparatus for use in hazardous area and relevant provisions of the IS/IEC 60079 series of standards, operation and maintenance of the flameproof, intrinsically safe apparatus and other apparatus conforming to the relevant Ex standards | 3 |
| 5 | Design layout, Safety in sub-station, switchyard and switchboards<br>i. Safe working clearance.<br>ii. Guarding of live apparatus.<br>Standard Operating Procedure (SOP) of circuit breakers, transformers, isolators, surge arresters, instrument transformers, storage tanks etc. | 4 |
| 6 | a) Operation, maintenance of overhead lines and underground cables<br>b) Safety measures in over headlines<br>c) Types of stays, its markings, grouting, stay insulator, binding etc.,<br>d) Types of guarding and clearances, earth/neutral wire, anti- climbing devices, and their erection.<br>e) Selection and fixing of control devices viz. Linked switches, fuses, isolators, and earthing switches, lightning arrestors and surge diverters.<br>f) Cables and conductors, their classification, construction, insulation types, laying, mining type cables and the related standards, cable jointing techniques and junction boxes | 4 |
| 7 | General safety:<br>I. General Safety to be observed in oil and gas mine and adherence to operator's Safety Rules.<br>II. Firefighting equipment, their type, use and periodical maintenance, indicators, and recorders etc.<br>III. First aid training, resuscitation of persons suffering from electric shock etc.<br>IV. Salient features of explosion proof protections like, Flameproof, intrinsically safe, increased safety, pressurized enclosure apparatus etc., for use in hazardous atmosphere of mine (coal/Oil) and relevant provisions of the IS/IEC 60079 series of standards, | 4 |

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| | operation and maintenance of the flameproof and intrinsically safe apparatus.<br>V.Lock-out/Tag out (permit to work as per IS:5216) and PTW system | |
| 8 | Legislation:<br>I. Provisions of Central Electricity Authority (measures relating to safety and electric supply), Regulations2023.<br>II. Provisions of ElectricityAct,2003<br>III. Relevant provisions of the mines Act,1952<br>IV. Relevant provisions of Oil Mines Regulation, 1984 (amended version) | 4 |
| 9 | Testing and Record keeping<br>I. Maintenance of Supervisors log sheet<br>II. Register of designated persons<br>III. History sheets of the electrical equipment/apparatus with regard to the repair/maintenance<br>IV. Preparation, Maintaining and updating the circuit diagram/Electrical Plan of the installations and electrical apparatus like breakers, starters etc.<br>V. Testing and recording of CTs, relays using primary and secondary injection kit.<br>VI. Register for maintenance of flameproof and intrinsically safe apparatus (coal/Oil mine).<br>VII. Testing and recording of Earthing system.<br>VIII. Measurement of Insulation Resistance, earth electrode resistance<br>IX. Maintenance of Battery bank | 4 |
| 10 | Case Studies related to Electrical accidents. | 3 |
| 11 | On Job training/ Practical/Laboratory Training<br>I. Practical tests (type, routine) of transformer, motors, cables, switchgears etc.,<br>II. Testing of CTs and relays through primary and secondary injection kits.<br>III. First aid training<br>I. Operation of different types of fire extinguishers. | 5 |
| 12 | Field Visit | 6 |
| 13 | Written examination to evaluate the performance for awarding the License | 1 |
| | Total | 48 |

## PART-III

## TRAINING SYLLABUS FOR ELECTRICIANS OF MINES

| Sl. No | Particulars | Number of Hours |
|---|---|---|
| 1 | Basic Electrical Engineering:<br>(i) Symbols of various electrical items/machines/elements<br>(ii) Sketches and circuit diagrams for the electrical systems/installations i.e. different types of distribution networks, starters and other electrical apparatus<br>(iii) Different types of PPEs, tools, and devices being used to maintain the electrical installations/apparatus such as Insulation tester, earth tester, multimeter etc., | 3 |
| 2 | Electrical Machineries:<br>I. Different types of motors (AC &DC), their applications, operation and maintenance<br>II. Different types of generators, operation and maintenance.<br>III. Different types of transformers, cooling of transformers, transformer oil, protective devices in the transformer, the common causes of failures, operation &maintenance.<br>IV. Renewable Energy Generation. | 3 |
| 3 | Electric Drives and Control:<br>Starting and speed control of motors, different types of starters and their operation maintenance | 2 |
| 4 | Switchgear and protective devices:<br>a) General Idea on Operation & Maintenance of different types of circuit breakers, CT/PTs,<br>b) General idea on different types of relays such as over-current, earth fault relays, broken conductor/negative sequence/ unbalance/single phasing preventer, Differential protection etc.,<br>c) Various protective schemes with circuit diagram: for motors, generators, transformers, capacitor banks etc., | 3 |
| 6 | Earthing system: Requirements, types of earthing, maintenance, chemical earthing and relevant provisions of IS - 3043. | 2 |
| 7 | Neutral system of power supply:<br>I. Solid neutral earthing, restricted neutral earthing, isolated neutral earthing, advantages /disadvantages<br>II. provisions of the Regulation for suitably designed restricted neutral system of power supply including neutral-ground monitoring protection system. | 2 |
| 9 | Operation and maintenance of substations and generating stations including<br>maintenance of storage battery and related auxiliaries | 3 |
| 10 | Protection against voltage surges and lightning | 1 |

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| 11 | Operation, maintenance of overhead lines and underground cables<br>I. Safety measures in over headlines<br>II. Types of stays, its markings, grouting, stay insulator, binding etc.,<br>III. Types of guarding and clearances, earth / neutral wire, anti-climbing devices and their installation /erection.<br>IV. Selection and fixing of control devices viz. Linked switches, fuses, isolators, and earthing switches, lightning arrestors etc.,<br>V. Cables and conductors, their classification, construction, insulation types, laying, mining type cables and the related standards, cable jointing techniques and junction boxes | 4 |
| 12 | Electrical apparatus and machinery for mine installation (as applicable for a particular type of mine like Coal/Metal/Oil)<br>I. Winders, man riding system, cranes<br>II. Electrically operated HEMM, portable transportable machinery, dragline, bucket wheel excavator, SDL, LHD, Road header, shearer, continuous miner<br>III. Salient features of Flameproof and intrinsically safe apparatus for use in hazardous atmosphere of mine (coal/Oil) and relevant provisions of the IS/IEC 60079 series of standards, operation and maintenance of the flameproof and intrinsically safe apparatus<br>IV. LMD, Environment monitoring system<br>V. Circuit diagram of Drill control panel, GEB, different types of circuit breakers, starters, Lighting & Signaling unit.<br>VI. Safety requirements of belt conveyor system installed in the belowground coal mine, OCPs etc.,<br>VII. Safety requirements of Drilling Rig in oil mine<br>VIII. Any other special type of Electrical machinery / apparatus used in mines (coal / oil / metal) | 8 |
| 13 | General safety:<br>I. Procedure for obtaining permission to work for carrying out operations and maintenance of electrical equipment (Permit to work as per**IS:5216)**;<br>II. Safety in electrical workshop<br>III. Firefighting equipment, their type, use and periodical maintenance, indicators, and recorders etc.,<br>IV. First aid training, resuscitation of persons suffering from electric shock etc., | 4 |
| 14 | Legislation/statutes as amended from time to time:<br>Relevant regulations of Provisions of Central Electricity Authority (measures relating to safety and electric supply) Regulations, 2023 | 4 |
| 15 | On Job training/ Practical/Laboratory Training<br>I. Erection and pre commissioning testing of transformers, motors, generators, switchgear<br>II. Measurement of earth resistance, insulation resistance etc.,<br>III. Testing of CTs, relays etc.,<br>IV. First aid training<br>V. Operation of different types of fire extinguishers | 7 |

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| 16 | Case Studies related to Electrical accidents | 1 |
| 17 | Written Examination to evaluate performance, feedback on training | 1 |
| Duration of the training course in hours | | 48 |

## Part-IV

TRAINING SYLLABUS FOR ELECTRICAL ENGINEERS

| Sl. No | Particulars | Number of Hours |
|---|---|---|
| 1 | **Power Transmission**<br>**a.** Different types of Electric towers/poles.<br>**b.** Conductors/Earth-wire and their accessories, types, configuration, transposition, selection criteria<br>**c.** Insulators and hardware fittings: types, strength, details<br>**d.** Right of way, CEA (Measures relating to Safety and Electric Supply) Regulations, 2023 and Acts, statutory clearances from other agencies, compensation, etc.<br>**e.** Operation and Maintenance of Transmission Line: line patrolling, routine checks, filling logbooks, T & P, thermo-vision scanning, fault failure analysis, hot line maintenance, case studies. | 2 |
| 2 | **Sub - Stations (220kV/132kV/33kV)**<br>(i)Types: generation sub-station, grid sub-station, mobile sub-station, gas insulated sub-station, indoor/outdoor, etc.,<br><br>ii)General arrangement and layout of switchyard, switching schemes, single line diagram.<br><br>(iii) Power Transformers and Reactors:<br>(a) Types: major components, constructional details, functions<br>(b) Design and selection, specification and rating<br>(c)Bushings, On Load Tap Changers (OLTC), Buchholz relay, conservator, breather, thermo syphon filter, indicators, etc.<br>(d)Cooling arrangements - methods of cooling, pumps, fans, radiators, etc.<br>(e) Transformer tests (f) Introduction to relevant Indian Standards<br><br>**(iv)Switchgears and Introduction to relevant Indian Standard**<br>(a) Circuit Breaker: Different types of circuit breakers and starters, selection parameters, ratings/ specifications, interlocks and introduction to relevant Indian Standard<br>(b) Isolator: Types, earth switch, interlocks and Bus bar types,<br>(d) CT/CVT/Lightning Arrestor/Lightning Mast: Types, constructional details, use, location, selection/design, ratings/specifications<br>(f) Instrumentation and Protective Relays: types, functions, selection, ratings/ specifications, testing and setting of relays and knowledge of relevant Indian Standard.<br>(h) Protection System Philosophy: types, design, protection schemes, tripping schemes, protection of transformers/reactors, motors, feeders, generator bus etc. and relay co-ordination. | 5 |

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| | v)Grounding: types of grounding, earth testing and treatment, earth mat design, step potential, touch potentials, transfer potentials, neutral grounding factor.<br>(vi)Auxiliary facilities<br>(a) DG set<br>(b) Firefighting system<br>(c) Sub-Station Battery System and different types of auxiliary power supply<br><br>(vii)Cables: types, control cables, power cables, layout, trench/gallery arrangement, cable ratings, selection, and cable termination and jointing.<br>(viii) Compensating devices: shunt reactor/capacitor, series reactor/ capacitor, static var compensators (SVC)<br><br>(ix) (a)Sub-station, Transformer and Reactor Maintenance: - Factors affecting the life of transformer/reactor, types of faults that can occur, reasons for breakdown, visual checks/ inspection/ preliminary testing of various components- oil sampling and testing, oil filtration, Dissolved Gas Analysis (DGA), maintenance Schedule, fault rectification, need for major overhaul and methods<br>(b)Switchgear and Protection Maintenance : maintenance of CB, isolator, earth-switch, support insulators, CT/CVT, LA. Lightning Mast (LM), meters/ recorders, PLCC, protective relay maintenance, protection system maintenance (c) Maintenance of auxiliaries and other systems- battery and charging system, DG set, air conditioning plant, compressed air system, fire-fighting system, switchyard – lighting, control room, earth resistance testing, cables, compensating devices. | |
| 3 | Electrical Machineries:<br>i. Operation, maintenance and pre-commissioning test of different types of motors (AC&DC).<br>ii. Operation, maintenance and pre-commissioning test of different types of generators.<br>iii. Operation, maintenance and pre-commissioning tests of different types of transformers.<br>iv. Machineries/Equipment related to renewable generating stations.<br>v. Battery operated vehicles and Locomotives. | 2 |
| 4 | Electric Drives and Control:<br>(i) Operation maintenance of Different types of starters including AC Drives such as VFDs etc., DC Drives, soft starters etc.,<br>(ii) PLC, SCADA and DCS-Application in mines. | 2 |
| 5 | Earthing system: Requirements, types of earthing, maintenance, chemical earthing and relevant provisions of IS - 3043. | 2 |
| 6 | Neutral system of power supply:<br>a. solid neutral earthing, restricted neutral earthing, isolated neutral earthing, advantages /disadvantages.<br>b. provisions of the Regulation for suitably designed restricted neutral system of power supply including neutral-ground monitoring protection system. | 3 |

| | | |
|---|---|---|
| 7 | Cables and conductors, their classification, construction, insulation types, laying, mining type cables and the related standards, cable jointing techniques, terminations and junction boxes. | |
| 8 | Electrical apparatus and machinery for mine installation (as applicable for a particular type of mine Oil/Coal/Metal)<br>I. Winders, man riding system, cranes, EOTs etc.,<br>II. Electrically operated HEMM, portable transportable machinery, dragline, bucket wheel excavator, SDL, LHD, Road header, shearer, continuous miner, UDMs etc.,<br>III. Salient features of explosion proof protections like, Flameproof, intrinsically safe, increased safety, pressurized enclosure apparatus etc., for use in hazardous atmosphere of mine (coal/Oil) and relevant provisions of the IS/IEC 60079 series of standards, operation and maintenance of the flameproof and intrinsically safe apparatus.<br>IV. Use of RF Electrical equipment in hazardous areas.<br>V. LMD, Environment monitoring system<br>VI. Circuit diagram of Drill control panel, GEB, different types of circuit breakers, starters, Lighting & Signaling unit.<br>VII. Safety requirement of belt conveyor system installed in the belowground mine, OCP.<br>VIII. Safety requirements of Drilling Rig in oil mine<br>IX. Any other special type of Electrical machinery / apparatus used in mines(coal/oil/metal) | 8 |
| 9 | General safety:<br>I. Procedure for obtaining permission to work for carrying out operations and maintenance of electrical equipment (permit to work as per**IS:5216)** and LOTO system.<br>II. Safety in electrical workshop.<br>III. Firefighting equipment, their type, use and periodical maintenance, indicators, recorders etc.<br>IV. First aid training, resuscitation of persons suffering from electric shock etc.,<br>V. Lightning Phenomenon and various lightning protections.<br>VI. Mine Lighting – design and layout methods. | 4 |
| 10 | Legislation/statutes as amended from time to time:<br>I. Provisions of Central Electricity Authority (Measures relating to safety and electric supply), Regulations 2023.<br>II. Provisions of ElectricityAct,2003<br>III. Relevant provisions of the mines Act,1952<br>IV. Relevant provisions of the Coal MinesRegulation,2017.<br>V. Relevant provisions of Metalliferous Mines Regulation,1961<br>VI. Relevant provisions of the Oil MinesRegulation,2017.<br>VII. Relevant Technical circulars of DGMS issued from time to time. | 4 |

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| 11 | On-Site emergency management plan in case of contingency related to electricity:<br>I. Emergency response procedure including response to off-site emergency management plan and crisis and disaster management plan.<br>II. Risk assessment information giving possible nature of incidents and events giving rise to emergency conditions, risk analysis and impact assessment; | 2 |
| 12 | Testing and Record keeping<br>a) Maintenance of Supervisors log sheet<br>b) Register of designated persons<br>c) History sheets of the electrical equipment/apparatus with regard to the repair/maintenance<br>d) Preparation, Maintaining and updating the circuit diagram/Electrical Plan of the installations and electrical apparatus like breakers, starters etc.<br>e) Testing and recording of CTs, relays using primary and secondary injection kit.<br>f) Register for maintenance of flameproof and intrinsically safe apparatus (coal/Oil mine).<br>g) Testing and recording of Earthing system.<br>h) Measurement of Insulation Resistance, earth electrode resistance<br>i) Maintenance of Battery bank<br>j) Form I, II, III and IV as per CEAR-2023.<br>k) Approval/Permission related documents<br>l) Annual returns, Notices, | 4 |
| 13 | Case studies related to Electrical accidents | 2 |
| 14 | Field Visit | 6 |
| 15 | Written Examination to evaluate performance, feedback on training | 2 |
| Duration of the training course in hours | | 48 |

Therefore, the owner, agent, and manager of all mines and oilfields where electricity is used are advised to arrange training for their personnel involved in the operation and maintenance of electrical installations, in accordance with the syllabus outlined above.

Director General of Mines Safety.

सत्यमेव जयते
भारतसरकार / Government of India
श्रमएवंरोजगारमंत्रालय/ Ministry of Labour & Employment
खानसुरक्षामहानिदेशालय / Directorate General of Mines Safety
आज़ादी का अमृत महोत्सव

dated : 23/08/2024

**DGMS Circular No. 05 of 2024**

**To**
**The Owner/Agent/Manager of all Coal/Metal/Oil/Gas Mines**

**Subject: Guidelines for determining adequacy of Electrical supervisors and Electricians on duty in every mine or oilfields while electricity is being used. [Sub-regulation (1) and (3) of regulation (117) of CEAR - 2023]**

Electrical supervisors play an important role within a mining operation. They are responsible not only for ensuring electrical safety but also for adhering to regulatory obligations. Consequently, an electrical supervisor should be able to understand and apply relevant legislation, standards, codes of practice, and guidelines.

According to sub-regulation (1) and sub-regulation (3) of regulation 117 of the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2023, significant updates were introduced over the previous CEAR 2010 regulations, specifically regarding the adequacy of electrical supervisors and electricians in mines and oilfields. The updates were enacted in the newly notified Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2023, and Directorate General of Mines Safety was bestowed with the power of formulating the guidelines regarding this.

To develop the guidelines, numerous meetings were held with stakeholders, including experts from the coal, metal, and oil mining sectors. Their input was incorporated into the framework. Key considerations for determining the adequacy of supervisors and electricians included:

- Establishing appropriate ratios of supervisors and electricians to the area covered and operational shifts/hours.
- Ensuring the presence of adequately trained personnel during emergencies.
- The volume of deployment of electrically operated HEMM along with the total installed capacity.

In compliance with sub-regulation (1) of regulation 117 of the Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2023, the following guidelines on the adequacy of electrical supervisors and electricians in mines and oilfields have been established.

I) **Adequacy of Electrical Supervisors**

Adequate number of Electrical supervisors shall be appointed in a mine for conducting the operation and maintenance works of electrically operated machinery/ equipment/ apparatus in accordance with the provisions of The Central Electricity authority (Measures relating to Safety and Electric supply) Regulations,2023.

1. In case of belowground mine having conventional and semi-mechanized workings, at least one electrical supervisor shall be appointed in each working district and associated electrical apparatus/substations in each shift of operation/ maintenance.

2. In case of belowground mechanized mines consisting of long wall machinery, continuous miners, Blasting Gallery or alike equipment, at least two electrical supervisors shall be appointed for each working district/panel and associated electrical apparatus/substations in each shift of operation/ maintenance.

3. In opencast mine consisting of Dragline, Bucket wheel excavators, High-capacity shovels, Surface Miner or any alike electrical equipment; at least one electrical supervisor shall be appointed for each such electrical machinery/ equipment inclusive of their switchgear based on size & type of equipment in each shift of operation/ maintenance.

   Provided that where the aggregate capacity of machinery is less than 2MVA, the HEMM and associated switchgear can be grouped to bring under one supervisor.

4. In opencast mine consisting of HEMM such as Electrically operated Shovels & Drilling Machines, associated switchgear, distribution lines, substations etc., at least one electrical supervisor shall be appointed in each shift of operation/maintenance for maximum up to six numbers of such electrically operated machinery/ equipment.

5. In case of opencast mines consisting of small and conventional electrical machinery such as substation equipment, distribution lines, production machinery, pump installations or any alike equipment, one electrical supervisor shall be appointed in each shift of operation/maintenance.

6. In case of oil/ gas/ coal/ Renewable energy based captive power plants with associated substations which are supplying electricity to mine installations; one electrical supervisor in general shift of operation/ maintenance shall be appointed.

   Provided that where the aggregate capacity of power plant is more than 10 MW, one electrical supervisor in each shift of operation/ maintenance shall be appointed.

7. In case of oil fields, where electrically operated drilling rigs inclusive of generators, substation apparatus and other electrical machinery are in use, one electrical supervisor in each shift of operation/ maintenance per rig shall be appointed.

8. In oil fields of production installations, group gathering stations along with associated wells or any alike installations where substations and electrically operated equipment are in use, at least one electrical supervisor in each shift of operation/ maintenance shall be appointed.

9. For the surface installations of a mine consisting of substations, switch stations, distribution lines and other electrically operated machinery/ equipment, at least one electrical supervisor in each shift shall be appointed for operation/maintenance.

   Provided that where the aggregated installed capacity of substations is more than 20 MVA, one additional electrical supervisor shall be appointed in each shift of operation/maintenance.

   Provided further that where the mine having ancillary installations like beneficiation plant, Railway sidings, coal handling plant, and other alike process equipment's one additional electrical supervisor shall be appointed in each shift for installations of aggregate load exceeding every 2MW.

10. All the appointed Electrical supervisors shall be designated specifying area of jurisdiction by the competent authority.

11. In special cases, the electrical inspector of mines may give relaxation for the appointment of number of electrical supervisors if he is satisfied that proper supervision can be exercised with such reduced numbers as he may deem fit.

**II) <u>Adequacy of Electricians.</u>**

Adequate number of electricians shall be appointed in a mine for conducting the operation and maintenance works of electrically operated machinery/ equipment/ apparatus in accordance with the provisions of The Central Electricity authority (Measures relating to Safety and Electric supply) Regulations, 2023.

1. In case of belowground mine having conventional and semi-mechanized workings, at least two electricians shall be appointed for each working district in each shift of operation/ maintenance.

2. In case of belowground mechanized mines consisting of Long wall machinery, continuous miners, Blasting Gallery or alike equipment, at least four electricians shall be appointed for each working district/panel and associated electrical apparatus/substations in each shift of operation/ maintenance.

3. In opencast mine consisting of Dragline, Bucket wheel excavators, High-capacity shovels or any alike equipment, at least two electricians shall be appointed for each such electrical machinery/ equipment inclusive of their switchgear based on size & type of equipment in each shift of operation/ maintenance.

   Provided that where the aggregate capacity of machinery is less than 1MVA, the HEMM and associated switchgear can be grouped to bring under one electrician.

4. In opencast mine consisting of HEMM such as Electrically operated Shovels & Drilling Machines, associated switchgear, distribution lines, substations etc., at least one electrician shall be appointed in each shift of operation/ maintenance for maximum up to two numbers of such electrically operated machinery/ equipment.

5. In case of opencast mines consisting of small and conventional electrical machinery such as substation equipment, distribution lines, production machinery, pump installations or any alike equipment are in use, at least one electrician shall be

appointed in each shift of operation/maintenance and additional electrician shall be appointed based on the type and size of installations and the area to be covered.

6. In the case of oil/ gas/ coal/ renewable energy based captive power plants with associated substations which are supplying electricity to mine installations, at least one electrician in each shift of operation/ maintenance shall be appointed.

   Provided that where the aggregate capacity of power plant is more than10 MW, one additional electrician in each shift of operation/ maintenance shall be appointed.

7. In the case of oil mines, where electrically operated drilling rigs/workover rigs inclusive of generators, substation apparatus and other electrical machinery are in use, one electrician in each shift of operation/ maintenance per rig shall be appointed.

8. In oil fields of production installations, group gathering stations, well or any alike installations, where substations and electrically operated equipment are in use, at least one electrician in each shift of operation/ maintenance shall be appointed. Where the distance between such installations exceeds 1KM, an additional electrician shall be appointed based on the type and size of installations and the area to be covered.

9. For the surface installations of a mine consisting of substations, switch stations, distribution lines and other electrically operated machinery/ equipment, at least two electricians in each shift shall be appointed for operation/ maintenance.

   Provided that where the aggregated capacity of substations is more than 20MVA an additional electrician shall be appointed in each shift of operation/ maintenance.

   Provided further that where the mine having ancillary installations like beneficiation plant, Railway sidings, coal handling plant, and other alike process equipment's one additional electrician shall be appointed in each shift for installations of aggregate load exceeding every 1MW.

   Therefore, in the interest of safety, the owner, agent, and manager of all mines and oilfields where electricity is being used are advised to strictly adhere to the above guidelines for appointing electrical supervisors and electricians.

23.08.2024

Director General of Mines Safety

आज़ादी का अमृत महोत्सव

भारत सरकार/Government of India

श्रम एवं रोजगार मंत्रालय/Ministry of Labour & Employment

खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

धनबाद -826001 / Dhanbad-826001

No. DGMS/OH/ (Tech) Circular No. 04 Dhanbad, Dated 21/08/ 2024

To
The Owners, Agents and Managers of all Mines

**Subject: Acceptance of Digital Radiography in Statutory Medical Examination of Mine employees conducted under Mines Rule 29 F of 1955**

## 1. Introduction

Chest radiographs are invariably essential for the detection of Dust induced Lung diseases including pneumoconiosis amongst Miners involved in dusty trades. As on date, conventional film screen radiograph (FSR) technology is being allowed for all statutory medical examinations like PME/IME, for ILO classification of the Chest Radiographs as per DGMS Circular No. DGMS (Tech.) No.04 of 2007, dated 11/05/2007. Accordingly all PME Centers of the Mines were to ensure the availability of a set of standard ILO International Radiograph 2000, for screening and classification of chest radiographs, for diagnosis of Pneumoconiosis.

In clinical practice and public health surveillance, digital chest radiographs (DR) presented on medical-grade monitors have largely replaced the conventional film-screen radiograph (FSR) technology. Though, conventional radiography is still used more widely than digital radiography but this dominance is fast dwindling.

The reasons behind the declining popularity of conventional radiography are—fixed dose latitude, fixed non-linear grey scale response, and limited potential for reducing dose to the patient. All these parameters limit the information that can be captured on film. The images cannot be changed in contrast once they have been processed. Apart from this, film is expensive, uses hazardous materials for processing, is labour intensive, and long term storage and retrieval of film is difficult. Further conventional radiography is not compatible with the picture archiving and communication systems (PACS).

The *International Labour Office (ILO) Guidelines for the Classification of the Pneumoconiosis* has been an invaluable tool for standardization of interpretations of chest radiographs for epidemiologic studies of the Pneumoconiosis. To enhance accuracy and precision in applying the ILO classification scoring system, readers are required to perform a side-by-side comparison of each individual worker's radiograph to one or more prototypical chest images, which illustrate a variety of types and severity of radiographic abnormalities induced by dust inhalation. The ILO classification system includes a standard set of chest images for comparison purposes.

Until recently, the ILO classification system only provided a set of standard images in the film-screen radiograph (FSR) format. However, in 2011, the ILO revised its guidelines to "extend the applicability of the Classification to digital radiographic images of the chest". In the 2011 revision of the classification, the ILO included a set of electronic image files (ILO Standard Digital Images [2011-D]) that was digitized from the film-based standards included in the 2000 revision of the classification. Subsequently in 2022 the revised edition of the Guidelines for the use of the ILO International Classification of Radiographs of Pneumoconiosis, which is accompanied by one set of digitally acquired radiographic images, was introduced by ILO after collaboration with NIOSH. This set consists of 23 radiographic images, which are called The ILO 2022 standard digital images:

In view of the current scenario, it has been decided to allow Digital Radiography, for all statutory medical examinations like Pre-employment Medical Examination/Periodical Medical Examination after fulfilling protocols specified below, based on the reference standards issued by ILO, in addition to the Conventional film screen radiographs (FSR), being used currently.

2. **Viewing Principles of Digital Radiographs:**

When viewing and classifying a subject's digital image (also known as "soft copy"), a high resolution, medical-grade flat-panel monitors designed for diagnostic radiology, is essential.

The intensity of illumination should be uniform all over the total surface of the high resolution radiology monitors used to view the chest images to be classified.

While classifying digital images, the ILO 2022 digitally acquired standard images should be displayed as provided, without alteration.

ILO digital images must be close enough for the observer to see opacities only 1 mm in diameter, that is, a distance of about 250 mm. It is also essential to view the entire chest image.

The observer should be seated comfortably. The viewing surfaces must be clean. The general illumination in the room should be low, without direct daylight. The room should be quiet, comfortable and free from distractions.

The diagonal display should be at least 21" (54 cm) per image, with a ratio of maximum to minimum luminance at least 50; a maximum luminance of at least 250 candelas per $m^2$; pixel pitch no greater than 210 µm; and with resolution at least 2.5 line-pairs per mm.

The subject and ILO 2022 digital images should be displayed simultaneously, similarly sized, side-by-side.

Further, for display, storage and classification of digital chest images/ Radiographs, recent version of the Digital Imaging and Communications in Medicine (DICOM) standards are required.

**Examples of approaches required to be avoided for viewing digital images include:**

- Displaying the images on a personal computer screen rather than on a medical-grade flat-panel monitor designed for diagnostic radiology.
- Comparing the subject digital image to ILO standard analog radiographs displayed on a view box.

- Viewing the subject digital image, or the ILO 2022 digital images, or both in formats reduced to less than two-thirds of their full size.
- Using digital images printed on film or paper for classification. As with all radiographic viewing activities, procedures should be followed to ensure an appropriate environment, including restriction of ambient light sources and other distracting factors.

**3. Image processing**

Digital radiographic systems vary in the approaches taken to address the display quality of digital chest images. Image processing software continues to evolve. Imaging systems should comply with the standards set by their countries respective radiologic societies and professional organizations. The NIOSH Guideline "Application of Digital Radiography for the Detection and Classification of Pneumoconiosis" is a useful resource and recommends that image enhancement functions be discouraged as chest images should appear similar to traditional film screen radiographs when displayed. No specific recommendations are made by the ILO regarding the selection of digital systems. Performance testing and monitoring should be used to evaluate the ability to produce quality images for any combination of hardware, exposure parameters and software. Facilities providing images for classification should employ a program for continual quality assurance consistent with national practices and standards. Staff at facilities that perform digital chest radiography for pneumoconiosis classification should review each image to ensure optimal quality.

**4. Image display**

Good image quality is essential for accurate classification of digital chest radiographs. Maintenance, assessment, and optimization of the image display monitors and all other components of the digital radiographic systems should be undertaken periodically, as recommended or specified by manufacturers, professional organizations, or governmental agencies.

**5. Data recording, storage and security**

Digital images should be securely archived and transferred in a manner that permits retrieval of their original appearance, in compliance with national practices and standards. Standard measures to prevent unauthorized access to data should be employed, for instance by password-protected access and rigorous security precautions for transfers through data networks.

All the Owners, Agents and managers are here by informed that henceforth, Digital Radiography shall be permissible as part of statutory medical examination for mine employees, once it is conducted following the standards and guidelines mentioned above.

Director General of Mines Safety &

Chief Inspector of Mines

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भारत सरकार
Government of India
श्रम एंव रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

आज़ादी का अमृत महोत्सव

No. DGMS (Tech) (SOMA)/ Circular No. 03 Dhanbad dated, 21/08/ 2024.

To

All Owners, Agents and Managers of Opencast Mines Coal Mines

**Subject: Ensuring Safety in Opencast Coal Mines: Preventing Accidents Involving Wheeled Trackless Transportation Machinery.**

I invite your attention to the alarming increase in accidents involving wheeled trackless transportation machinery, specifically dumpers, tippers, etc., in opencast coal mines. The analysis of fatal accidents in 2023 revealed that 36% of them were caused by dumpers, tippers, trucks, and similar vehicles. Among these accidents, 46% were due to run-overs, 23% were caused by being hit by dumpers, 15% by head-on collisions, 8% by toppling, and 8% by other causes, such as the fall of dumpers from a height.

I urge your immediate attention to the following incidents occurred this year, illustrating the urgent need for action.

**Few Accident cases:**

1. While an empty dumper was being parked in the parking yard of an opencast coal mine, another dumper operator, who was present in the parking yard after parking his dumper, was run over by it and succumbed almost instantly.

2. While a tipper was on the way back to the opencast coal mine after unloading coal at SILO bunker, the operator lost his control over the tipper in the process of negotiating a curve along the road due to over speeding and hit an abandoned building adjacent to the road resulting in his fatal injury at the spot.

3. While driving a loaded water tanker from the water loading point to the workshop for scheduled maintenance, the operator stopped the water tanker on the haul road having a mild gradient (1 in 22) in an opencast coal mine, got down the ladder located at the front side of the water tanker, fell down on the ground. Meanwhile, the water tanker moved forward and rolled over him, and he succumbed to his injuries almost instantly.

4. While a CSIF person entered the dump yard unauthorisedly, he was run over by a dumper.

5. While a hired Bolero vehicle, driven by an untrained and unauthorized driver with six employees, was overtaking a 100T Dumper on the haul road approaching towards an overburden loading face in an opencast coal mine; it was hit, toppled, and dragged for about 6m by the Dumper, inflicting fatal injuries to three persons and serious bodily injuries to three persons.

6. While a jeep camper was stopped along the haul road, it was hit by a dumper leading to the death of 2 persons.

7. While a tipper was moving along the haul road, it hit another tipper, leading to a head-to- tail collision of tippers causing the death of the tipper operator.

8. While a tipper operator got down from the tipper at the working face in an opencast coal mine, the tipper started moving down the gradient, and when the operator tried to board the moving tipper, it collided with another tipper parked idle aside, crushing the operator in between and causing him fatal injury.

9. While a person engaged for guiding unloading of dumpers carrying overburden to form a platform for the coal stock yard near the CHP was taking rest in that area, inadvertently overburden was dumped over him, inflicting fatal injuries.

10. While a supervisor was standing aside a haul road, a tipper hit him.

All these accidents could have been prevented had the following statutory provisions been complied:

**Procedure, Compliance and Documentation:**

1. If the dumper operator had followed the Safe Operating Procedures (SOP) framed for dumper operation and given an audible warning signal while parking the dumper in the parking yard, as required under Regulations 63(g) of the Coal Mines Regulations, 2017.

2. If the parking brake had been applied by the operator while getting down from the Tipper, as per SOP issued for Tipper operation under Reg. 110 of the Coal Mines Regulations, 2017.

3. If the Tipper had been operated on the left side of the road and carefully within speed limits, thereby following the traffic rules as per Reg. 63(1)(d); Reg. 40(1) and Reg. 239 of the Coal Mines Regulations, 2017.

4. If untrained and unauthorized drivers without valid driving licenses had not been allowed to drive light motor vehicles, thus not negligently endangering the lives of persons riding them, as required under Regulation 239 read with Regulation 40(1) and Regulation 109(1) of the Coal Mines Regulations, 2017, read with the traffic rules issued by the Manager.

5. If authorization had been issued by the Manager to the drivers operating light motor vehicles in the mine, as required under Regulation 35(5) of the Coal Mines Regulations, 2017.

6. If the provision of fail-safe brake had been ensured before deploying the Tipper into operation, as per Gazette notification G.S.R. 987(E), Dhanbad, the 1st October, 2018, on "Safety features and devices to be provided in Heavy Earth Moving Machinery (HEMM) including trucks and tippers" under Reg. 216(2) of the Coal Mines Regulations, 2017.

7. If a separate road had been provided for Light Motor Vehicles plying in the mine, as required under Regulation 101 of Coal Mines Regulations, 2017, read with clause no.7 of the gazette notification no. G.S.R. 976(E), Dhanbad, the 1st October, 2018 on "Conditions for Haul Roads" under Regulation 101 of the Coal Mines Regulations 2017

8. If the Dumper had been provided with suitable blind spot mirrors or cameras to cover all blind areas and a proper Proximity warning system to warn the Operator or an anti-collision device been provided as required under the Regulation 216(2) of the Coal Mines Regulations, 2017, read with gazette notification No. G.S.R. 987(E) Dhanbad, the 1st October, 2018 on "Safety features and devices to be provided in Heavy Earth Moving Machinery (HEMM) including trucks and tippers".

**Preventing Unauthorized Access/ Access without safety:**

1. If the system of recording names in the register before proceeding to work had been implemented for hired light motor vehicle drivers, as required under Regulation 40(3) of the Coal Mines Regulations, 2017.

2. If the hired light motor vehicles had been provided with suitable red flags or flasher lights to improve visibility to Dumper Operators, thus not negligently endangering the lives of the persons riding them, as required under Regulation 239 the Coal Mines Regulations, 2017 read with the Safety Management Plan prepared by mine management.

3. If adequate lighting arrangements had been ensured, as required under Regulation 178 read with Government Gazette Notification No. 981(E) dated 01.10.2018.

4. If individuals had not entered unauthorized places.

5. If pedestrians had been prevented on haul roads.

**Training:**

1. If copies of transport rules had been handed over to light motor vehicle drivers and their compliance ensured, as required under Regulation 109(2) (3) of the Coal Mines Regulations, 2017.

2. If vocational training had been imparted to light motor vehicle drivers before allowing them to duty in the mine, as required under Rule 6(1) of the Mines Vocational Training Rules, 1966, read with Regulation 39(2)(a) 217(2) of Coal Mines Regulations, 2017.

3. If the SOP framed for Motor grader/Water tanker operations had been followed, particularly when it was required to get down from the Water Tanker. The driver would follow the operating procedure to shut off a running water tanker like engaging the parking brake before the ignition switch is turned off, applying and retaining the service brake till the parking brake is engaged. Extra precaution would be taken by giving sufficient jam on both sides of the wheel if it was unavoidable to park on a gradient to prevent inadvertent movement of the water tanker, as required under Regulation 110 of the Coal Mines Regulations, 2017.

**Supervision and awareness:**

1. If it had been ensured that the place of coal stock yard and persons engaged there were placed under the charge of a statutory supervisor, in compliance with Regulation 129(1) of Coal Mines Regulations 2017.

2. If employees had taken reasonable care for their own safety by not entering the operating area of the dumpers, thus not endangering their own safety, in compliance with Regulation 239 read with Regulation 40(1), 40(4)(a) of the Coal Mines Regulations, 2017.

3. If transport rules had been followed, maintaining an adequate distance from other vehicles.

I am confident that taking appropriate steps will go a long way in preventing accidents involving wheeled trackless transportation machinery in opencast coal mines.

21.08.2024

**(Prabhat Kumar)**
**Director General of Mines Safety &**
**Chief Inspector of Mines**

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आज़ादी का अमृत महोत्सव

भारत सरकार/Government of India

श्रम एवं रोजगार मंत्रालय/Ministry of Labour & Employment

खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

No. DGMS/SOMA/(Tech) Circular No. 02 Dhanbad Dated 22nd May 2024

To
The Owners, Agents and Managers of All Mines

**Subject: Precautions against danger of inundation in mines.**

The sudden rise in water level in or around the catchments area due to rains during monsoon is a common phenomenon. The heavy current of water may cut across the bunds and barriers by deviating its normal course of water and also may result in flooding of low lying area including mine workings, if they are not adequately guarded.

Precautions against the danger of inundation due to the surface water and underground water have been provided under Regulations 149 & 150 of CMR, 2017, Regulations 127 & 128 of the MMR 1961 respectively. Also learning from the earlier inundation incidents/accidents including major disasters, DGMS guidelines/circulars have been issued for implementation to safeguard against the inundation in mines.

Identification of possible sources of danger due to surface water, remedial measures to avoid such danger, monsoon preparation and precaution against danger of inundation from surface water were emphasized and circulated through DGMS Tech. Circular No. 2 of 1978 and DGMS/SOMA/(Tech) Circular No. 6 of 2004.

However, in spite of above guide lines and caution letters issued from this Directorate from time to time, there have been cases of inundation in underground and opencast mines, mainly because adequate precautions were not taken.

The following instances have been recorded during the recent years

(i) Instances of flooding of mines due to the sudden rise of water in the river/nallahs which have over flown above the known HFL, breaching the bund constructed for the protection of opencast workings against the river/nallah, resulting in flooding of the mine workings.

(ii) The workmen going to the place of work near the sump have been washed away into the sump by the flowing water in the mine during heavy rain.

(iii) Drowning of persons in the sumps/waterlogged workings for attempting to enter the sump for various reasons.

(iv) Rainwater entering the underground workings through the subsidence cracks of the shallow cover workings.

(v) The Dumper operator driving the dumper on the haul road inadvertently entered the sump.

To prevent the occurrence of the incidents/accidents of inundation, all the mining companies shall prepare a principal hazard management plan specific to the mine and based on the risk assessed, prepare and implement the safety management plan which shall have bearing to and not limited to the following precautions:

1. Effective implementation of the provisions of the Regulations 149 & 150 of CMR, 2017, Regulations 127 & 128 of the MMR 1961, DGMS circulars issued on the subject and recommendations made by the courts of inquiry appointed on the disasters occurred in Indian mines due to inundation.

2. The pathways leading to the working places in the opencast mines shall be so situated that there is no danger to the passers thereby due to the water.

3. The rain water of the catchment area surrounding the mine shall be coursed away from the mine through a system of garland drains, so that even in heavy rains there is no danger to the persons working at the sump areas in the mine.

4. The bunds/retaining wall constructed against the river/ water courses shall be thoroughly examined and maintained according to the principles of engineering so that there occurs no breach during the incessant rains in the catchment area.

5. Proper fencing shall be maintained against the sump and the waterlogged old workings so that there is no unauthorized / inadvertent entry into such workings by any person.

6. Pontoon pumps shall be so maintained, that the necessity for the persons to go near the pumps for operation and all the repair/maintenance works is almost avoided. A proper safe operating procedure (SOP) to be framed and implemented for the repair and maintenance of the pumps near the sumps.

7. The travelling roads in the opencast mines shall be so designed that there is no danger to the persons from the water flowing into the sumps during the rains.

8. The haul roads passing by the side of waterlogged workings/sumps shall be suitably guarded by berm/ parapet wall against the vehicle drivers inadvertently driving into such workings.

9. A mechanism with adequate manpower to be established for inspection of surface area over the depillared panels and old workings for formation of cracks, if any, and the cracks shall be immediately filled up to prevent water entering into the underground workings.

10. A close liasoning and communication with local meteorological department, water dams/ reservoir authorities shall be established to get alert of heavy rainfall, rise of water level and release of water from water dams etc.

I solicit your commitment in the effective implementation of the measures circulated, in the interest of safety of persons employed in the mines.

22/05/2024

**(Prabhat Kumar)**
**Director General of Mines Safety**

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आज़ादी का अमृत महोत्सव

**भारत सरकार / Government of India**
**श्रम एवं रोजगार मंत्रालय / Ministry of Labour & Employment**
**खान सुरक्षा महानिदेशालय / Directorate General of Mines Safety**

No. DGMS(Tech) Circular (OH)/01 Dhanbad, dated 19 .04.2024

To

The Owner, Agent and Managers of all Mines

**Sub: Heat wave in summer and precautions against occurrence of Accidents/incidents due to exposure to high temperature.**

In preparation for this summer season, it is imperative to acknowledge and mitigate the risks associated with working in hot environments, especially for miners. Heat stress poses a significant threat and can result in various health complications if not adequately addressed.

The physiological effects of exposure to high atmospheric temperatures during the summer months and the guidelines for dealing with the situation were outlined in Circular No. DGMS (Tech) Circular (OH)/01, Dhanbad dated 24th April 2023. The guidelines issued shall be strictly followed.

Further, here are some key points to keep in mind to ensure everyone's safety during the upcoming season:

(i) Recognizing the Symptoms of Heat Stress and taking preventive measures:

| Recognizing the Symptoms of Heat Stress: | Preventing Heat Stress: |
|---|---|
| - Skin is hot, usually dry, red, or spotted.<br>- Body temperature rises.<br>- Victim may be confused.<br>- The face may be pale or flushed.<br>- Muscle cramps from loss of sodium. | - Provide cool drinking water near miners.<br>- Encourage miners to drink a cup of water every 15 to 20 minutes.<br>- Avoid drinks with caffeine and large amounts of sugar.<br>- Use sun blockers, proper protective clothing, and shade.<br>- Implement administrative controls to rotate miners on hot jobs.<br>- Schedule heavy tasks during cooler times of the day. |

(ii) Do's and Do Not's while treating the person with symptoms of Heat Stress:

| Do's | Do Not's |
|---|---|
| - Remove the miner from the hot area.<br>- Apply cool wet cloths.<br>- Give water if the miner is awake.<br>- Seek medical attention if there is no improvement. | - Apply ice directly to the skin.<br>- Allow the miner to become so cold that shivering develops.<br>- Leave the miner alone. |

You are advised to take the following precautions to ensure preparedness and effectively manage the heat wave conditions in the mines to mitigate the risks to the health of miners associated with working in hot environments:

(i) Slowing down the pace of work shall be allowed if the worker feels any discomfort.
(ii) Rest areas shall be located as near to the place of work as possible.
(iii) Provide cool drinking water and electrolyte supplements near the working place in the mines.
(iv) Encourage miners to drink a cup of water every 15 to 20 minutes.
(v) Use sun blockers, proper protective clothing, and shade.
(vi) Implement administrative controls to rotate miners on hot jobs.
(vii) Schedule heavy tasks during cooler times of the day.
(viii) Ensure that the workers do not enter/work in an atmosphere having no ventilation or inadequate ventilation in underground mines.
(ix) Provide awareness among all the employees on the symptoms of heat stress and the dos and don'ts shall be prepared and pasted at conspicuous places of the mines.
(x) Provide required training on "heat-stress recognition & prevention" to all employees.
(xi) Monitor environmental conditions regularly.
(xii) Encourage open communication about any discomfort or symptoms experienced.

Also, include the training on "the physiological effects of exposure to high atmospheric temperatures during the summer months and dealing with the situation" as a part of the regular vocational training (Basic/Refresher/Special/others) programmes.

Let's prioritize health and safety as we navigate through the summer months. Our Miners' health and well-being are paramount, and by being vigilant and proactive, we can ensure a safe and productive work environment for everyone.

Stay cool and stay safe!

(Prabhat Kumar)
Director General of Mines Safety

DGMS(Genl)/ Circular No. 01 of 2023 Dhanbad, Dated 10th May 2023

To

All Owner, Agent and Manager of the Mines.

**Sub: Jurisdiction of the Zones and Regions of DGMS after Reorganisation - Reg.**

Please refer to the Notification of Government of India, Ministry of Labour and Employment, (Directorate General of Mines Safety), published in the Gazette of India, part II, Section – 3, Sub-Section (i), vide G.S.R. 300(E) dated the 17th April 2023 read with corrigendum published vide G.S.R. 342(E) dated the 2nd May 2023 in respect of the Jurisdiction of Zones and Regions of the Directorate General of Mines Safety. Subsequent to the reorganization of jurisdiction of zonal and regional offices of DGMS, revised jurisdiction of zones and regions is as below:

**Central Zone (CZ) having jurisdiction in the State of Bihar and part of Jharkhand with Headquarters (HQ) at Dhanbad (Jharkhand), comprising of Dhanbad Region-1, Dhanbad Region-2, Dhanbad Region-3 and Koderma Region.**

**Dhanbad Region-1, Head Quarters at Dhanbad in the State of Jharkhand**

| | | |
|---|---|---|
| Part of the Jharkhand state | : | All the mines in the district of Dhanbad lying on the West of Giridih-Tundi- Govindpur Road and North of NH- 32 from Govindpur - Dhanbad to Bokaro. |

**Dhanbad Region-2, Head Quarters at Dhanbad in the State of Jharkhand**

| | | |
|---|---|---|
| Part of the Jharkhand state | : | All the mines in the district of Dhanbad lying on the East of Giridih-Tundi-Govindpur Road and South of NH-32 from Govindpur- Dhanbad to Bokaro. |

**Dhanbad Region-3, Head Quarters at Dhanbad in the State of Jharkhand**

| | | |
|---|---|---|
| Part of the Jharkhand state | : | All the mines in the districts of Jamtara, Deoghar, Dumka, Pakur, Godda and Sahebganj. |

**Koderma Region, Head Quarters at Koderma in the State of Jharkhand**

| | | |
|---|---|---|
| Bihar state & Part of Jharkhand | : | All the mines of Bihar state and all mines in the districts of Koderma, Giridih & Bokaro of Jharkhand state. |

**Eastern Zone (EZ) having jurisdiction in the States of West Bengal, Assam, Sikkim, Arunachal Pradesh, Manipur, Mizoram, Meghalaya, Nagaland, Tripura and Union Territory (UT) of Andaman & Nicobar Islands with Headquarters at Sitarampur (West Bengal), comprising of Sitarampur Region-1, Sitarampur Region-2, Sitarampur Region-3 and Guwahati Region.**

**Sitarampur Region-1, Head Quarters at Sitarampur in the State of West Bengal**

| | | |
|---|---|---|
| Part of West Bengal state | : | All the mines in the District of Paschim (West) Burdwan situated on the south of NH-2.<br>All mines in the districts of Purulia, Bankura, Jhargram, Paschim (west) Medinipur and Purba (East) Medinipur. |

**Sitarampur Region-2, Head Quarters at Sitarampur in the State of West Bengal**

| | | |
|---|---|---|
| Part of West Bengal state | : | All the mines in the districts of Paschim (west) Burdwan in the north of NH-2 and east of NH-60 leading from Punjabi more on NH-2 to |

| | | |
|---|---|---|
| | | Pandaveswar Ghat.<br>All Mines in the districts of Purba(East) Burdwan, Murshidabad, Nadia, North-24-Parganas, South-24-Parganas, Howrah, Hooghly, Kolkata, Malda, Dakshin Dinajpur, Uttar Dinajpur, Darjeeling, Jalpaiguri, Alipurdwar, Cooch Behar and Kalimpong. |
| UT of Andaman & Nicobar Islands | : | All Mines |

**Sitarampur Region-3, Head Quarters at Sitarampur in the State of West Bengal**

| | | |
|---|---|---|
| Part of West Bengal state | : | All the mines in the districts of Paschim (West) Burdwan on the north of NH-2 and west of NH-60 leading from Punjabi more on NH-2 to Pandaveswar Ghat.<br>All the mines in the district of Birbhum |

**Guwahati Region, Head Quarters at Guwahati in the State of Assam**

| | | |
|---|---|---|
| States of Assam, Sikkim, Arunachal Pradesh, Manipur, Mizoram, Meghalaya, Nagaland and Tripura | : | All Mines. |

**South Eastern Zone (SEZ) having jurisdiction in the State of Odisha and Part of Jharkhand with Headquarters at Ranchi (Jharkhand), comprising of Ranchi Region, Chaibasa Region, Bhubaneswar Region-1 and Bhubaneswar Region-2.**

**Ranchi Region, Head Quarters at Ranchi in the State of Jharkhand**

| | | |
|---|---|---|
| Part of the Jharkhand state | : | All mines in the districts of Ranchi, Ramgarh, Hazaribagh, Chatra, Palamu and Garhwa. |

**Chaibasa Region, Head Quarters at Chaibasa in the State of Jharkhand**

| | | |
|---|---|---|
| Part of the Jharkhand state | : | All Mines in the districts of East- Singhbhum, West-Singhbhum, Saraikela-Kharsawan, Gumla, Khunti, Simdega, Latehar and Lohardaga |

**Bhubaneswar Region-1, Head Quarters at Bhubaneswar in the State of Odisha**

| | | |
|---|---|---|
| Part of Odisha state | : | All Mines in the districts of Angul, Dhenkanal, Jajpur, Keonjhar (Kendujhar), Bhadrak, Balasore( Baleswar), Kendrapara, Jagatsinghapur, Cuttak, Khordha, Puri, Nayagarh, Ganjam, Gajapati and Mayurbhanj. |

**Bhubaneswar Region-2, Head Quarters at Bhubaneswar in the State of Odisha**

| | | |
|---|---|---|
| Part of Odisha state | : | All Mines in the districts of Sundargarh, Jharsuguda, Sambalpur, Deogarh (Debagarh), Boudh, Bargarh, Subarnapur (Sonepur), Nuapada, Balangir, Kandhamal (Phulbani), Rayagada, Kalahandi, Nabarangpur, Koraput and Malkangiri. |

**South Central Zone (SCZ) having jurisdiction in the States of Telangana and Andhra Pradesh with Headquarters at Hyderabad (Telangana), comprising of Hyderabad Region-1, Hyderabad Region-2, Hyderabad Region-3 and Nellore Region.**

**Hyderabad Region-1, Head Quarters at Hyderabad in the State of Telangana**

| | | |
|---|---|---|
| Part of Telangana state | : | All Mines in the districts of Khammam, Karimnagar, Hanumakonda, Warangal, Mahabubabad, Bhadradri Kothagudem, Jayashankar Bhupalpally, Mulugu, Jangoan, Siddipet, Mahabubnagar, Wanaparthy, Jogulamba Gadwal, Narayanpet, Suryapet, Yadadri Bhuvanagiri, Medchal-Malkajgiri, Rangareddy, Hyderabad, Nalgonda and Nagarkurnool. |

**Hyderabad Region-2, Head Quarters at Hyderabad in the State of Telangana**

| | | |
|---|---|---|
| Part of the Telangana state | : | All Mines in the districts of Adilabad, Mancherial, Nirmal, Komuram Bheem, Nizamabad, Peddapalli, Rajanna-Sircilla, Kamareddy, Medak, Sangareddy, Jagtial and Vikarabad. |

**Hyderabad Region-3, Head Quarters at Hyderabad in the State of Telangana**

| | | |
|---|---|---|
| Part of the Andhra Pradesh state | : | All Mines in the districts of West Godavari, East Godavari, Krishna, Kakinada, Dr B.R.Ambedkar Konaseema, Eluru, Alluri Sitharamaraju, Guntur, Palnadu, Bapatla, Visakhapatnam, Vizianagaram, Srikakulam, Prakasam, Kurnool, Nandyal, Anakapalli, Parvathipuram-Manyam and NTR. |

**Nellore Region, Head Quarters at Nellore in the State of Andhra Pradesh**

| | | |
|---|---|---|
| Part of the Andhra Pradesh state | : | All mines in the districts of Sri Potti Sreeramulu Nellore, YSR, Chittoor, Ananthapuramu, Annamayya, Tirupati, and Sri Satyasai. |

**Southern Zone (SZ) having jurisdiction in the States of Karnataka, Kerala, Tamil Nadu and Union Territories (UTs) of Lakshadweep Islands & Puducherry with Headquarters at Bengaluru (Karnataka), comprising of Bengaluru Region, Bellary Region-1, Bellary Region-2 and Chennai Region.**

**Bengaluru Region, Head Quarters at Bengaluru in the State of Karnataka**

| | | |
|---|---|---|
| Part of the Karnataka state | : | All mines in the districts of Chikmagalur, Dakshin Kannada, Chitradurga, Tumkur, Hassan, Kolar, Bengaluru Urban, Bengaluru Rural, Mandya, Mysuru (Mysore), Chamarajnagar, Kodagu, Ramanagara, Chikkaballapura, Davangere, Shivamogga and Udupi. |
| Kerala and UT of Lakshadweep Islands | : | All Mines |

**Bellary Region-1, Head Quarters at Bellary in the State of Karnataka**

| | | |
|---|---|---|
| Part of Karnataka state | : | All Mines in the districts of Ballary(Bellary),Vijayanagara, Raichur(Raichuru), Yadgiri, Kalaburgi (Gulbarga) and Bidar |

**Bellary Region-2, Head Quarters at Bellary in the State of Karnataka**

| | | |
|---|---|---|
| Part of the Karnataka state | : | All mines in the districts of Vijayapura(Bijapur), Bagalkote, Gadag, Koppal, Belagavi(Belgaum), Dharwad, Haveri and Uttar Kannada. |

**Chennai Region, Head Quarters at Chennai in the State of Tamil Nadu**

| | | |
|---|---|---|
| Tamil Nadu state | : | All mines |
| UT of Puducherry | : | All Mines. |

**Western Zone (WZ) having jurisdiction in the States of Maharashtra, Chhattisgarh and Goa with Headquarter at Nagpur (Maharashtra), comprising of Nagpur Region-1, Nagpur Region-2, Bilaspur Region-1, Bilaspur Region-2, Raigarh Region and Goa Region.**

**Nagpur Region-1, Head Quarters at Nagpur in the State of Maharashtra**

| | | |
|---|---|---|
| Part of Maharashtra state | : | All mines in the districts of Gondia, Bhandara, Nagpur, Wardha, Amravati, Akola, Buldhana, Jalna, Hingoli, Parbhani, Aurangabad, Washim and Gadchiroli. |

**Nagpur Region-2, Head Quarters at Nagpur in the State of Maharashtra**

| | | |
|---|---|---|
| Part of Maharashtra state | : | All mines in the districts of Chandrapur, Yavatmal, Nanded, Latur, Beed and Osmanabad. |

**Bilaspur Region-1, Head Quarters at Bilaspur in the State of Chhattisgarh**

| | | |
|---|---|---|
| Part of Chhattisgarh state | : | All Mines in the districts of Korba, Raipur, Gariaband, Balodabazar-Bhatapara, Dhamtari, Bastar, Kondagaon and Sukma. |

**Bilaspur Region-2, Head Quarters at Bilaspur in the State of Chhattisgarh**

| | | |
|---|---|---|
| Part of Chhattisgarh state | : | All Mines in the districts of Korea, Manendragarh-Chirmiri- Bharatpur, Bilaspur, Mungeli, Kawardha(Kabirdham), Durg, Rajnandgaon, |

Khairagarh-Chhuikhadan-Gandai, Mohla-Manpur-Ambagarh Chouki, Balod, Bemetara, Kanker, Narayanpur, Dantewada, Bijapur and Gaurela-Pendra-Marwahi.

**Raigarh Region, Head Quarters at Raigarh in the State of Chhattisgarh**

| | | |
|---|---|---|
| Part of Chhattisgarh state | : | All Mines in the districts of Raigarh, Sarangarh-Bilaigarh, Jashpur, Surguja, Surajpur, Balrampur, Janjgir- Champa, Sakti and Mahasamund. |

**Goa Region, Head Quarters at Madgaon in the State of Goa**

| | | |
|---|---|---|
| Goa state | : | All Mines in the state of Goa. |
| Part of Maharashtra state | : | All Mines in the districts of Ahmednagar, Nandurbar, Mumbai, Mumbai Suburban, Thane, Palghar, Nashik, Dhule, Jalgaon, Satara, Ratnagiri, Sangli, Kolhapur, Solapur, Sindhudurg, Raigad and Pune. |

**North Western Zone (NWZ) having jurisdiction in the States of Gujarat, Rajasthan and Union Territories (UTs) of Daman, Dadra & Nagar Haveli and Diu, with Headquarters at Udaipur (Rajasthan), comprising of Ahmedabad Region-1, Ahmedabad Region-2, Surat Region, Udaipur region, Ajmer Region-1 and Ajmer Region-2.**

**Ahmedabad Region-1, Head Quarters at Ahmedabad in the State of Gujarat**

| | | |
|---|---|---|
| Part of Gujarat state | : | All Mines in the districts of Jamnagar, Devbhoomi Dwarka, Porbandar, Rajkot, Morbi, Junagadh, Gir-Somnath, Amreli, Bhavnagar, Ahmedabad and Botad. |
| UT of Diu | : | All Mines |

**Ahmedabad Region-2, Head Quarters at Ahmedabad in the State of Gujarat**

| | | |
|---|---|---|
| Part of Gujarat state | : | All Mines in the districts of Gandhinagar, Mehasana, Patan, Kutch, Mahisagar, Surendra Nagar, Banaskantha, Sabarkantha and Aravalli. |

**Surat Region, Head Quarters at Surat in the State of Gujarat**

| | | |
|---|---|---|
| Part of Gujarat state | : | All Mines in the districts of Panchmahal, Dahod, Vadodara, Chhota Udaipur, Bharuch, Narmada, Surat, Navsari, Tapi, Valsad, Dang, Anand and kheda. |
| UT of Daman, Dadra & Nagar Haveli | : | All Mines in Daman and Dadra & Nagar Haveli |

**Udaipur Region, Head Quarter at Udaipur in the State of Rajasthan**

| | | |
|---|---|---|
| Part of the Rajasthan state | : | All mines in the district of Rajsamand, Udaipur, Dungarpur, Banswara, Pratapgarh, Chittorgarh, Sirohi and Jalore |

**Ajmer Region-1, Head Quarter at Ajmer in the State of Rajasthan**

| | | |
|---|---|---|
| Part of the Rajasthan state | : | All mines in the district of Jaipur, Ajmer, Dausa, SawaiMadhopur, Tonk, Bundi, Bharatpur, Alwar, Kota, Bhilwara, Baran, Jhalawar, Karauli and Dholpur. |

**Ajmer Region-2, Head Quarters at Ajmer in the State of Rajasthan**

| | | |
|---|---|---|
| Part of the Rajasthan state | : | All mines in the district of Jodhpur, Barmer, Jaisalmer, Bikaner , Sri Ganganagar, Hanumangarh , Pali, Nagaur, Churu, , Jhunjhunu and Sikar |

**Northern Zone (NZ) having jurisdiction in the States of Uttar Pradesh, Haryana, Uttarakhand, Himachal Pradesh, Punjab, Madhya Pradesh and Union Territories (UTs) of Delhi, Chandigarh, Jammu & Kashmir and Laddakh with Headquarters at Ghaziabad (Uttar Pradesh), comprising of Ghaziabad Region, Srinagar Region, Parasia Region, Jabalpur Region, Gwalior Region and Varanasi Region.**

**Ghaziabad Region, Head Quarters at Ghaziabad in the State of Uttar Pradesh**

| | | |
|---|---|---|
| Part of Uttar Pradesh state | : | All Mines in the districts of Muzaffarnagar, Shamli, Saharanpur, Bijnor, Meerut, Hapur, Baghpat, Ghaziabad, Bulandshahar, Gautam Buddha Nagar, Jyotiba Phule Nagar(Amroha), Moradabad, Rampur, Aligarh, Badaun, Sambhal(BhimNagar), Bareilly, Pilibhit, Mathura, Hathras, Etah, Kanshiram Nagar ( Kasganj), Shahjahanpur, Lakhimpur Kheri, Agra, Firozabad, Mainpuri, Farrukhabad, Hardoi, Sitapur, Etawah, Kannauj, Auraiya, Kanpur Nagar, Kanpur Dehat, Unnao, Lucknow, Jalaun, Jhansi, Lalitpur , Hamirpur and Mahoba. |
| Haryana, Uttarakhand states and UT of Delhi | : | All mines |

**Srinagar Region, Head Quarters at Srinagar in the Union Territory of Jammu and Kashmir**

| | | |
|---|---|---|
| UTs of Jammu & Kashmir, Laddakh and Chandigarh | : | All mines |
| Himachal Pradesh and Punjab states | : | All mines |

**Parasia Region, Head Quarters at Parasia in the State of Madhya Pradesh**

| | | |
|---|---|---|
| Part of Madhya Pradesh state | : | All Mines in the districts of Chhindwara, Betul, Seoni, Balaghat, Mandla, Narmadapuram (Hoshangabad), Narsinghpur and Harda. |

**Jabalpur Region, Head Quarters at Jabalpur in the State of Madhya Pradesh**

| | | |
|---|---|---|
| Part of Madhya Pradesh state | : | All Mines in the districts of Rewa, Satna, Panna, Damoh, Katni, Umaria, Shahdol, Anuppur, Jabalpur and Raisen. |

**Gwalior Region, Head Quarters at Gwalior in the State of Madhya Pradesh**

| | | |
|---|---|---|
| Part of Madhya Pradesh state | : | All Mines in the districts of Morena, Sheopur, Bhind, Gwalior, Shivpuri, Guna, Bhopal, Vidisha, Datia, Rajgarh, Tikamgarh, Chhatarpur, Ashok Nagar, Sagar, Sehore, Jhabua, Alirajpur, Dhar, Khargone, Khandwa, Barwani, Burhanpur, Neemuch, Mandsaur, Ratlam, Ujjain, Shajapur, Agar Malwa, Dewas, Indore, Niwari and Dindori. |

**Varanasi Region, Head Quarters at Varanasi in the State of Uttara Pradesh**

| | | |
|---|---|---|
| Part of Uttar Pradesh state | : | All mines in the districts of Bahraich, Shravasti, Barabanki, Gonda, Raebareli, Fatehpur, Banda, Chitrakoot, Kaushambi, Pratapgarh, Sultanpur, Amethi, Ayodhya (Faizabad), Basti, Balarampur, Siddharth Nagar, Maharajganj, Sant Kabir Nagar, Ambedkar Nagar, Jaunpur, Prayagraj, Kushinagar, Deoria, Gorakhpur, Azamgarh, Mau, Ballia, Sant Ravidas Nagar (Bhadohi), Varanasi, Mirzapur, Chandauli, Sonbhadra and Ghazipur. |
| Part of Madhya Pradesh state | : | All mines in the district Sidhi and Singrouli (Waidhan). |

This is in supersession of the earlier circulars issued in this regard.

10/05/2023

**(Prabhat Kumar)**
**Director General of Mines Safety &**
**Chief Inspector of Mines.**

भारत सरकार/Government of India

श्रम एवं रोजगार मंत्रालय/Ministry of Labour & Employment

खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

No.DGMS(Tech) Circular(OH)/ 01 Dhanbad, dated 24.04.2023

To

The Owner, Agent and Manager of all Mines

**Subject: Accidents/incidents due to exposure to high temperature**

Sir/Madam,

1. During peak summer every year, many incidences of mine workers getting affected due to exposure to high atmospheric temperature get reported. Some such cases had even turned into fatalities. Opencast mines during summer are most vulnerable in this regard. In some cases, persons get affected due to heat in underground mines also, mostly due to inadequate ventilation. Inquiries revealed that in most of the cases "Heat stroke" was the major contributory cause. Hence, the mine management shall educate all the field officers, supervisors and workmen on the illnesses due to exposure to high atmospheric temperature, so that they can take necessary precautions and also render proper first-aid without delay.

**2. Physiological effects of working in high atmospheric temperature:**

Sweating, which is the release of fluid through sweat glands in the skin, helps release heat, but it must evaporate in order to cool the body. While working in high atmospheric temperature, a person's body is restricted from releasing heat from the body to the atmosphere. As a result, heavy sweating takes place, which results into loss of mineral salt along with fluid from the body. Heat-related illnesses, each of which can occur alone or in combination with others, are generally classified and handled as follows:

i. **Heat rash** is in the form of tiny red blisters usually on the areas of more sweating like neck and upper chest, in the groin, under the breasts, and in elbow creases. It is caused due to continuous presence of unevaporated sweat. Regularly washing and drying the skin are the important precautions from it. In case formation of blisters takes place, care should be taken, not to burst them.

ii. **Sun-burn** is the damage to the skin, mostly the superficial layer (Epidermis), causing the skin to be purplish. The person suffering from it, feel hot and feverish. In more severe cases, fluid-filled blisters form which can get infected. Application of cold compresses to the sunburned areas, gives some relief. The suffering person also can be given cool sponging. In case, formation of blisters takes place, care should be taken, not to burst them, to avoid skin infection.

iii. **Heat fatigue** is indicated in a person with impaired and inadequate performance in jobs that require skill involving adeptness in neuro-muscular activities as well as good judgment and vigilance. In all such cases, the affected person shall be taken to a cooler place and shall be kept there till his recovery.

iv. **Heat cramps** are severe muscle pains along with spasms; generally take place in the abdomen, arms, or legs. Cramps often affect people who sweat a lot during strenuous activity. They can be caused by both too much and too little salt consumption, resulting into electrolyte imbalance in the body. In such condition, affected persons to be given lightly salted water (1/4 tablespoon of table salt per quart of water) or a beverage that replaces lost electrolytes. If the cramps don't subside in about one hour or the person is on a low-sodium diet or has a history of heart problems, medical attention to be sought without delay.

v. **Heat syncope** (fainting due to heat) occurs when the adequate quantity of blood fails to reach the brain due to movement of more blood towards the skin for throwing off the body heat into the atmosphere. In hot atmosphere more fluid is also lost in the form of sweat, resulting less quantity of body fluid available to the heart for pumping to the Brain. Under such scenario, brain is unable to function properly, in absence of adequate nutrient and Oxygen, causing giddiness, nausea and sudden collapse. The facial skin also becomes pale in most cases. In such situation the affected person shall be immediately taken to a cooler place and if the person is at least in semi-conscious state, he can be given water (or a clear juice or sports beverage) slowly. If the person is totally unconscious, medical attention to be sought immediately.

vi. **Heat exhaustion (dehydration)** occurs when a person fails to replenish enough fluid and minerals in the body due to excessive sweating, resulting into electrolyte imbalance. Inadequate electrolyte in the body causes disturbance in the brain causing symptoms like headache, nausea, vertigo, weakness, thirst, palpitation and muscle cramps. The victim's skin becomes moist, the complexion pale or flushed. Left untreated, Heat exhaustion can lead to Heat Syncope or even Heat stroke. It is vital that the affected person drinks lots of lightly salted water (1/4 tablespoon of table salt per quart of water) or a beverage that replaces electrolytes. Plenty of rest away from heat is also important. In severe cases the affected person may require medical advice as well.

vii. **Heat stroke** (sun stroke) is the most serious amongst all heat-induced illness. It's caused by fatigue of body cooling mechanism and lack of sweating due to continuous exposure to high atmospheric temperature, resulting into an accelerating rise of body temperature. In such condition Brain as well as all other vital organs of the body unable to function normally. Symptoms include throbbing headache, confusion, hallucinations, slurred speech, convulsions, fainting and coma. The skin becomes hot and dry, the pulse becomes rapid, and blood pressure low. Body temperature can soar up to 106°F (41°C) or more. Heat stroke can cause irreversible damage to the body and is life threatening. This condition can be fatal unless rapid and adequate treatment is obtained. After removing the victim to a cooler area, immediately cooling of the skin to be facilitated by loosening the clothing, spraying with cool water and a fan, or body sponging with chilled water. Medical attention to be sought without any delay while attempting to cool down the body of the affected person.

**3. Dealing with exposure to the environments of high temperature issues in mines**

Problems due to exposure to high surrounding temperature can be reduced in mines by adopting proper engineering measures, suitable work practices and use of proper Personal protective equipment including clothing.

A. **Engineering measures:**

a. Rest shelters shall be provided at all the locations, within a reasonable distance from the places where persons have to work directly under the sun. As far as practicable, the temperature in the Rest shelter should be maintained below 25°C.
b. To provide cool drinking water to the employees at 10 to 15°C.
c. Proper mine ventilation to be provided for supplying cool air to the work place or air-conditioning of the work place, in case natural cool air is not available.
d. Covered drainage or insulated piping for a speedy transfer of hot water to the surface, in order to control the problem of hot ground water heating up the underground mine environment.

B. **Administering suitable work practices:** When Engineering measures alone fail to prevent workers from suffering from heat stress, a combination of engineering measures and following work practices shall be adopted:

a. To take frequent breaks and reasonably short work periods.
b. To perform heavy tasks in cooler areas or at a time, when atmospheric temperature is reasonably low
c. To adopt job rotation for personnel exposed to high atmospheric temperature.
d. To encourage all employees to drink a cup of water every 15 to 20 minutes and to drink lightly salted water.
e. To encourage to take extra salt at meals as per the health condition of the employees.
f. To increase awareness on effects of consuming drinks with caffeine, alcohol and excess sugar.

C. **Personal Protective Equipment and clothing**: Clothing worn in hot conditions should ideally be made of cotton and not too tight. Loose clothes; on the other hand, puts the wearer at risk of being caught/pulled into moving parts of machinery. Most of the reflective clothing does not allow air exchange through them; hence reflective clothing should be worn as loosely as practicable. During mines rescue operations, personal protective equipment and self-contained breathing apparatus should not be worn continuously for more than two hours.

**4. Conclusion**

Working in environments with high-temperature causes several other illnesses varying from heat Rashes to heat stress. The symptoms include confusion, hallucinations, chills, throbbing headache, and loss of consciousness, convulsions, slurred speech, and coma. These illnesses are also manifested as frustration, rage, and other emotions that might lead to hasty, short-cut unsafe acts and risky behaviour.

The above guidelines are helpful to address the issues related to extreme to high temperatures.

Therefore, the mine management shall take the suitable measures to deal with the situation and to prevent the persons working in mines from getting exposed to high atmospheric temperature, which have an adverse effect on health.

Yours faithfully,

(Prabhat Kumar)

Director General of Mines Safety

भारत सरकार
**Government of India**
श्रम एंव रोजगार मंत्रालय
**Ministry of Labour & Employment**
खान सुरक्षा महानिदेशालय
**Directorate General of Mines Safety**

आज़ादी का अमृत महोत्सव

No. DGMS/Circular(Tech)/02 Dhanbad, Dated 29th April, 2022

**To**

**The Owners, Agents and Managers**
**of all Coal and Metalliferous Mines**

**Sub: Recommendations of the Rajmahal Court of Inquiry constituted to inquire into the causes and circumstances leading to the accident at Rajmahal Opencast Mine of M/s Eastern Coalfields Limited on 29.12.2016: Reg.**

The court of Inquiry was constituted under the Section 24 of the Mines Act, 1952, to inquire into the causes and circumstances attending to the accident that occurred at Rajmahal Opencast Mine of M/s Eastern Coalfields Limited on 29.12.2016, due to the failure of batter resulting into instant sliding of dump, about 600m X 100m in size and 4.31 lakh cu.m. in volume (as per HPC Report), burying 23 workers employed thereat.

The court of Inquiry made the following recommendations to avoid similar accidents in future:

**(i) Preparation and approval of the Project Report:** While preparing a Project Report of a large opencast mine, planners should clearly specify in detail all operations like manner of extraction, place of dumping, layout of dump, layout of roadways for transportations etc, required to be carried out in the mine. The estimated cost of the project should also include funds for safety and acquisition of land. The project should be approved with the condition that operations in the mine is commenced only after complete acquisition of land required for operations. The report should be considered for approval after its vetting by Internal Safety Organisation.

**(ii) Planning & Execution:** There should be a clear segregation of authorities involved in planning and those responsible for execution of the Plan. It is recommended that a Planning and Monitoring Committee may be set up comprising all relevant stake holders who would be responsible for preparation and execution of the Project Report after taking into consideration all parameters including safety parameters involved in operation of a mine. This Committee may

also be entrusted with the responsibility of regular monitoring of the project at its execution stage to ensure that there are no deviations from the original approved Plan. This is necessary as an executive, generally concerned with production, is likely to take decisions deviating from the approved Plan in order to achieve production targets. Such decisions may prove costly in terms of safety parameters of the mine. If any deviation is required due to changed circumstances, it should be done in consultation and approval of this Planning and Monitoring Committee.

**(iii) Status of the Manager:** As per requirements of Section 17 of the Mines Act, 1952, a Manager is responsible for the overall management, control, supervision and direction of the mine. However, in practice, it is seen that the Manager is a very junior officer and therefore has virtually very little control over the management of the mine. Most of the operational decisions are taken at higher levels with very little input from the Manager. This creates lot of confusion and is against the spirit of Section 17 of the Mines Act, 1952. Hence, it is recommended that a sufficiently senior officer is appointed as Manager of the mine to fulfill the statutory requirements of the Act.

**(iv) Role of the Contractor:** Full and exclusive responsibility for safety in the mine should rest with the Manager and mine officials under him as required by the Mines Act, 1952 and the Rules and Regulations made thereunder. Role of a Contractor should be limited only to carrying out certain operations in the mine under total control and direction of the Manager.

**(v) External Safety Audit:** In addition to Internal Safety Audit, a mine should also be audited by an external agency to detect any unsafe condition/practice prevalent in the mine.

**(vi) Monitoring of slope stability in opencast mines:** Strata monitoring including dump monitoring for deeper opencast mines and dumps of more than 60m height should be made mandatory to provide real time information about the loads and strains on benches and dumps.

**(vii) Digital Occupational Safety and Health (OSH) Observatory:** There have been many disasters due to opencast bench and dump failures in coal mines in India in recent past. In most of the cases the causes of failures were one and the same, i.e. none adherence to the bench parameters and presence of geological disturbances including hydrological effects.

It is recommended that a Digital OSH Observatory should be set up at national level where in digital records of all the accidents, disasters, health issues, status of mines and their risk levels in digital forms is maintained for reference and is in public domain.

**(viii) Mine Digitalization and Emergency Action Plan:** After any mine disaster, it is generally difficult to locate the entrapped miners leading to delay in rescue and recovery operations. In order to avoid such a situation and to ensure emergent rescue operations of affected persons, a provision under the Coal Mines Regulations, 2017 has already been made as given below: Regulation 37 (5)(c) "The Owner shall ensure that a system is established so that the names of all persons who are employed belowground can be accurately known at any time,

as well as their probable location". It is recommended that the above mentioned provision 37 (5) (c) of the Coal Mines Regulations, 2017 be amended so that it is applicable to opencast mines also.

**(ix) Delegation of financial powers to the 'Nominated Owner:** As per Section 18 (1) of the Mines Act, 1952, the 'Owner' and 'Agent' of every mine are responsible for making financial and other provisions and for taking such steps as may be necessary for compliance with the provisions of the Act and the regulations, rules, byelaws and orders made thereunder. The company, under Section 76 of the Act, nominates one of its Directors to assume the responsibility of the 'Owner' of the mine for the purposes of the Act. Therefore, it is recommended that such 'Nominated Owner' be delegated full financial powers for matters related to safety so that he is able to fulfill his obligations required by the Act.

You are, therefore requested to take suitable steps to implement the above mentioned recommendations of the Rajmahal court of inquiry in the mines under your control.

25.04.2022

(Prabhat Kumar)
Chief Inspector of Mines.

भारत सरकार/Government of India
श्रम एवं रोजगार मंत्रालय/Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

No. DGMS (Tech) Circular (OH)/01 Dhanbad , dated 28.04. 2022

To,
The Owner, Agent and Manager of all Mines

Subject: **Accident/ incidences due to exposure to high atmospheric temperature.**

Sir,

Due to rising of the atmospheric temperature, mine workers can be subjected to high levels of heat and humidity that may cause heat related morbidity and mortality. This year we are experiencing unprecedented heat waves across India including mining belt.

DGMS has already issued the consequences due to high atmospheric temperature and precautionary measures vide DGMS Circular No. DGMS (Tech) Circular (MAMID)/01, dated 06.05.2015.The same is annexed for your perusal and compliance.

Yours faithfully,

28.04.2022
(Prabhat Kumar)
Director General of Mines Safety

Encl:- As above

भारत सरकार
Government of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS (Tech) Circular (MAMID)/ 01 Dhanbad, dated : 06/05/2015

To

The Owner, Agent and Manager of all Mines

Subject : Accidents/incidences due to exposure to high atmospheric temperature.

Sir,

During peak summer every year, many incidences of mine-workers getting exposed to high atmospheric temperature get reported. Some such cases had turned into fatalities. Opencast mines during summer are most vulnerable in this regard. In some cases, persons got affected due to heat in underground mines also, where ventilation was inadequate. Inquiries revealed that in most of the cases "Heat Stroke" was the major contributory cause. Heat stroke generally occurs when the body stops adjusting to the hot temperature by sweating, and can't keep up with the heat. It is characterized by hot, dry, red skin that is warm or hot to touch and immediate medical attention is needed in such cases. The other heat related disorders could be,

Heat Exhaustion
Heat exhaustion is caused by loss of large amounts of fluid from the body. A worker with heat exhaustion continues to sweat, but their body can't keep up with the heat. The worker may have a headache, fatigue, or flu like symptoms. In most cases the worker needs to rest, cool down, and drink plenty of fluid.

Heat Cramps
Workers may suffer from cramps and painful muscle spasms. This happens when workers drink water to replace the fluids they lose from sweating, but don't replace the body's loss of salt. Drinking fluids with electrolyte replacement ingredients are recommended in such cases.

Heat Syncope
Heat syncope is a fainting episode or dizziness that usually occurs with prolonged standing or sudden rising from a sitting or lying position. Factors that may contribute to heat syncope include dehydration and lack of acclimatization.

Heat Rash
Heat rash is a skin irritation caused by excessive sweating during hot, humid weather.

Neurological Effects
Excessive heat may also lower mental alertness and ability to work. Workers in extreme environments may make more mistakes and may have more injuries.

Contributing Causes
Heat can increase the risk of suffering from other illnesses and health problems.

The following precautions will go a long way in overcoming such incidences/accidents,

1. Slowing down the pace of work should be allowed, especially if the worker feels even slight heat strain,

2. Rest areas should be located as near to the workplace as practicable,

3. Ensure that adequate quantity of cool water and electrolyte supplements are easily available,

4. In really hot conditions, workers should drink at least a glass of water every 15-20 minutes,

5. Different schedules may be negotiated to let workers do the hardest work during the coolest parts of the day,

6. Rest timings may be re-scheduled to avoid work during high/extremely hot temperatures. Where this is not possible, a two-person crew should be assigned to perform work during extremely hot temperatures,

7. Ensure that worker do not enter/work in an atmosphere having no ventilation or inadequate ventilation in underground mines,

8. Workers must be made aware of the dangers from excessive heat and humidity and remedial measures.

Yours faithfully,

(Rahul Guha) 6.5.15
Director General of Mines Safety

सत्यमेव जयते

2021
जनगणना से जन कल्याण

**भारतसरकार / Government of India**
**श्रमएवंरोजगारमंत्रालय / Ministry of Labour & Employment**
**खानसुरक्षामहानिदेशालय/Directorate General of Mines Safety**

No.DGMS(Legis.)(Exam) Circular No. **01** of 2021 Dhanbad, dated: 27th August 2021

To,

All concerned

**Subject**: Bye-Laws for Grant of Competency Certificate's under CMR, 2017 & MMR, 1961.

The bye-laws as to the conduct of the examination and as to the granting of certificates of competency, as required under sub-regulation (1) & (4) of Regulation 13 of Metalliferous mines Regulations, 1961, have been made by the Board of Mining Examination constituted under Regulation 11 of the Metalliferous Mines Regulations, 1961 and notified in Gazette of India vide Notification nos.: G.S.R.560(E), 561(E), 562(E), 563(E), 564(E), 565(E) & 566(E) dated 12th August, 2021 and Corrigendum notification vide No. G.S.R. 577(E) dated 17th August, 2021.

Similarly the bye-laws as to the conduct of the examination and as to the granting of certificates of competency, as required under sub-regulation (1) & (4) of Regulation 12 of the of the Coal Mines Regulation, 2017,have been made by the Board of Mining Examination constituted under Regulation 10 of Coal Mines Regulation, 2017 and notified in Gazette of India vide Notification Nos.: G.S.R. 910(E), 911(E), 912(E), 913(E), 914(E) & 915(E) dated 24th September, 2018 and amended by the Board and notified in Gazette of India vide Notification Nos.: 555(E), 556(E), 557(E), 558(E) & 559(E)dated 12th August, 2021.

Some of the salient points of the above notifications are as below:

1. The examination for grant of Manager's Certificate of Competency under the Coal Mines Regulation, 2017 & the Metalliferous Mines regulation, 1961 shall consist of Computer Based Test(CBT) only and there shall be no oral examination for these certificates.
2. The examinations for grant of Overman's, Foreman's, Surveyor's, Sirdar's, Mining Mate's, Blaster's and Gas Testing competency certificates shall consist of Computer Based Test (CBT) only and there shall be no oral examination for these Certificates.
   However, in case of Mining Mate's, Blaster's and Gas Testing competency Certificate Examinations, a literate person who does not possess senior secondary or Intermediate qualification and who is not familiar with use of computers, the option of examination by oral test has been provided.
3. For persons holding Degree orDiploma in Mining Engineering, the Gas Testing certificate of competency shall be granted on exemption basis and no test is required.

(Prabhat Kumar)
Chief Inspector of Mines &
Director General of Mines Safety

भारत सरकार/Government of India
श्रम एवं रोजगार मंत्रालय/Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

DGMS (Tech)(OH) Circular No.01 of 2021 Dhanbad, dated 06/08/ 2021.

To,

1. The Owners, Agents and Managers of all mines.
2. The Owners and Training Officer In-charge of First-Aid Training Institutes/ Centres

Subject: **Standards for conduct of First-Aid Training and issue of First-Aid Certificate.**

This is to bring to your notice that as required under sub-regulation (2) of Regulation 14 of the Coal Mines Regulations 2017, standard specified for the Institute /Training centres imparting First-Aid training and issuing First-Aid certificates has been published in Gazette of India, vide Notification No. G.S.R. 529(E) dated 4th August, 2021.

The Institute /Training centres imparting First-Aid training and issuing First-Aid certificates shall strictly comply with the standard specified in the Notification.

The Institute /Training centres may be inspected by the Chief Inspector of Mines or Inspector of Mines at any time to check the compliance with the standard, as specified in the said Notification.

06.08.2021

(Prabhat Kumar)
Chief Inspector of Mines &
Director General of Mines Safety

भारत सरकार / Government of India
श्रम एवं रोजगार मंत्रालय / Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

**DGMS (Approval) Circular No. 01 of 2020 Dhanbad dated 06 .11.2020**

**To**

**The Owner/Agent/Manager of Coal and Metalliferous Mines & OEM**

**Subject: Adoption of Standards for Man Riding Systems used in Mines.**

The Bureau of Indian Standard (BIS) had notified the following standards vide S.O. 3200 (E) dated 29 August 2019 published in Part II-Section 3-sub section (ii) of Extraordinary Gazette of Government of India dated 04 September 2019:

(i) IS 17241:2019 – Man Riding Car by Rope Haulage System for Transportation of persons in Mine and

(ii) IS 17242:2019 – Man Riding Chair Lift System for Transportation of Persons in Mines.

In the interest of Safety, Man Riding Car by Rope Haulage System and Man Riding Chair Lift System for transportation of persons shall be designed, constructed, installed, operated, maintained and tested in accordance with above referred standards and Guidelines, Circulars, Orders, etc issued from time to time by this Directorate.

Accordingly, Original Equipment Manufacturers (OEM) and Owner/Agent/Manager of every mine where the Man Riding Systems are used, are requested to ensure compliance with the Standards.

06.11.2020
(Prabhat Kumar)
Director General of Mines Safety (Off.)

भारत सरकार/Government of India
श्रम एवं रोजगार मंत्रालय/Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

No. DGMS(Tech) Circular No. 14 of 2020 Dhanbad dated : 24 /12/2020

To
The Owner, Agent and Manager
All Coal and Non-coal Mines

Subject: Precautions against premature blast of Site Mixed Emulsion (SME) / Site Mixed Slurry (SMS) explosive.

Recently, in a fatal accident, occurred in an opencast coal mine, four persons were fatally injured and three received serious injuries due to premature detonation of Site Mixed Emulsion (SME) explosive column during charging in large diameter hole, drilled in a boulder.

(A) The detail inquiry conducted to find out the cause and circumstances attending the accident revealed the following:

(i) Large diameter (150mm) holes, 0.7-1.0m in depth, were drilled in some boulders, measuring about 1.5m X 2.0m X 2.0m – 2.0m X 3.0m X 3.0m at an angle varying from about $40^0$-$45^0$ from horizontal for fragmenting.

(ii) The primer [cast booster (weighing 100 gms) and NONEL] could not go of its own at the bottom of holes, drilled in boulders.

(iii) The mouth/collar of hole in boulder, being charged with SME explosive, was situated at a height of about 1.5-1.7m from ground level. Seven work persons, who were charging the hole, had to hold the hose pipe, carrying SME, above their shoulder because of it's heavy weight. The process itself was very tedious; as such it was an unsafe practice.

(iv) The hazards associated with the handling and use of explosive including Site Mixed Emulsion (SME) explosive were not identified and their risk were not assessed and addressed in Safety Management Plan.

(v) No Standard Operating Procedure (SOP) for handling and use of explosive including Site Mixed Emulsion (SME) explosive was framed.

(vi) Training on handling and use of explosive including Site Mixed Emulsion (SME) explosive, was not imparted to persons employed in the mine for the purpose.

(B) Premature detonation of SME explosive column (non-cap sensitive explosive) was not possible without initiation of detonator of NONEL which was inserted into cast booster (altogether called primer). Thus sufficient shock, transmitted to primer, must have caused the explosive column (SME) to explode accidentally. One or combination of the following reasons must have created shock to NONEL to initiate the explosive column:

(i) The primer was placed at the mouth/collar of hole (1.0m in depth and inclined at $40^0$-$45^0$ from horizontal) drilled in boulder as it did not move inside the hole by its own weight (100gms) because of inclination of the hole. When SMS explosive was poured at a speed of about 2.5kgs/sec, explosive (SME) column alongwith primer collided at the back of hole at high speed. This impact might have created sufficient shock to the detonator and cast booster for initiation, thus exploding the whole explosive column.

(ii) During the process of manufacturing the non-electric (NONEL) detonators, there have been several incidents of tube initiation, both in our country and overseas, occurring when the tube has broken under tension. This tendency to SNAP, SLAP and SHOOT has also been experienced in the field as well.

In an incident, a work person was attempting to remove a signal tube (NONEL) detonator from a hole when it got jammed. The worker pulled hard on the tubing, causing it to break. As the tube broke, the work persons noticed a spark at the hole collar and the detonator fired in the hole. Fortunately the bulk of the explosive had already been removed from the hole and the worker was not seriously injured.

In this particular case, there might have been undue tension in NONEL shock tube causing its breakage and created a SNAP, SLAP and SHOOT situation which ultimately caused unintended initiation of the shock tube resulting explosion of the explosive column.

(iii) The Mercury Fluminate (highly sensitive) is sometime used instead of Lead Azide (less sensitive) to manufacture NONEL shock tube to cut cost (Mercury Fluminate is cheaper than that of Lead Azide). In such case, there might have been chance of accidental detonation due to small shock as well which might had been received due to the above mentioned reasons.

(C) In order to avoid recurrence of such incidence in future, all concern are requested to take following precautions,

(i) Fragmentation of boulders by blasting shall be avoided. Rock breaker or other similar device shall be used for breaking the boulder. If it is, at all necessary to carry out blasting in boulder, large diameter holes shall not be drilled in it for the purpose. Instead, in such cases small diameter (32mm) holes shall be drilled and blasted by small diameter explosive cartridges in small quantity.

(ii) Simultaneous blasting of charged holes in benched and that in boulders shall not be done.

(iii) Standard Operating Procedure (SOP) for handling and use of explosives including SME explosive shall be framed on the basis of assessed risk.

(iv) The amount of electrostatic charge generated and stored in conductive shoes & nylon socks, synthetic clothes etc. are unknown. If sufficient amount of electrostatic charge is stored, it may also cause premature initiation due to sudden release charge and causing spark. Thus the persons engaged in charging/stemming operation shall be refrain from wearing such conductive shoes/clothing/socks etc. during the said operations.

(v) The inclination of deep hole to be drilled (whenever necessary to do so) shall be such that the primer (detonator in NONEL inserted into cast booster) could be lowered at the bottom of hole easily with gravity.

(vi) Drilling and charging operations shall not be done simultaneously in a place. Before charging operations, the area shall be fenced. No heavy earth moving machinery shall be deployed in the area till blasting is completed and area is declared safe by an official of the mine.

(vii) The main composition of NONEL shock tube shall be verified from the manufacturer. If required, necessary testing shall be done from an authorized laboratory for the purpose. In no case the shock tube containing highly sensitive explosive (like Mercury Fluminate) shall be used for blasting.

(viii) All initiating devices like shock tube detonators shall be used on 'first in first out' basis. Older the material, greater the risk in usage. All the shock tube detonators must be carefully examined for any physical damage and spillage of powders outside the metallic shells.

(ix) In no case, the primer shall be placed in collar/mouth of deep hole and pushed it in the bottom of the hole alongwith SME/SMS explosive column. Rather the primer shall be gentle lowered by gravity at the bottom of hole. When it is ensured that the primer reached at bottom of hole, the charging of SME/SMS shall be started.

(x) Minimum number of persons shall be employed for charging and stemming of deep holes. The unsafe practice of holding the hose pipe, carrying SME/SMS explosive, above ground level by persons engaged in charging shall be eliminated.

(xi) If the weather condition before and during blasting operation is such as to cause thundering and lightening, the blasting operations shall be immediately suspended and precautions suggested through DGMS Circular No. 10 of 2020 dated 23.06.2020 shall be followed.

(xii) While conducting blasting in fire area/hot strata, the precautions mentioned in DGMS Circular (Tech) No. 2 of 1985 and No. 2 of 1990 shall be taken.

(xiii) Drilling in misfire shots may be another reason for accidental detonation. In order to eliminate such incidence, the guidelines mentioned in DGMS Circular (Tech) No. 2 of 1983 and No. 10 of 2001 shall be followed in addition to the statute provided for the purpose.

(xiv) All other guidelines on blasting operation, issued by DGMS from time to time in the form of circular, shall be followed.

I am sure that observance of the aforementioned precautions shall go a long way in preventing recurrence of such incidence in future.

24.12.2020

(प्रभात कुमार)
खान सुरक्षा महानिदेशक एवं
मुख्य खान निरीक्षक

सत्यमेव जयते

भारत सरकार / Government of India

श्रम एवं रोजगार मंत्रालय / Ministry of Labour & Employment

खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

2021 जनगणना से जन कल्याण

DGMS(Tech) (OH) Circular No. 13 of 2020 Dhanbad, dated the 16th October 2020

To
The Owners, Agents and Manager of all Metalliferous Mines,

Subject: Issue of medical certificate of fitness under the provision of Regulation 31 of the Metalliferous Mines Regulations 1961.

After nationwide lockdown due to unprecedented COVID-19 pandemic, the 5th phase of unlock period has started. In the unlocking phase most of the activities, barring few, have resumed.

Thus, the guideline issued under the provision of Regulation 31 of Metalliferous Mines Regulations 1961 vide DGMS (Tech) (OH) Circular No. 09 of 2020 dated 22.06.2020 for conducting medical examinations and granting medical certificates of fitness to persons above 60 years of age during the period of COVID-19 pandemic has become redundant.

In view of above, DGMS (Tech) (OH) Circular No. 09 of 2020 dated 22.06.2020 is hereby withdrawn.

16.10.2020
(Prabhat Kumar)
Chief Inspector of Mines,
DGMS, Dhanbad

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भारत सरकार
Government of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS (Tech) Circular No.12 (Revised) of 2020 Dhanbad, dated: 10.08.2020

To,
The Owner, Agent and Manager of all mines.

Sub: Online submission of intimation of accident and notices of accident & dangerous occurrence through software module hosted on DGMS website – **CORRIGENDUM**.

Sir,

This is to inform you all that the software for online intimation of the accident and dangerous occurrence by mine management has now been enabled and made operative through the official website of the Directorate General of Mines Safety. The software can be accessed through the link http://www.dgms.gov.in or http://accident-statistics.dgms.gov.in

This software module has been enabled to make the system of sending the information of the accident and dangerous occurrence in real time and transparent. First information of reportable/minor, serious, fatal accident and dangerous occurrence; Notices of accident in Form IVA, IVB & IVC or Form 4-A, 4-B & 4-C as the case may be, shall be sent online to this Directorate. Hard copies of the notices of accident shall be sent to the other authorities concerned in the prescribed form.

In this regard, you are requested to login to the above said web page through your already existing ID (Login credentials) and unregistered mine users shall register for the log-in credentials, and start reporting online from 01.08.2020 onwards. The step by step guide may be referred to understand the system of online submission and this can be accessed through the path dgms.gov.in website ⇨ onlinetools ⇨ external login accident management on DGMS website.

All mine management are henceforth requested to send intimation of accident and notices of accident and dangerous occurrence online through the above system. The jurisdictional regional offices may be contacted for further clarification.

Yours faithfully,

10/08/2020

(DK Sahu)
Director General of Mines Safety (Officiating)

सत्यमेव जयते

भारत सरकार

Government of India

श्रम एवं रोजगार मंत्रालय

Ministry of Labour & Employment

खान सुरक्षा महानिदेशालय

Directorate General of Mines Safety

No. DGMS (Tech) Circular No. 11 of 2020 Dhanbad, dated : 15/07/2020

To,
The Owner, Agent and Manager of all mines.

Sub: Online submission of annual return through software module hosted on DGMS web site – Reg.

Sir,

This is to inform you all that the software for online filing of annual return by mines has now been enabled and made operative through the official web site of the Directorate General of Mines Safety. The software can be accessed through the link https"//www.dgms.gov.in or http://accident-statistics.dgms.gov.in

This software module and system has been enabled to ease the system of filing online returns, tracking of the status report and generation of database.

In this regard, you are requested to log in to the above said web page through your already existing ID (Login credentials) and unregistered mines shall register for the log-in credentials. The step by step guide may be referred to understand the system of online filing and this can be accessed through the path dgms.gov.in website ⇨ onlinetools ⇨ external login statistics management on DGMS website.

All mine management are requested to file the online annual return on the system for the year 2019 onwards and retrospectively for the years 2015 to 2018 for generation of database. They are further requested to submit the annual returns retrospectively from the year 2015 onwards.

In case clarity on any of the issue is required, the jurisdictional regional offices may be contacted.

Yours faithfully,

15/07/2020

(DK Sahu)
Director General of Mines Safety (Officiating)

सत्यमेव जयते

भारत सरकार/Government of India
श्रम एंव रोजगार मंत्रालय/Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

DGMS (Tech) Circular No.10 of 2020 Dhanbad, dated: 23 / 06/2020

To,
Owners/Agents/Managers of all mines

**Subject:** Protection against lightning in mines-Reg.

1.0 Of late, it is observed that there have been spurts in incidents related to lightning in the mines as a number of persons and installations got hit by the lightning in direct or indirect manner, endangering their safety in the process. Following measures are suggested herewith to be followed in mines as to prevent occurrence of incidents related to lightning:

2.0 In case of every mine, the Lightning risk assessment study shall be carried out with an emphasis to calculate Expected number of lightning flashes per square kilometre per year as elaborated in IS-2309 or IS/IEC-62305. It is instructed that the mine shall mandatorily be equipped with adequate lightning protection in the event of measure of **Exposure risk** i.e. **Expected number of lightning flashes per square kilometre per year** coming in excess of $10^{-5}$ ( 1 in 100,000 ).

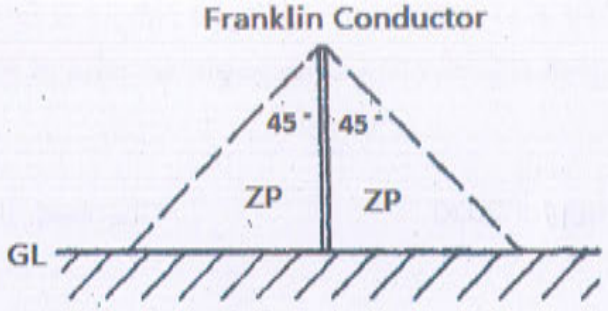
3.0 Even if the calculation of **Exposure risk** is in moderation of $10^{-5}$ (1 in 100,000), the adequate lightning protection shall be provided in the following areas of mine in the interest of safety:

a) Where large numbers of people congregate;
b) Where the blasting operations are carried out.
c) Where the explosives are stored;
d) Where the overhead lines passing through the mine periphery;
e) Where the pumping installations are there which necessitate the continuous presence of an operator or maintenance crew at the site;
f) At the top of OB dump yard, which are more vulnerable and liable to attract lightning with likelihood of injuring the persons employed there.

23/06/2020

4.0 Depending upon the type of application, following lightning protection systems (LPS) shall be provided as a safeguard against lightning:

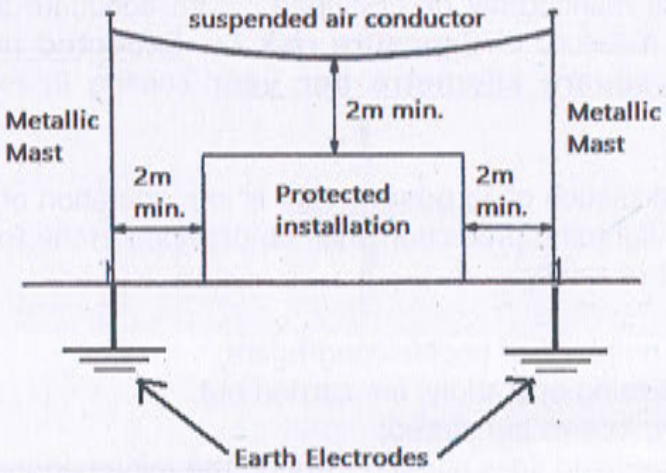
4.1 **Conventional air terminal (Franklin Rod/conductor):** This shall be provided in the manner that the site to be protected shall be within **45°** of Zone of Protection (i.e. ZP) in the manner as depicted below:




4.1.1 The ZP shall be further reduced to **30°** for important places, where dangers associated with lightning are more or which require fool-proof lightning protections.

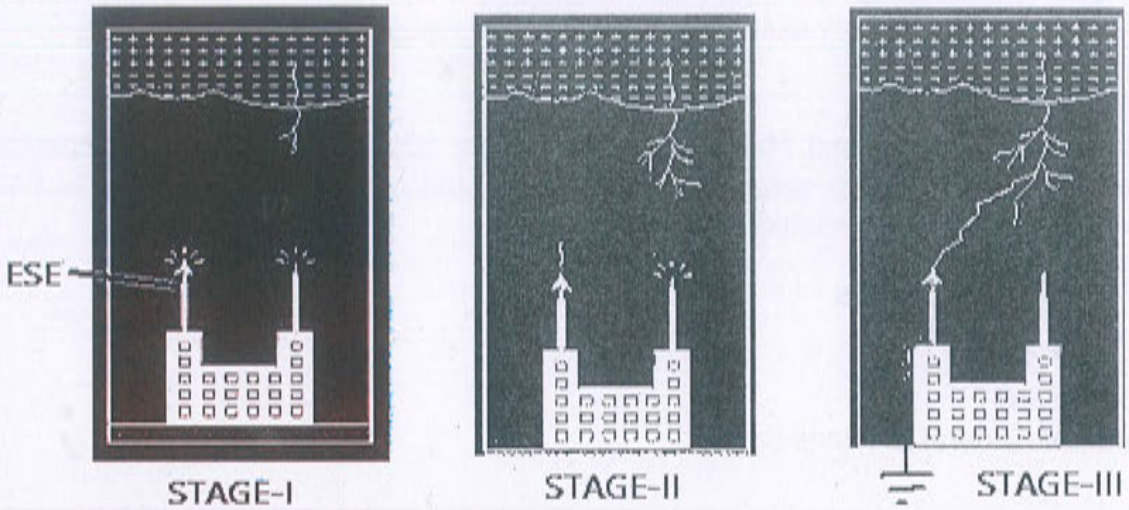
4.1.2 The Franklin or lightning conductor shall be so installed as to cover the places like blasting site, places of people congregation, etc in respective Zone of Protection (ZP).

4.2 **MESHED CONDUCTOR NETWORK or Faraday's Cage:** By providing Electrostatic shielding using metallic wires in criss-crossed manner and grounding the same minimum at two independent places in the manner as shown below. The installations to be protected include outdoor of a sub-station i.e. switchyard, explosive room, etc.




25/06/2020

4.3 **IONIZING AIR TERMINAL or EARLY STREAMER EMISSION (ESE):** ESE system functions by generating an upward ladder through the respective air terminal as to meet the downward leader progressing downward from the cloud at a certain speed as to preferentially strike the lightning to the relevant point as demonstrated below:




4.3.1 The design and specifications of ESE system to be installed shall be in accordance with the relevant Indian/international standard and should be tested in an NABL or internationally recognized laboratory as a prerequisite prior to its use.

4.4 The provisions as mentioned in IEC 62305-3 shall be followed with regard to protection of various installations of oil mines against lightning.

4.5 The records related to lightning survey and maintenance shall be properly maintained.

4.6 This circular is not exhaustive and provisions of relevant standards shall be followed depending upon the merit of the case.

5.0 All the remedial measures as elaborated above won't deliver the desired outcome if the lightning pulse so collected is not discharged safely to earth through efficient type of grounding system. Following points with regard to earthing systems being used in conjunction with LPS shall be followed scrupulously:

5.1 The earthing system used in conjunction with LPS shall be in accordance with IS-3043 and be designed in such a manner as to prevent the risks of conduction, Induction and Feedback while discharging the lightning strike to earth.

23/06/2020

5.2 The earthing system being used with lightning protection system (LPS) shall be independent from existing grounding system.

5.3 The magnitude of earth pit resistance (collective) shall be within 2Ω or as mentioned in relevant standards as to keep the hazards associated with step and touch potentials within safe limits.

5.4 The remote earthing shall be adopted if the local grounding conditions are not favorable as observed in locations like OB dump yard, quarry, etc.

All Owners, Agents and Managers of mines are advised to ensure compliance of the above guidelines as to safeguard the persons and machineries deployed in the mines from the hazards associated with lightning strike.

23/06/2020

(D K Sahu)
Director General of Mines Safety

सत्यमेव जयते

भारत सरकार
Government of India
श्रम एंव रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS (Tech) Circular (MAMID)/ 08 Dhanbad, dated 29/04/2020

To,

The Owner, Agent and Manager of all Mines

**Subject: Recommendations of 12th National Conference on Safety in Mines held on 28th & 29th January, 2020 at New Delhi.**

You are aware that the 12th National Conference on Safety in Mines was held on 28th & 29th January, 2020 at New Delhi. Besides reviewing the status of implementation of the recommendations of 11th National Conference on Safety in Mines, the Conference deliberated upon and made valuable recommendations on the following subjects:

1. Electrical safety – Recent trends, Strategy for improvement.
2. Role of information technology in mining sector.
3. Prevalence of pneumoconiosis/silicosis amongst workers, present status of dust control measures and strategy for improvement.
4. Strategies for disaster prevention in coal mines.
5. Occupational safety and health issues of contractual workers- Strategy to improve safety and health status.

The recommendations of the Conference as enclosed, as annexure are hereby being brought to your attention for information and necessary action.

24/04/2020

Director General of Mines Safety (Officiating) and
Chief Inspector of Mines,
DGMS, Dhanbad.

Annexure to DGMS (Tech) Circular (MAMID)/ 08 Dhanbad, dated 29/04/2020

# Recommendations of 12th National Conference on Safety in Mines held on 28th & 29th January, 2020, at New Delhi.

## 1.0 REVIEW OF STATUS OF IMPLEMENTATION OF RECOMMENDATIONS OF 11TH NATIONAL CONFERENCE OF SAFETY IN MINES HELD ON 4TH AND 5TH JULY 2013.

1.1.1 Indigenous manufacturers should be encouraged to manufacture necessary safety related equipment's.

1.1.2 In specified underground mines where long or arduous travel is involved, arrangement for transport of men should be made with a target of 20 % every year.

1.1.3 In respect of small-mechanized mines, which are operating in NON-COAL sector, it may not be feasible for a small organization to create a special department on Occupational Health Services. For such small mines, it is suggested that an Association of small mines operators creates common facilities and infrastructure for occupational health services. Creation of such facilities is specially needed for asbestos, manganese and mica mines.

1.1.4 Development of a portable instrument for detecting hidden slips in roof of COAL mines should be taken up on priority by R&D organizations. The instrument should be developed by S&T project which should be guided by a committee consisting of an officer from DGMS and others from COAL Industry and Research Organizations.

1.1.5 In case of smaller mines, such arrangement may be made by association of mine operators.

1.1.6 Considering the risk of fire, all COAL mine companies shall rank its COAL mines on a uniform scale according to its risk from fire on scientific basis. Guidelines may be framed by DGMS and circulated to all mining companies.

1.2 Safety issues in mines of un-organized sector

1.2.1 In case of stone quarries on hillocks, whole of the hillock should be given out as a single lease so that necessary development could be done from top downwards after making approach road to reach to top of the hillock before starting extraction of stone/removal of overburden. A condition to this effect may be incorporated before granting such leases.

1.2.2 In the lease document, reference should be made to the Mines Act and the Rules and Regulations made there under for compliance. The DGMS may prepare, in consultation with Ministry of Mines a model document for grant of leases by the State Government so that the conditions of leases are such that there is a uniformity and compliance with central laws.

1.2.3 A copy of the lease document should be sent to the DGMS and the lessees explicitly be asked to send notice of opening of the mine to DGMS in accordance with the Provisions of the Mines Act.

1.2.4 The Conference has noted that there have been instances in some States where leases have been granted in close proximity of inhabited area and within 45 m. of Railway acquired land and land acquired for National and State highways, public works without consulting the appropriate statutory authority. The conference recommends that the States may grant mining leases in conformity of Central Laws.

1.2.5 DGMS should organize Orientation Programs for officers of State Mines and Geology Departments to inform them about safety laws.



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1.3 Occupational Health surveillance and Notified Diseases

1.3.1 Ergonomical assessment of all latest machines, before their introduction into mining operation as per ISO standards. Ergonomical assessment should include:

* Assessment of work process.
* Assessment of working Aids/tools
* Assessment of working posture.

1.3.2 For smaller mines where PME facilities are not existing, medical examinations can be done through other competent agencies.

1.4 Mechanization with view to phase out manual loading etc.

1.4.1 Possibility of deployment of multi-skilled miners in the green roof/hazardous areas shall be explored to reduce the exposure at hazardous areas without affecting employment.

1.5 Below ground communication and tracking system

1.5.1 Mining companies in collaboration with research institutions/equipment manufacturers shall initiate and fund for, suitable research initiatives for establishment of appropriate communication system for below ground mines including to locate the trapped miners.

1.5.2 Mine management in collaboration with equipment manufacturers shall evolve a system of proximity warning device in HEMM and initiate measures for its implementation.

1.6 Implementation of ILO convention No. 176 in Mines

1.6.1 The committee decided that a separate discussion be held by the Govt. of India in a tripartite forum to deliberate on the implications arising out of ILO Convention No. 176.

1.7 Small Scale Mining

1.7.1 The concerned authority in State Government may grant prospecting lease/mining lease/ mining right after ascertaining technical feasibility of mineral extraction in pursuance of provisions of the mining law, so that the lessee can make medium to long-term plan for investment in infrastructure and work the mines in a safe and scientific manner. While conducting of mining operations, it should be ensured that the Central Laws, including the Mines Act are complied with.

1.7.2 The State Governments may explore the feasibility of demarcation of mining zones to avoid problems of growing habitation encroaching into the mining area, thereby creating unsafe and unhealthy conditions. However, the State Government may take efforts to relocate the habitation already existing near mining zones.

1.7.3 The lease granting authority of State Government may assign a unique identification number, which will serve as a common reference for all central and state authorities responsible for administration of central and state laws.
The details of lease may be displayed in a board of permanent nature in a prominent place in the lease hold area showing following:

a. Name of lessee and postal address:
b. Lease number:
c. Period of lease:
d. Unique identification number:

1.7.4 The lease granting authority of State Government may insert a clause in the lease document requiring the lessee to submit a notice of

(i) commencement of any mining operation, and
(ii) appointment of a manager, prescribed under the Mines Act, 1952 and Rules and Regulations framed there under.

1.7.5 The concerned authorities of State Government may be requested to explore the possibility of introducing a course in Mining at Industrial Training Institutes in consultation with DGMS to augment the requirement of Mining Mates.

1.7.6 Orientation Programs may be organized for officers of State Mine and Geology Departments on OSH Laws.

1.7.7 Organized mines of public and private sector may consider extending their facilities in Vocational Training, Occupational Health Surveillance and other Safety Awareness Programs for workers engaged in small scale mining sector.

1.7.8 As a promotional initiative, social dialogue and deliberations at appropriate level may be initiated to facilitate formation of Cooperative Society/Mine Owners Association to tackle issues of resource and logistics management essential for safe and healthy mining.

1.7.9 The Conference appreciates the efforts made by Ministry of Labour and Employment and Directorate General of Mines Safety for encouraging and adopting innovative means to create awareness about OSH issues and improving compliance in small scale mining sector with public private interventions. It is recommended to continue with such initiatives vigorously and in enhanced manner.

1.7.10 The concerned authorities may explore possibilities of setting up of Mine Workers Welfare Boards for minerals like sandstone, marble and granite.

1.8 Safety, Health and Welfare of Contractual Workers.

1.8.1 Central Government should take steps against non-compliance of the Recommendations of the National Safety Conferences.

1.9 Surface and Underground Transportation Machinery:

1.9.1 MACHINERY FOR SURFACE OR OPENCAST OPERATIONS

1.9.1.1 Safety Features in HEMM : GPS-GSM Based Navigation System
The GPS-GSM based vehicle navigation system shall be used in large mines in a phased manner.

1.9.1.2 Skill Development and Training: General Skill Development programme should be undertaken for training of operators and all other associated staffs using state of the art technique including simulation and 3D Virtual Reality system.

1.9.1.3 Protection against Fatigue: Long or Extended Hours of driving beyond 8 continuous hours with a rest interval of half an hour after four hours of continuous operation, shall not be permitted, for which biometric system of check-in & check-out system of attendance associated with suitable software shall be introduced in the mine.

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1.9.2 TRANSPORTATION MACHINERY IN UNDERGROUND:

1.9.2.1 All steam winders should be replaced with electric winders in phased manner within a period of five years.
OR
Alternate access to the mine in the form of Inclines or Shafts may be considered and implemented within the same period.

1.9.2.2 Safety Features in Winding: Detailed survey of all winding installations which completed 20 years shall be carried out by a committee of experts and its recommendations shall be implemented.

## 2.0 ELECTRICAL SAFETY – RECENT TRENDS, STRATEGY FOR IMPROVEMENT

2.1 Shutdown procedures with lock out and tag out system with a provision of multiple lock, displaying the person's name, designation and photo shall be implemented. When any switchgear cannot be locked out, the same shall be modified or replaced to make it capable of being locked.

2.2 Specific category wise training shall be imparted to all electrical personnel whenever- a new electrical machinery/apparatus is introduced, change in jurisdiction of job/Profile, change in the working voltage and Change in working place (Below Ground / opencast/surface installation), etc.

2.3 The contractor engaged for any electrical installation, maintenance, repairs, etc., should possess a valid electrical contractor license issued by the state licensing board and engage adequate number of competent Electrical personnel. It shall be included in Terms and conditions of contract agreement / NIT (Notice Inviting Tender) and shall be ensured by the principal employer.

## 3.0 ROLE OF INFORMATION TECHNOLOGY IN MINING SECTOR

3.1.0 At every working mine, the Owner shall ensure the following in respect of employment of persons.

3.1.1 Details of every Initial/Periodical Medical Examinations conducted and Initial/ Refresher Vocational training provided to persons employed in mine(s) are uploaded onto an appropriately designed Digital platform on a non-editable mode and also linked to the individual's 'Aadhaar number' so as to be amenable for quick retrieval and for portability wherever required.

3.1.2 The register of employees in Form-A are maintained in Digital form, along with Digital linkage to details in non-editable form of Initial/Periodical Medical Examinations conducted, Initial/Refresher Vocational training provided and individual's 'Aadhaar number' for every entry made therein.

3.1.3 'Biometric Attendance system' for the purpose of booking attendance of all persons employed in the mine(s) is provided at locations as may be fixed by the Manager in writing to ensure that only those persons with entry in the Digitized Form-A register of employment as mentioned above can book attendance to gain entry into the mine(s). Entries made in the Biometric Attendance system' shall be retained permanently and shall be easily amenable for quick retrieval when required. Wherever possible 'Aadhaar number based Biometric Attendance system' shall be implemented for booking attendance.

3.1.4 For on the spot easy identification while working in a mine, every person employed is issued smart Digital tokens containing his/her complete Form-A Register entry.

3.2.0 At every mine with deployed machinery including electrical machinery, the Owner shall ensure the following in respect of deployment and operation of machinery in the mine.

3.2.1 Every deployed machinery shall be identified by a unique and mine specific 'Machinery Reference Number (MRN)'. All technical details of such machinery shall be made available on a customized Digital platform for easy retrieval when required.

3.2.2 Every deployed machinery is accompanied by a Digitally generated pre-deployment fitness certification duly signed by the concerned mine official.

3.2.3 Excepting in case of any emergency or other such situations to be recorded in writing by the Manager, no machinery without a valid MRN shall be deployed in the mine.

3.2.4 In respect of operation of such machinery, a comprehensive Digitized system shall be developed for

3.2.4.1 making available the details of actual deployment to the shift officials within 15 minutes of the commencement of the shift working hours;

3.2.4.2 initial examination of such machinery by the engaged operator as per check-lists formulated in accordance with various DGMS guidelines, OEM stipulations, etc., and entering the findings through Digital kiosks/tools;

3.2.4.3 dissemination of the report of such initial examination to all concerned officials as may be decided by the Manager for ascertaining safe operating conditions of the machinery;

3.2.4.4 regular maintenance at stipulated intervals as per OEM stipulations/other guidelines and entering of records thereof in the Digital history sheet of the machinery and

3.2.4.5 making all information Digitally available to all concerned mine officials.

3.2.5 A system of Digital tracking of all transportation machinery while in operation within the mine boundary shall be deployed.

3.3.0 At every mine, the owner shall arrange to develop and implement a comprehensive digital system in respect of,

3.3.1 reporting by the engaged machine operators, technicians, supervisors and statutory officials in non-editable form so as to be amenable for immediate scrutiny by concerned persons at multiple levels in the management hierarchy;

3.3.2 recording various statutory and non-statutory monitoring activities pertaining to mine environment including that of sealed-off areas in belowground mines, ground movements, condition of operating machinery, etc., so as to be instantaneously available for multi-level scrutiny, supervision and analysis,

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3.3.3 statutory mine plans, sections, records, returns, registers, etc., in such a manner that they are always kept updated and available for scrutiny/examination at multiple levels in non-editable form,

3.3.4 all purchase/procurement activities at the mine which could have adverse impact on safety due to any delay, and

3.3.5 availability of mines rescue equipments, trained manpower, etc., so as to ensure instantaneous mobilization for effective management of mine accidents/disasters.

3.4.0 Every State/Central Government/Authority vested with the responsibility of issue of mining/quarrying lease shall formulate a comprehensive Digital policy which will allow

3.4.1 availability of details of all active and valid mining/quarrying leases including the GIS (Geographic Information System) coordinates of all points of the lease demarcated by the State Authority on a common web-based platform for easy access / sharing amongst stake holders,

3.4.2 for sharing of all information on production, employment, etc., and contact details of lease holder amongst all stake holders and

3.4.3 archival at District level of booked Digital attendance through Biometric system in mines for being easily accessed.

3.5.0 Wherever there exists poor network connectivity, standalone systems shall be continued till network connectivity issue is resolved.

## 4.0 PREVALENCE OF PNEUMOCONIOSIS/SILICOSIS AMONGST WORKERS, PRESENT STATUS OF DUST CONTROL MEASURES AND STRATEGY FOR IMPROVEMENT

4.1 Permissible respirable dust levels be brought down to 1.0 mg/m3 (In case percentage of free Silica in Mines is up to 5) or 5 divided by percentage of free Silica in Dust, from the present level, in the line of prescribed limits of National Institute for Occupational Safety and Health (NIOSH), USA.

4.2 For early detection of Silicosis amongst Miners of Stone quarries, Medical examination should be conducted at least once in every year and Chest Radiography once in every two years.

4.3 All mining companies shall have the services of at least one Doctor qualified in OH and trained in ILO classification of chest radiographs. DGMS may facilitate necessary training, if needed.

4.4 In order to establish a close employer-employee relationship, Mine owners should try to keep the contractual workers on permanent basis as far as practicable, and not to change the workforce frequently. Their details shall be maintained in form A (Register of Employees) and they should be provided with all the benefits due to them, statutorily and otherwise.

4.5 State Government shall create facilities like Chest Radiography (X-ray machine 300 mA or more), Spirometry, Audiometry, Blood Biochemistry etc. at Primary/Community Health Centres and also get their Doctors trained in OH and ILO Classification of Chest Radiograph, if necessary with the funds available under District Mineral Fund (DMF).

4.6 There shall be at least one referral occupational health centre established in every state, for confirmation and tertiary care of Pneumoconiosis cases.

4.7 For getting further insight into various other occupational lung diseases due to dust, Diesel Particulate Matter, etc. appropriate scientific agencies may be engaged.

4.8 To create awareness amongst the workers about the dust related disease, mine management shall conduct structured training and awareness programmes at regular intervals.

4.9 Every mine owner shall submit a quarterly return relating to measures taken to prevent generation of respirable dust at all work places in the mine.

## 5.0 STRATEGIES FOR DISASTER PREVENTION IN COAL MINES

5.1 The Safety Management Plan (SMP) of every mine shall give adequate priority on developing the Principal Hazard Management Plan (PHMP) based on Risk Assessment and shall provide suitable organizational structure with adequate resources for reducing the risk level as low as reasonably achievable. It shall also be ensured by the owner, agent and manager of every mine that mitigation of such identified principal hazards on an auditable mode is done in accordance with DGMS (Technical) Circular No 3 of 2019dated 23.12.2019.

5.2 The Safety Management Plan (SMP) of every mine shall include specific guidelines for emergency withdrawal and re-entry protocol based on Triggered Action Response Plan (TARP) for all principal hazards having potential to cause multiple fatalities.

5.3 The owner, agent and manager of every mine shall encourage their employees to report and record all cases of near-misses/incidences, not resulting in any injury or loss of property but having the potential to cause serious harm to person(s) or property in the mine. It shall also be ensured by the owner, agent and manager that:-

5.3.1 all near-misses or incidences are properly enquired by an official of the mine who shall also make appropriate recommendations for preventing recurrence,

5.3.2 such recommendations are circulated by appropriate mechanisms including digital/electronic mode, to every other mine of the same owner and also amongst other mines of other owners, to create awareness and for designing suitable preventive strategies, and

5.3.3 a properly structured accident/incident management system is evolved under the Safety Management Plan with the basic objective of preventing recurrence of similar such incidences in mines.

5.4 The owner, agent and manager of every mine shall ensure that

5.4.1 all immediate steps as may be required after an accident in a mine, including first response like rescue, recovery and medical aid, containment of further escalation or worsening of hazardous conditions and quarantining the place of accident, are carried out,

5.4.2 every case of accident/incident including near-miss is enquired into for finding out root cause(s) using suitable 'root cause analysis techniques',

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5.4.3 appropriate corrective actions are suggested using the principle of hierarchy of controls (elimination / substitution / engineering / separation / administrative/ PPE) in respect of all root causes identified through root cause analysis technique, and

5.4.4 specific, measurable, accountable, reasonable, timely (SMART) and effective recommendations are made for implementation and necessary follow-up thereof.

5.5 The manager of every mine shall ensure that all pre-warning signals are thoroughly investigated with an aim to find out subsequent consequence(s) by adopting the culture of risk assessment with commitment and leadership of the top management. The prevailing risk shall be mitigated by using the principle of hierarchy of controls.

5.6 It shall be ensured by the owner, agent and manager of every opencast mine that adequate arrangements exist for dealing with such kinds of emergencies as may be arising at the mine. They shall also establish and maintain a close liaison with agencies like NDRF, SDRF or similar agencies for effectively managing such emergencies. It shall also be ensured that joint exercises are conducted at regular intervals with such agencies so as to ensure the preparedness to deal with actual cases of emergencies.

## 6.0 OCCUPATIONAL SAFETY AND HEALTH ISSUES OF CONTRACTUAL WORKERS- STRATEGY TO IMPROVE SAFETY AND HEALTH STATUS

6.1 Any worker or official, while on duty in active zone of a mine (where any mining operations are being carried out) shall not carry mobile phone. Every mine shall have provision of safe keep storage of mobile phone at suitable place(s). In emergent situation the manager may allow any person or a category of persons to carry mobile phone in such zone.

6.2 The contractor workers shall be provided with proper residential facilities outside active zone of the mine. For the purpose, wherever feasible, the principal employer shall, either construct suitable accommodation facilities for the contractual workers or provide a suitable land/site to the contractor to build the residential facilities with all basic amenities. On completion of the contract, the contractor shall hand over the land/site to the principal employer.

6.3 The manager of every opencast mine shall frame and implement Standard Operating Procedures (SOP) in respect of regulating vehicle deployment density on the basis of appropriate Risk Assessment procedure.

6.4 No person shall be engaged in any job in a mine unless his skill has been assessed by the management through a well-defined process.

6.5 Modern gadgets and equipment e.g. training videos, simulators, virtual reality (VR) etc. shall be used for skilling and up skilling of existing and newly appointed contractual employees.

24/04/2020

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भारत सरकार / Government of India
श्रम एवं रोजगार मंत्रालय / Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

**DGMS Technical Circular No. 07 of 2020**

To

The Owner, Agent, Manager of Mines Coal/Metalliferous Mines.

**Sub: Safe conduct of operation at railway sidings of the Mines.**

In the recent past, electrical accidents have been reported in railway siding of the mines due to live overhead electric traction line. The inquiry in to such accidents revealed that there is no process of permit to work being followed between the Railway authority and the mine management. The personnel engaged in loading and sample collection work are exposed to the vicinity of the traction line on the basis of assumption of shut down of traction line and accidents occurred due to inadvertent charging of the same. The matter was widely discussed and deliberated upon with various stake holders and accordingly, the following precautionary measures are recommended.

1. For loading operation of empty railway wagons after rake placement, sampling or any work in the vicinity of 25KV Traction line (overhead line), Mine authority shall take a written "Permit to Work" from Railway Authority and also the controlling isolator shall be locked so that it can't be operated by any unauthorized person.

2. Mine Management shall issue a permit to work to the authorized person of the concerned Agency for conducting any work in the vicinity of traction line and rake.

3. After completion of all the operations, obtaining return permit from the concerned Agency and ensuring removal of men and material away from the rake , the Mine Management shall return the permit along with completion memo to the concerned Railway Authorities and controlling isolator shall be unlocked.

Therefore, all Owner, Agent, Manager of Mines where railway siding is in operation, are requested to ensure strict implementation of the aforesaid recommendations.

28/2/2020

(R. Subramanian)
Director General Of Mine Safety(officiating)
Chief Inspector of Mines.

भारत सरकार / Government of India
श्रम एवं रोजगार मंत्रालय / Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

**No. DGMS (Tech) Circular No. 06 of 2020 Dhanbad dated 27 .02.2020**

**To**

**The Owner/Agent/Manager of Coal and Metalliferous Mines & OEM**

**Subject: Minimum Design requirements for various Safety Features to be incorporated for use in Heavy Earth Moving Machinery (HEMM) & Heavy/Light vehicles in Open Cast Mines.**

1. With increasing dependence on opencast mines for all the production demands in the Coal and Metalliferous sector, there has been a steep rise in the population of HEMMs and heavy/light vehicles in mines, distributed between both departmental and contractual components. The recent statistics on alarming rise in cases of incidences/accidents in opencast mines singularly point to the basic cause as intricately connected to such deployment in mines. Though, several statutory provisions have already been made under the Coal Mines Regulations, 2017 and the Metalliferous Mines Regulations, 1961, and various statutory permissions issued thereunder apart from DGMS Circulars having been issued from time to time, the issue of their safe operations with particular reference to provisioning and satisfactory operation of various safety features, continues to be a major cause of concern to all.

2. Inspections by officers of this Directorate in the recent past have revealed highly unacceptable levels of compliance in mines, with mere provisioning of such safety features gaining the upper hand rather than effective and sustained functionality. Even on provisioning, it has been observed that there are wide variations on design aspects, with availability of multiple but unverified types/models, mostly without adherence to any acceptable Indian/International standards wherever are available already. In nut shell, the very purpose of provisioning and effective functioning of such safety features with HEMMs deployed in opencast mines, appears to be largely defeated as could be appreciated by the alarming rising trends of connected incidences/accidents.

3. Therefore, with a view to harmonizing the entire gamut of safety features to be provided with any HEMM and heavy/light vehicles for deployment in an opencast mine, in respect of the minimum required design/functionality, a one day technical workshop was organized at DGMS(HQ) on the occasion of the 119$^{th}$ Foundation Day Celebrations on the 7$^{th}$ of January, 2020 in which, a total of 260 senior level representatives from coal mines,

metalliferous mines, manufacturers and educational/other institutions respectively, participated, including officers from this Directorate.

**4. Arising out of wide, extensive and successful deliberations, a broad consensus was arrived at amongst all stake holders into maintaining the minimum design requirements of such safety features as per the Guidelines enclosed with this Circular. It may please be borne in mind that the enclosed guidelines are only the minimum recommended levels and may be altered from time to time as per evolving needs and that there is no bar on adherence to any higher/superior levels of design and functionality in the interest of safety. It also further be appreciated that adherence to this circular will go a long way in drastically minimizing hazards due to operation of both HEMM and light/heavy vehicles in opencast mines, thus commensurately enhancing safety in mines.**

5. Accordingly, the owner/agent/manager of every opencast mine in operation and the Original Equipment Manufacturers (OEM) are requested to ensure compliance with this circular.

26/2/2020

(R. Subramanian)
Director General of Mines Safety (Off.)

Encl: As above.

**GUIDELINES IN RESPECT OF PROVISIONING OF SAFETY FEATURES OF HEMMs & HEAVY/LIGHT VEHICLES FOR SAFE DEPLOYMENT IN OPENCAST MINES.**

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## 1.0. Rear Vision Camera:

A system that consists of a Monitor (component that provides visual image of Blind Area), Camera (component that transmits the images detected by it to the monitor) and other components capable of detecting objects including people within the Blind area unambiguously with an uninterrupted sequence of signal or information appropriate to detection Zone / Field of View (Blind Area).

Applicability: All Heavy Earth Moving Machinery

### 1.1. The Rear vision camera shall meet the following minimum requirements and standards:

1.1.1. The system shall boot automatically along with starting of Engine / Power source of Machine, shall perform an initial system check and shall give readiness indication. The system shall shutdown along with shutting down of Engine / Power source. The system shall have system readiness, standby and system malfunction indication to indicate its status.

1.1.2. The system shall remain in stand-by mode (operation mode whereby the system is active, but no information is transmitted by the camera or monitor) and shall wake up automatically upon selection/engagement of appropriate control(s) (such as reverse gear, etc) by Machine Operator for negotiating Blind Area (Killing Zone) to provide uninterrupted vision of Blind Area(s) to the operator. The system shall return to Stand-by mode upon release the appropriate controls by the operator.

1.1.2. The monitor shall be so positioned that it can easily be seen by the Operator sitting in his/her seat in either Day light or Darkness without strain. Appropriate shielding shall be used to reduce the effect of direct sunlight onto the Monitor.

1.1.3. The system shall be provided with auto mode tail light with adequate illumination for better visibility during darkness. The system shall be capable of operating in dark and shall automatically switch to infrared / any other suitable technique /mode when the brightness of field of view is too low or in case of failure of the tail light.

1.1.4. Components of the system shall in no way restrict any function or operation of the machine. The components shall be so designed and mounted to the machine in such a way to limit exposure to, or amplification of, dynamic loads, temperature, shock or vibration and dust that could prematurely damage the device and to deter unauthorized disablement or their removal. Components of system shall be adequately protected from external damage.

1.1.5. The system shall have field of vision in accordance with ISO 16001 (Earth-moving machinery-Object detection systems and visibility aids-Performance requirements and tests) (or equivalent Indian standard when formed), shall satisfy test requirements of ISO 16001 and shall have Ingress Protection of IP 69K in accordance with IEC 60529 (Degrees of Protection Provided by Enclosures (IP Code)) and test Certificates to these effects shall be obtained from any Government / NABL Accredited institutions/Test Houses having adequate test facilities.

26/12/2020

1.1.6. The System may be provided with provisions for recording the images captured with time stamp to enable easy retrieval and analysis of the immediate past 24 deployment operating hours.

## 2.0. Warning System for Operator Fatigue:

A system capable of analyzing various symptoms associated with Operator fatigue to detect drowsiness of Operator from regular driving / operating behaviour and sound loud audio and visual warnings immediately upon detection of drowsiness to alert the Operator and others in the vicinity by incorporating one or more technique(s).

Applicability: All Heavy Earth Moving Machinery

### 2.1. The Warning System for Operator Fatigue shall meet the following minimum requirements and standards:

2.2.1. The system shall boot automatically along with starting of Engine / Power source of Machine, shall perform an initial system check and shall give readiness indication. The system shall shutdown along with shutting down of Engine / Power source. The system shall be provided with system "ON", initialization, tracking and system malfunction indication to indicate its status.

2.2. 2.The system shall detect state of drowsiness of Operator from regular driving behavior and shall provide loud verbal warnings to him / her and simultaneously flash externally mounted warning light easily visible to others for alerting the Operator and others in the vicinity to pay attention. It shall also be capable of detecting the drowsiness even when spectacle is worn by the Operator.

2.2.3. The system shall have following four stages:

(a) **Initialization** - Every time the system is started, it needs to be set up and optimized for current user (Operator) and conditions. The initialization process shall be a quick one,

(b) **Tracking** - continuous monitoring of the Operator within a dynamically specified tracking area in real-time,

(c) **Drowsiness Detection** and

(d) **Warning** - Once it has been determined that the driver/operator appears to be in an abnormal driving state, the system shall alert the driver of potential dangers that can arise. Combination of audio and visual alerts is used to attract the Operator's attention and raise their alertness level. Alerting has to be implemented in such a way as not to cause the opposite effect of intended and startle the driver / operator into causing an accident.

2.2.4. Components of the system shall in no way obstruct Operator's line of sight hindering his / her visibility and restrict any function or operation of the machine. The components shall be so designed and mounted to the machine in such a way to limit exposure to, or amplification of, dynamic loads, temperature, shock or vibration and dust that could prematurely damage the device and to deter unauthorized disablement or their removal.

2.2.5. The System may be provided with provisions for recording the warning generated with time stamp to enable easy retrieval and analysis of the immediate past 96 deployment operating hours.

2.2.6. For determining type, duration and sound level of audio warning and intensity of external Visual warning, DGMS Circulars, Indian and International standards issued in this regard may be referred to.

**3.0. Auto Dipping System:**

Applicability: Dumpers /Tippers / Light and Heavy Vehicles plying in the Mine.

A System comprising sensor(s) and a Control Unit capable of automatically switching high beam lamp to low beam as soon as it senses a vehicle approaching from the opposite direction at a distance of about 150 meters and switches it back to high beam when the vehicles pass each other to avoid glare and blinding of Operator so as to relieve the operator from frequent switching between high and low beam of head light.

**3.1. The Auto Dipping System shall meet the following minimum requirements and standards:**

3.1.1. The system shall boot automatically along with switching "ON" of head light of the vehicle/machine, shall perform an initial system check and shall give readiness indication. The system shall shutdown along with switching "OFF" of the head light. The system shall be provided with system "ON" and system malfunction indication to indicate its status.

3.1.2. System sensor shall be capable of detecting high beam light of incoming vehicle approaching from opposite direction at a distance of about 150 meters or at much closer proximity in case of vehicles approaching from branch roads and send signal to Control unit. Suitable filters shall be incorporated in the system to avoid nuisance/false reaction to Pole lights, spot lights and haul road general lightings. The sensor shall send appropriate signal immediately to control unit upon cessation of high beam light falling on it.

3.1.3. System control unit shall automatically activate Low beam or high beam upon receipt of appropriate signal from the sensor without the intervention of the Operator.

3.1.4. Components of the system shall in no way obstruct Operator's line of sight hindering his / her visibility. The system shall be equipped with Operator Override to comply with authorized override to meet eventualities.

3.1.5. Test Certificates to these effects shall be obtained from any Government / NABL Accredited institutions/Test Houses having adequate test facilities.

**4.0. Mechanical Device to avoid Head to Tail Collision of Dumpers:**

A mechanical system / device(s) adequately designed to protect operator of Dumper in the event of Head to Tail collision even in mixed capacity dumpers operating environment. The device(s) / system shall be of standalone mechanical structure or combination of mechanical structures wherein maximum impact energy generated by collision is absorbed by the device / system or diverted away from the operator to protect the operator when the operator is adequately constrained in his / her seat by seat belt.

Applicability: Dumpers

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**4.1. The Mechanical Device to avoid Head to Tail Collision of Dumpers shall meet the following minimum requirements and standards:**

The system / device(s) shall be of standalone Mechanical structure or combination of Mechanical structures, viz, combination of Operator cabin protective structure and protection arrangement at Tail end of the Dumper or bumper extension or any other suitable arrangements. Hydraulic system or any other suitable system may be included as add-on. As far as possible, in new Dumpers, the Device(s) / System shall be part of original design of the Dumpers to avoid retro fitting difficulties.

4.1.1. The system / device(s) shall protect the Dumper Operator during head to tail collision when the operator is constrained by operator seat belt even in mixed capacity dumper operating environment.

4.1.2. Components of the system / device(s) shall not affect visibility of Operator, stability of the Dumper and intended use for which the Dumper is designed.

4.1.3. The system / device(s) shall absorb most of impact energy generated by collision or divert most of the impact energy away from the Operator so as to ensure protection from direct hit or crushing of Operator.

4.1.4. Components of the system / device(s) shall not hinder with loading operation or foul with components of Loader / Shovel / Excavators.

**5.0. <u>Automatic Fire Detection and Suppression System (AFDSS) for HEMM:</u>**

An automatic system to detect and suppress fire in hot zones of machine and is capable of sensing, activating and delivering the fire suppression agent(s) without human intervention in the event of fire with additional provision for manual actuation and appropriate indication and warning to Operator by incorporating one or more kinds of heat sensing system and suitable fire suppressant agents.

<u>Applicability</u>: All Heavy Earth Moving Machinery

**5.1. The Automatic Fire Detection and Suppression System (AFDSS) shall meet the following minimum requirements and standards:**

5.1.1 The system shall meet requirements of DGMS (Approval) Circular No. 2 dated 08.07.2013. In addition, it shall meet following additional requirements:

5.1.2. The system shall have system healthy and system malfunction indication to indicate its status. The system shall be provided with Manual actuation control(s) inside Operator cabin and t outside of operator cabin preferably away from hot zones. Components of the system shall in no way obstruct Operator's line of sight hindering his / her visibility.

5.1.3. The system shall cover all fire susceptible areas including engine, diesel tank, battery box, transmission, exhaust pipe and other hot zones having potential to cause fire.

5.1.4. The system shall be fully automatic, robust and shall not be damaged / made inoperative during routine maintenance activities. Components of system, in particular, sensing elements, shall be adequately protected from external damage. Nuisance heat sensing shall be avoided by the system.

5.1.5. The system, as far as practical, shall be designed in such a way to supply adequate quantity of fire suppressing agent to the zone where the fire is detected and to be suppressed on need basis for effective fire fighting and to avoid re-ignition of fire instead of blind discharge through all discharge nozzles.

**6. 0. Dump Body raised position indicator with warning:**

A system or a device capable of sensing non-return of dump body to completely retracted & transportation mode, restricting transmission of Dumpers / Tipper trucks, when engaged, up to first gear while the dump body is not completely lowered and simultaneously triggering an audible and/or visual warning till such time the dump body is completely lowered.

Applicability: Dumpers / Tipper trucks

**6.1. The Dump Body raised position indicator with warning shall meet the following minimum requirements and standards:**

6.1.1. The system shall trigger visual warning sooner Dump body is raised from its retracted cum transport mode. The warning shall remain "ON" till such the time the Dump body is not completely retracted/lowered. The system may have additional mechanical indicator to show that the dump body is not in fully retracted position. The visual warning shall be so located as to be readily visible and recognizable in the daylight and distinguishable from other alerts at night time by the Operator when seated in Operator Seat. As far as possible, the warning indicator shall be integral part of Operator console / Display Panel.

6.1.2. The system shall sound Audio warning in addition to Visual Warning when Dumper / Truck is attempted to move from its stationary position with dump body not in completely retracted position. The system shall not allow engagement of transmission system beyond first gear when the dump body is in raised position.

6.1.3. Sensors of the system shall have Ingress Protection of IP 68 in accordance with IEC 60529 and test Certificates to this effect shall be obtained from any Government / NABL Accredited institutions/Test Houses having adequate test facilities.

**7. 0. Exhaust Brake:**

Applicability: Dumpers / Tipper trucks / Heavy Vehicles.

**7.1. The Exhaust Brake shall meet the following minimum requirements and standards:**

7.1.2. The brake shall be an Auxiliary Braking System and shall be compliment but not a replacement to service Brake.

7.1.3. Control forces of the braking system controls and other brake testing requirement shall be in accordance with IS 16479 (*Performance requirements and test procedures of braking systems for wheeled high-speed rubber-tracked Earth Moving Machines and construction equipment vehicles*) stipulated for Retarder. For Heavy vehicles, it shall be in accordance with relevant Automotive Industry Standards (AIS).

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7.1.4. The Brake control shall be provided in the Operator's cabin within the Zone of Reach and distinctly marked.

**8. 0. Load Indicators:**

An automatic Load sensing, measuring and data logging system to monitor load, to sound warning when loaded beyond its designed safe carrying load and to record the payload during machine operation. The system shall have signaling provision on both sides of the Dumpers / Tipper trucks to indicate the loading status along with indication to the Operator.

Applicability: Dumpers / Tipper trucks

**8.1. The Load Indicators for Dumpers and Tippers shall meet the following minimum requirements and standards:**

8.1.1. The system shall comprise of onboard automatically load sensing/measuring device, indicating arrangement and warning system.

8.1.2. The system shall have exterior load indicating device(s) (in the form of different light indicators) so that the loader Operator is aware of under load, safe load and Over Loading of the Dumpers / Tippers. The indication shall also be extended to Dumper / Tipper Operator and the indication shall be suitably placed in Operator cabin as easily seen by the Operator without strain and without affecting his outside visibility. The Exterior load indicator shall be provided on both sides of Dumper / Tipper.

8.1.3. The system shall sound Audio warning when safe carrying capacity of Dumper / Tipper is reached. The Warning shall be continuous when the Dumper/truck is overloaded. The system shall not have manual override.

8.1.4. The system shall have Ingress Protection of IP 68 in accordance with IEC 60529 and test Certificates to this effect shall be obtained any Government / NABL Accredited institutions/Test Houses having adequate test facilities.

8.1.5. Light intensity of the Indicator shall be as per the requirements of AVA stipulated by DGMS. Intensity of Audio Warning shall be as per the requirements of AVA stipulated by DGMS.

8.1.6. The System may be provided with provisions for recording the warning generated with time stamp to enable easy retrieval and analysis of the immediate past 96 deployment operating hours.

**9.0. Dump Body Stabilizers for Tippers:**

**The Dump Body Stabilizers for Tippers shall meet the following minimum requirements and standards:**

Adequate and suitable mechanical arrangement(s) in the form of stabiliser to prevent toppling of Tipper / separation of dump body of the Tipper from lift cylinder(s) during dumping operation of the Tipper shall be provided in all Tippers. As far as possible, the dump body shall be designed during design phase of Tippers.

**10.0. Seat belt and Seat Belt Reminder:**

Applicability: Dumpers / Tipper trucks / Light and Heavy Vehicles.

**10.1. The Seat belt and Seat Belt Reminder shall meet the following minimum requirements and standards:**

**10.1.1. Seat Belt**

(a) Seat Belt shall be an arrangement of strap(s), 3 point contact type with a securing buckle with quick release, adjusting devices and attachments which are capable of being anchored in Operator's cabin of HEMM.

(b) Seat Belt shall be designed to minimize the risk of injury to its wearer (Operator), in the event of collision or of abrupt deceleration of the vehicle, by limiting the mobility of the wearer's body. It shall be capable of returning to normal operating position sooner the condition(s) causing the risk is/are diminished and shall not hinder normal operations of the Operator.

(c) A cutting arrangement shall be provided in Operator cabin at a place which is easily approachable by the operator/person for cutting the strap in case of jamming of securing buckle during escape / rescue operations in case of any eventualities.

**10.1.2. Seat Belt Reminder system**

(a) The system shall detect an unfastened safety-belt and initiate two stages of both Visual and Audible alerts, namely, First Level Warning and Second Level Warning.

(b) The visual warning shall be so located as to be readily visible and recognizable in the daylight and distinguishable from other alerts at night time by the Operator when seated in Operator Seat. As far as possible, the warning indicator shall be integral part of Operator console / Display Panel. The Visual Warning shall be flashing tell-tale.

Note 1: "First Level Warning" means a visual warning activated when the ignition switch is engaged (engine running or not) and the Operator's safety-belt is not fastened. An audible warning can be added as an option.

Note 2: "Second Level Warning" means a visual and audible warning activated when a Operator operates a vehicle without fastening of Operator safety-belt.

Note 3: Reference for Test requirements: AIS 145 (for appropriate N type vehicle) or any other acceptable international automotive standards

**11. 0. No Bump Circuit for Drills:**

**The No Bump Circuit shall meet the following minimum requirements and standards:**

A system capable of automatically bringing down and maintaining speed of vertical travel and rotary motion of rotary mechanism automatically to predetermined safe level(s) during drill rod connection between rotary and drill rod and between drill rods irrespective of speed selection by Operator of Drill machine. The No Bump Circuit shall provide for such speed(s) during the above mentioned connections so as to avoid damage to threads of pipe(s) and rotary heads.

26/2/2020

**12. 0. Breakout Wrench for Drills:**

**The Breakout Wrench shall meet the following minimum requirements and standards:**

12.1. The wrench shall be of adequate design and construction and shall be capable of breaking out tightly threaded Drill Rod Connections safely and operated from Operator cabin of the Drill. Break out wrench shall be mounted in the machine and is in addition to normal arrangement provided to break out threaded drill rod connections. For smaller diameter Drill pipes and machines intended for drilling holes for secondary blasting, a portable Break out wrench arrangement may be used.

12.2. The wrench shall have provision to automatically adjust its jaws to diameter of Drill rod to compensate for any drill pipe wear and shall be provided with mechanical locking arrangement to secure the wrench at its resting position. The wrench shall be so installed as not to affect Operator's visibility to Drill Rods / Drill Platform.

12.3. Adequate safeguard shall be provided to prevent accidental / inadvertent actuation of controls in Operator's Cabin.

**13. Propel joystick-spring loaded type to return to neutral (Dead-man safety) for Drills:**

**The Propel joystick-spring loaded type to return to neutral (Dead man safety) shall meet the following minimum requirements and standards:**

It shall be capable of returning to deactivated (Neutral) position automatically upon release of lever by Operator and shall immediately bring propel / tramming operation of the Machine to Halt and safe state.

**14.0. Proximity Warning Device:**

A system designed for early detection of static and moving objects, vehicles, human beings encountered within virtual target area during movement of Dumper / Tipper and for triggering warning the operator to prevent collision or run over. The system shall comprise sensors which may employ one or more or combination of technology / methodology (for detection of objects, vehicles, and human beings), control unit(s) (for receiving input from sensor(s), processing it and forwarding necessary input to Warning Unit) and warning unit to trigger Audio visual warning to the operator. The system shall have variable target area during forward movement depending upon speed of the Dumper / Tipper and predetermined target area during rearward movement.

Applicability: Dumpers / Tipper trucks

**14.1. The Proximity Warning Device shall meet the following minimum requirements and standards:**

14.1.1. Proximity warning device / system shall be provided for detecting static and moving objects including human beings on its own during the vehicle movement for a specified range, and warn the operator in the operator's station.

14.1.2. At least one object detection sensor, accessible and not interfering with the Dumper's / Truck's operation shall be provided both in the front and at rear of the Dumper / Truck at suitable

locations. The system shall be ergonomically designed and mounted for operator and maintenance personnel.

14.1.3. The system shall be reliable and be able to provide an adjustable audio visual warning when it detects static and moving objects including human beings, least height light motor vehicle used in the mine, etc., within the virtual target area of respective Dumper/Truck.

14.1.4. The sensor shall detect static and moving objects in a virtual target area as defined below. The manufacturer shall ensure maximum possible detection coverage in the virtual target area depending on the available fitment area and proximity detection technology defined as below:

14.1.5. **Virtual Target Area in Front of Dumper/Truck:**

(a) Width of the virtual target area shall be equal to the width of the Dumper/Truck plus 0.5m on both sides.

(b) The inner edges (base line) that represent the width of the virtual target area shall pass through the inner edge of bumper of Dumper/Truck. The centerline of the virtual target area and the Dumper/Truck centerline shall coincide.

(c) Length of the virtual target area shall conform to maximum stopping distance as mentioned in the IS: 16479 (*Performance requirements and test procedures of braking systems for wheeled high-speed rubber-tracked Earth Moving Machines and construction equipment vehicles*) and the length of virtual target area shall be calculated by the Control Unit of the system dynamically and automatically with relation to vehicle's speed at any given point of time while covering the blind spot distance observed within the width of virtual target area when the Dumper / Tipper was in static pre-start (ignition – on) condition. While calculating stopping distance in accordance with IS 16479, the test slope percentage may be taken as 6.25 % (i.e. 1 in 16, which is maximum permissible slope of haul road under normal operating conditions). Further, Brake response time and operator response time shall also be considered while calculating the stopping distance.

14.1.6. **Virtual Target Area in Rear of Dumper/Truck:**

(a) Width of the virtual target area shall be equal to the width of the Dumper/Truck plus 0.5 m on both sides.

(b) Length of the virtual target area shall be more than or equal to the length of the Dumper/Truck.

(c) The inner edges (base line) that represent the width of the virtual target area shall pass through the centerline of the rear axle of the Dumper/Truck.

(d) The centerline of the virtual target area and the Dumper's/Truck's centerline shall coincide.

14.1.7. The system shall not detect any obstacles beyond the width of the virtual target area and its detection area shall be restricted along the vehicle's pathway for minimizing false alarm. The system shall have intelligent alert generating mechanisms like indication of obstacle in the vehicle's pathway, whether left, right or center and triggering audio alerts after detection of obstacles of auto-cut off type, to avoid operator inconvenience/distraction. The System shall be provided with provisions for recording of details of warning generated with time stamp with

location details (if feasible) to enable easy retrieval and analysis of the immediate past 96 deployment operating hours.

14.1.8. The system shall be tested at any Government approved laboratories or Test houses accredited by NABL subject to confirmation of its ability to conduct such tests conforming to following Standards (or its revised versions) and the test house shall not be part of Manufacturer's testing facility.

(a) IEC 61000-4-5:2014 - Electromagnetic compatibility (EMC): Testing and measurement techniques - Surge immunity test.

(b) IEC 61000-4-6: 2013 - Electromagnetic compatibility (EMC): Testing and measurement techniques - Immunity to conducted disturbances, induced by radio frequency fields.

(c) JSS 55555:2000(Rev-2) - Sinusoidal Vibration Test, Frequency: 8 to 500 Hz, Acceleration: 40m/$s^2$, Duration 2 hrs in each axis.

(d) IS-9000: Part-V/Sec 1 - 1981 Reaffirmed 2007 - Damp Heat Test (at 40° C & 95% RH for 16 Hrs).

(e) IS-9000: Part-II/Sec 3 - 1977 reaffirmed 2004 - Cold Test (-10°C).

(f) IS-9000: Part-III/Sec 3 - 1977 reaffirmed 2004 - Dry Heat Test (+70°C).

(g) IS-9000: Part-XIV/Sec 2 – 1998- Rapid Temperature Cycle Test.

(h) Ingress Protection Test, IP-66 required;

14.1.9. Rules/guide lines framed by Ministry of Communications and Information Technology (Wireless Planning and Co-ordination Wing), wherever applicable, shall be complied. The technology / technologies of the system shall also comply with other applicable statutory guidelines framed under various Rules /Regulations / Acts by Government of India.

16/4/2020

(R. Subramanian)
Director General of Mines Safety (Off.)

भारत सरकार / Government of India
श्रम एवं रोजगार मंत्रालय / Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

**DGMS (Tech.) Circular No. 05 of 2020, Dhanbad, dated 24.02.2020**

To

All Owners, Agent, and Managers of Oil/Gas Mines.

**Subject: Safe Conduct of Drilling and Production operations in Oil & Gas Mines.**

Recently, there has been a spate of several fatal/serious accidents in oil/gas mines/ installations, caused mainly due to sudden ignition/fire of surcharged HC gas cloud in the area. While the enquiry into these accidents revealed several shortcomings as the root cause, there still appeared many areas for enhancing work-procedures to completely avoid such accidents.

Accordingly, the matter was discussed with various senior representatives from various oil/gas mines, OISD in addition to officers from DGMS, for evaluating risk factors associated with such operations in oil & gas mine(s) by on-site examination and study of various procedures in vogue, measures & type of safety features/equipments in use during various processes of production & drilling operations. Subsequent to holding detailed deliberations and discussions with various stake holders, the following guidelines are framed for ensuring safe conduct of drilling and production operations in oil/gas mines.

**A.1 - General:-**

1. In every mine, personal Supervision of the mine or part of the mine shall be exercised by the Manager at least once in every week to see that safety in every respect is ensured. He shall also ensure to carry out at least one inspection of complete installation at every new location. Of these inspections, one at least in every fortnight shall be made during the night shift.

2. Every company shall have defined HSE Policy for the hiring of services. The technical qualifications as well as competency of the persons to be employed by the hiring agencies shall be evaluated before deployment.

3. The qualifying criteria based on HSE policy or standards/guidelines of the company for hiring of services and/or equipment/Rig, etc. shall be framed by the Owner/Agent/Manager before awarding the Contract.

4. Qualification and competency of all contractual persons employed or to be employed in the mine shall be evaluated by the board constituted by the management (i.e. owner/Agent/Manager) of the mine, who shall be persons

who are not connected with imparting of training, provided that the training officer may be co-opted in the board as observer.

5. In case of well-defined sequential procedures involving multiple operating groups at any given work site, a system of obtaining electronic permits/clearances for the sequential operations, shall be installed and also implemented to effectively preventing bypassing the sequence, thereby avoiding cropping-up of hazards as a consequence.

6. It shall be ensured that persons deployed within 30 m of any tank, separator, oil well, oil/gas manifold in the installation including Zone-2 hazardous area(s), do not carry/possess mobile phones and electronic device, cigar, cigarette, biri/other smoking apparatus or any match or kind which is capable of producing a light, flame or spark, except intrinsically safe apparatus or such device which are housed in a flame proof enclosure.

7. It shall be ensured that the entire process area and/or drilling area is kept under intrinsically safe effective CCTV surveillance to monitor all operations closely. Recording of all such surveillance shall be stored for a period of at least 30 days. Before deleting the data, it shall be examined for unsafe act/practice. If any abnormality is observed, the same shall be rectified and recorded in a bound paged book kept for the purpose.

8. Record of every inspection, testing, examination of any apparatus, equipment, controls, machinery, system or any part of the installation shall be maintained in the bound paged book kept for the purpose. The record shall be signed by the person(s) making such inspection, testing, and examination and be countersigned by the installation Manager/Dy. Manager/ Manager.

**A.2 -General (Machinery & Equipment):-**

9. In an area where flammable gas concentration is found or likely to contain in excess of the limit as specified in Regulation 95(2) of the Oil Mine Regulations 2017 (OMR-2017), the area shall be cordoned/fenced off and no person shall enter into such area. Provided that only competent person with all provisions of life saving rescue apparatus and equipment may be allowed to enter into such area(s) for the purpose of detection and control, subject to the condition that the flammable gas concentration does not exceed the lower limit of explosion. Any vehicle/internal combustion engine without air intake shutoff valve, spark arrestor and without proper insulation of exhaust pipe, catalytic convertor & such other hot components of the equipment shall not be allowed in such area.

10. All machinery and equipment deployed in the mine shall be inspected at least once in a week by the competent person (s) appointed for the purpose to ensure its safe working and also to ensure that machinery being maintained as per OEM guidelines and strictures and statute of Oil Mines Regulations, 2017. Record of all such examination shall be kept maintained at the site.

11. Where compressed air operated starter of IC engine is not provided, the starter and the battery shall be housed in flame proof enclosures.

12. It shall be ensured that suitable protective systems, such as automatic fire detection and suppression system (AFDSS), engine coolant temperature

sensor, engine oil pressure gauge, over heating tripping system and exhaust manifold and turbo charger guards, are provided and maintained on every IC engine. It shall also be ensured that the exhaust of every IC engine including exhaust pipe, muffler/ silencer, are adequately insulated/protected to prevent contact with inflammable fluids.

13. At every new location, before commencement of production/drilling activities, a pre-commissioning audit of all the equipments shall be carried out by a HSE team and the deficiencies, so observed shall be rectified before commencement of production/drilling activities. A record of the same shall be kept available at the Installation for reference and shall be produced to the Inspecting Officer, whenever required.

14. Diesel engine of fixed/mobile vehicles used in hazardous area shall be provided with a readily accessible air intake shut off valve, in addition to the remote controlled provided where a diesel engine is located within 30 m of a well as per the Regulation 97(3)(a) of OMR, 2017.

**B.1 - Production Operations (On-site Requirement):**

15. The abstract of operating instructions, emergency shutdown (ESD) procedure, ESD Trip set pressures shall be displayed / made available in the control room and near all important operating equipment in local language or language known to majority.

16. A system for continuous monitoring and detection of hydrocarbon gas with alarm system shall be provided and maintained at production manifold, gas injection manifold, gas separator/scrubber area, all fired heaters areas including heater treater, bath heater, indirect heater areas, flare knockout drum area and other areas as determined by manager for the purpose. In addition, monitoring by portable spot gas detection system on hourly basis or at shorter intervals as may be decided by the manager shall be carried out and a record of such monitoring/detection by portable spot gas detection system shall be kept in register kept for the purpose and shall be signed and dated by the person making the measurement and countersigned by the Installation Manager. In case of the continuous monitoring and detection system, the measured reading for at least 30 days shall be kept in distinct non-editable electronic form.

17. Intrinsically safe internal communication system, like paging, walkie-talkie& mobile phones shall be provided at strategic locations for the purpose of effective communication.

18. An Alarm Management System shall be established to ensure that all the alarms are monitored, analysed, segregated and acted upon so that all the operational parameters are well within the permissible limits.

19. Pneumatic or electronic operated Emergency shutdown (ESD) valve to shut off fuel/gas supply in fired heaters, heater treater and bath heaters for quick response, in case of any emergency, shall be provided and maintained.

20. Exhaust pipe of any burners (fired heaters, heater treater, bath heater, etc) shall be thermally insulated.

## B.2 - Production Operations (Pipelines):

21. Detailed Layout plan(s)/part plan(s) of all pipelines & their network, connected to production Installation showing clearly the size, length, identification code & purpose, shall be prepared on a suitable scale, maintained and kept available at the mines in addition to the plans maintained under Regulation 9(1) of the OMR-2017. The plan shall be accurate and updated whenever any pipeline is laid/replaced/removed.

22. Records of pipeline data, containing design data and as laid drawings shall be maintained at respective Installation. Operating conditions of pressure /temperature and dozing shall be prepared for each and every pipeline with suitable controls.

23. It shall be ensured that persons engaged in operation and maintenance possesses adequate knowledge and experience to ensure functioning of the pipelines in a safe and efficient manner.

24. If a pipeline system is de-rated to a lower operating pressure in lieu of repair/ replacement or reduction in pipe wall thickness, the new MAWP (Maximum Allowable Working Pressure) shall be determined.

25. Records of all operational activities for pipelines shall be kept and maintained. All pipelines operations & maintenance including detection of leakage, repair, laying and replacement shall be carried out by the person authorised for the purpose under the supervision of an official/ competent person(s), carrying adequate safety devices including portable gas detector and arrangement of Fire Fighting.

26. The persons engaged in operation shall maintain vigilance for detection and control of any leakages. At least three portable gas detectors, duly calibrated, shall be kept available and maintained at Installations to monitor the leakage.

27. Any reported leakage of any pipeline shall be immediately investigated/ examined by competent person(s) authorized for the purpose and report of all such examinations and repair carried out thereafter shall be recorded in a bound page book.

28. Persons likely to be affected shall be made aware about the hazards associated with the Hydrocarbon pipeline(s) and suitable measures to be taken in case of observance of oil/gas leakages, at periodic/regular interval.

29. The fire-fighting arrangements shall be made and kept readily available for immediate use while detecting and repairing of hydrocarbon leakage.

30. Sections in pipelines where probability of water and / or solid accumulation is more shall be identified and flagged. Such identified sections that are predicted to have highest susceptibility to accumulation of corrosion causing substance and for longest residence time shall be assessed to have highest likelihood of occurrence of internal corrosion.

31. If there is high number of leakages in the pipeline, then the pipeline shall be replaced on priority.

32. On the basis of analysis of pipe line survey/measurement results, the competent person authorized for the purpose shall declare a pipeline, whether it is 'fit for use'. The period of further use of pipeline after every such test shall be clearly mentioned in the report. The residual life of all pipelines arrived/based on recommended practice shall explicitly be recorded in terms of years & months.

33. Non-destructive Testing of all Pipeline(s) shall be carried out to detect cracks, fissures, metallurgical degradation besides physical deterioration such as loss in thickness, pitting etc. Ultra sonic/Non-destructive Testing of pipe wall thickness measurement shall be carried out for both underground as well as above ground pipeline sections once in every five years and records thereof shall be maintained. The frequency of Ultrasonic Test inspection shall be increased as determined by the manager depending upon the pipeline condition, leakage history and criticality of operation.

34. Valves on flow pipelines shall be tested and serviced once in every year in in-situ condition to ensure in safe working order.

35. Calibrated pressure gauges & Pressure relief valves of each type used in mine shall be kept readily available in spare in adequate numbers.

36. After Bean Pressure(ABP) of flowing wells shall be monitored on daily basis. If there is any abnormal reduction or increase in ABP, investigation shall be carried out to ascertain the reason for the same and corrective measures shall be taken.

37. Standing operating Procedures for rig-less logging of the well shall be prepared and implemented to ensure safe operations.

38. Non- destructive testing & structural stability test shall be carried out for installation structure(s) including flare structure which are susceptible to stress, corrosion and fatigue once in every five years.

39. All equipment, plant, machinery and facilities system which are no longer in use shall be taken out of service with all hazardous fluid removed from the system.

**C. - Drilling Operations:**

40. Detailed layout plan, on a suitable scale, of all the production/injection pipelines, power cables and any other line connected with any production facilities shall be prepared and kept available, in addition to the plan maintained under Regulation 9(1) of the OMR,2017 and a copy thereof shall be provided to concern Installation Managers of the drilling & production operations.

41. Rig transportation, rigging-up and rig-dismantling operations shall be carried out under the constant and close supervision of official authorized by the manager for the purpose.

42. During rigging-up and rig-dismantling operation, a suitable arrangement for anchoring of safety belt and/or other suitable fall prevention devices, like mobile elevating work platform, shall be provided.

43. In case of drilling activity inside an installation/at cluster location, prior to movement of the rig, detailed risk analysis shall be carried out to determine the additional risks that may arise due to drilling rig related activities.

44. In a cluster well location, the drilling rig and equipment shall be suitably placed at safe distance from a production/injection wells, X-mas trees, flow lines and injection lines to carry out drilling activities in safe & efficient manner and protected to prevent from damage due to fall of material during rig transportation, rigging-up and rig-dismantling operations.

45. Procedure for handing over/taking over including intervening activities of well shall be documented.

46. Tubing tongs with proper locking arrangement shall be provided for making and breaking of tubing connections.

47. A gas detector or explosimeter, connected to audio visual alarm near the driller's stand, shall be provided and maintained at the riser mouth in addition to the detector provided at shale shaker.

48. Pressure gauges of hydraulic power tongs shall be provided at driller's stand for monitoring, in addition to that provided at substructure of the rig.

49. It shall be ensured that every draw works is provided with fail safe braking system, so as to get automatically applied in case of any pneumatic/hydraulic component failure.

50. Care shall be taken for ensuring that various SOP's made in connection with drilling operation shall be in accordance with OMR 2017 and relevant OISD standards and guidelines issued from time to time.

All Owners, Agents and Managers of the oil mines are therefore, advised to strictly comply with the aforementioned guidelines for enhanced safety in their respective oil/gas mines.

24/2/2020

(R. Subramanian)
Chief Inspector of Mines and
Director General of Mines Safety(O).

भारत सरकार / Government of India
श्रम एवं रोजगार मंत्रालय / Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety

**DGMS Technical Circular No. ...01.. of 2020, Dhanbad, 24th February, 2020**

To

Owner/Agent/Manager of belowground coal mines.

**Subject**: Prevention of inflammable gas hazards in belowground coal mines - reg.

1.0 Accidents/disasters in belowground mines due to methane (generally termed as 'Gas') ignition and explosion are well known for many centuries in the coal mining history. Indian Belowground coal mines are no exception and have a number of gas-related accidents/disasters on record. History, by far, have revealed the lack of adequate precautions to deal with the unpredictable nature of mine gas emissions during mine development and coal extraction, particularly by the Longwall caving method, as the major causative factor of such accidents/disasters. Recent gas-related incidents in belowground coal mines have prompted to review the adequacy of the Coal Mine Regulations 2017 to safeguard the mineworkers from gas hazards, especially, of Jharia and Raniganj coal seams which are highly gassy in nature.

2.0 Globally, over the years, a significant body of knowledge has been developed in understanding the prediction of gas emission in belowground coal mines and effective techniques have been developed and successfully implemented to mitigate gas problems. Knowledge of the gas occurrence, emission characteristics and expected gas flow from a coalmine as a function of the coal production rate are therefore, the essential ingredients of safe operations, mine planning, ventilation, gas utilisation, Greenhouse gas (GHG) emission control purposes, etc. Coal extraction and effective gas management will become increasingly challenging as shallow coal reserves are exhausted and deeper and gassier seams are being mined.

3.0 In view of the above, the following measures are suggested for the prevention of gas hazards in belowground coal mines.

3.1 **Determination of degree of gassiness:** This is the first step to reduce hazards due to gas emissions during the mining process. Merely knowing the degree of gassiness of the coal seam only gives a probability of gas emissions which changes with coal production technology, barometric pressure, fan failure, roof falls, etc.

Hence, the gassiness of coal seams shall be determined on a scientific basis by measurement of in-situ gas content of working seams, overlying and underlying seams and immediate coal measure strata. The gas content of a coal seam shall be determined by appropriate scientific methods by taking freshly cut coal cores either from surface drilling or UG drill bore cores, as may be applicable, and sealing the cores in a canisters and carryout gas desorption measurements by well known national/international standards like 'Determination of Gas Content of Coal and Carbonaceous material - Direct Desorption Method' (AS 3980-2016 or ASTM D7569 / D7569M-10(2015)e1). The measured gas content data need to be interpreted for gas reservoir size and estimation of gas emission rates during mine development and production cycles.

3.2 **Ventilation Planning:** knowledge of the gas occurrence, emission characteristics and expected gas flow from a coal mine/panel as a function of the rate of coal production is essential for ventilation planning. In some mines, a gas emission to the tune of 36 $m^3/t$ of coal had been reported, which is a potential for outburst conditions. To dilute such a high gas emission rates to the safe level of <1.25% $CH_4$in general body air and <0.75% $CH_4$in return airways of the district by increasing quantity of intake air may lead to a very high air velocities at Longwall face due to limited maximum span of the face causing dusty atmosphere and leakage of more air into the goaf that leads to spontaneous combustion problems and further potential increase in gas percentage in the return airways. Hence, it is necessary to determine the gas outburst threshold limits for the pre-drainage of the coal seam to safe limits before mining the coal.

3.3 **Gas drainage:** A suitable pre-mining methane drainage system shall be adopted in coal seams with gas content > 10 $m^3/t$ to reduce gas content of coal seam below the critical level to achieve safe belowground working conditions and for improving panel ventilation. The pre-gas drainage system also takes care of the gas blowers and outbursts encountered during mining of seam having high gas contents, low-permeability zones and geological structural features such as faults or shear zones.

The mine Owner/ Operator/ Contractor may characterize the gas reservoir size (i.e. cu.m of gas per sq.m. area, $m^3/m^2$) to determining the pre-drainage requirements before initiating the production activities, to ensuring that mining activity and ventilation planning match with the planned production with due regard to safe operations belowground.

3.4 **Monitoring:** A Tele-monitoring system having a sensor for continuous monitoring of methane ($CH_4$) and carbon monoxide (CO) at the face, goaf edges and in the return airway of the panel may be provided and maintained in every mine having seams of 2nd and 3rd-degree gassiness. A telemonitoring sensor may be installed at the immediate return of the longwall panel/depillaring panel to detect the presence of inflammable and noxious gases continuously and having a feature to automatically cut off power in case the percentage of $CH_4$ exceeds 0.75% and noxious gases exceed 50ppm along with the automatic alarming system.

In addition, Local Methane Detector (LMD) to trip the power supply at 0.75% methane may be installed just out bye of the Longwall face in the return airway and LMD to trip the power supply at 0.5% methane may be installed at the Longwall face. The methane sensor of the telemonitoring system and LMD may be placed within 1.0m of the roof. Approved type of methane monitors installed on the shearer/cutting machine as required under Reg. 214(2) of CMR, 2017, shall be kept functional which shall record inflammable gas continuously and trip the power of the face equipment if the percentage of CH4 gas exceeds 0.5%.

3.5 **Ignition of gas:** In all the mines having seams of 2nd or 3rd-degree gassiness, the cutter drum having water spraying arrangement with a jet directed towards the tip of the pick shall only be provided to prevent a generation of frictional spark and the subsequent possibility of ignition of the gas.

A nitrogen/carbondioxde plant may also be installed at the surface of every mine having seams of 3rd degree gassiness with intricate network of connected pipelines for conveying nitrogen/carbondioxide gas within the mine. An automatically operated fire suppression device shall be provided at every face cutting machine as required under Reg. 139(1)(f) of CMR, 2017.

3.6 **Post goaf drainage:** The post goaf drainage plans may be prepared, formulated and implemented in every mine having gassy seams of 2nd and 3rd degree for safe

periodical drainage of gas accumulated inside the panel after its extraction and sealing for the safety of the mine workings.

3.7 **Gas Hazard Safety Management Plan:** In all belowground gassy mines of 2nd and 3rd degree, a safety management plan also containing the following elements of the principal gas hazard management, shall be prepared, monitored and reviewed periodically.

- Emergency Response;
- Gas emission assessment and determine gas content threshold limits;
- Gas Monitoring;
- Mine ventilation planning;
- Methane drainage i.e. Pre- and post drainage plans;
- Outburst management;
- Prevention of Gas ignition;
- Spontaneous combustion.

Every belowground coalmine shall prepare, formulate and implement a 'Gas Emission Control and Management Plan' and 'Emergency response and evacuation plan'.

All Owners, Agents and Managers of belowground coal mines are advised to ensure compliance of this circular. It is also advised that wherever new belowground mines/belowground mining operations are planned, the scope shall include gas reservoir studies, gas emission modelling and gas drainage plans.

24/2/2010

(R. Subramanian)
Director General of Mines Safety

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**DGMS(Tech.) Circular No. 03 of 2020** **Dhanbad, dated 16|01|2020**

To

All Owners, Agents and Managers of Opencast Coal Mines.

**Subject: Guidelines for Scientific Study under Regulation 106 of Coal Mines Regulations, 2017**

Sir,

Regulation 106(2) of the Coal Mines Regulations, 2017 (CMR, 2017) mandates that before starting a mechanized opencast working, the owner and agent of the mine have to ensure that the mine, including its method of working, ultimate pit slope, dump slope and monitoring of slope stability, has been planned, designed and worked as determined by a scientific study and a copy of the report of such study has been kept available in the office of the mine. Further, Regulation 106(3) of the same requires the owner, agent and manager of every such mechanized opencast mines to ensure that the recommendations made in the report of scientific study referred to in sub-regulation (2) are complied with.

However, recent scrutiny by officers of this Directorate, of reports of scientific study undertaken in different mines to meet the above statutory requirements revealed several serious discrepancies like unconnected subjectivity, inconclusiveness, factual mistakes, etc. Invariably, recommendations made on any particular activity were completely devoid of logic. In nut shell, such reports appeared to have been made without any scientific basis and justification, thereby defeating the very essence of the statute to enbling the mine level management with scientific backing in respect of planning and execution of mining activities.

Therefore, with a view to reviewing the prevailing status and standardizing the basic elements of a scientific study as referred above, a technical workshop on the subject captioned "scientific study and slope monitoring in opencast mines and way forward" was organized by DGMS on 06.12.2019 at DGMS Western Zone, Nagpur. The workshop was attended by about 79 officials and experts from regulator, various coal mining companies and research/academic institutions, like DGMS, CMPDI, CSIR-CIMFR, IIT Kharagpur, VNIT Nagpur, M/s SECL, M/s MCL, M/s NCL, M/s WCL, M/s ECL, M/s SCCL, M/s NLC, M/s SAIL, etc.

After detail deliberations and discussions, the following considerations emerged in respect of any scientific study to be made under Regulation 106(2) of the CMR - 2017.

**1.0 General:**

1.1 No part of the report shall contradict with any provision made under the Mines Act, 1952, rules, regulations, byelaws or orders made there under.

## 2.0 Scope of the study:

2.1 The scope of the said scientific studies conducted in a mine shall address on systematic and scientific mining for the planned life of the mine, and shall include clear recommendation on

i) suitable method of mining for new mine, or review and validation of existing method of mining and with/without modifications,

ii) sequence of mining and sequence of dumping, specially with reference to various geological disturbances traversing the mine, operational slope, ultimate slope,

iii) mechanization including the type/size/capacity, etc., in accordance with the designed capacity of mine,

iv) design of bench geometry including inter-ramps (height, width, slope, etc.), considering blasting/cutting/mechanization, etc., including conditions of deployment of large specialized machinery like draglines, bucket-wheel-excavators, surface miners, etc.,

v) type of drilling and blasting methods including controlled blasting, if so warranted,

vi) transport layout including the haul road dimensions, provision of one-way traffic, separate road for different type/capacity of dumpers/vehicles, layout of other modes of transport like conveyor, etc.,

vii) layouts of various surface facilitations,

viii) slope monitoring as an integral part of planning,

ix) water management viz-a-viz in-pit sump design, de-silting of sumps, design of effective drainage system, requirement of pumping, pre-mining hydrostatic depressurization of bench slope, provision of weep holes, monitoring of profile of water table, hydrological study, etc.,

x) type of dump – external or internal, site selection, dump foundation design to bear the ultimate load of the dump, height, slope, benching/terracing, limiting gradient of base floor for internal dumping, distance from the active workings/quarry edge, other facilities, drainage system, reclamation, etc., and

xi) effect of fire or spontaneous heating on bench/dump stability,

2.2 Care shall also have to be taken to ensuring validation of the pre-existing data by laboratory test, if used for designing the slope, and to ascertain that the data considered for designing/study, is truly site-specific and representative of the mine under study.

## 3.0 Factor of safety:

3.1 Factor of safety for design of pit bench & dump shall be determined considering all concerned parameters such as geo-mechanical properties of rock-mass, ground water condition, hydro-geological studies, seismic effect, method of mining, etc.

3.2 However, the Minimum Factor of Safety to be considered for design of pit, bench & dump slope shall in any case not be less than 1.50 for permanent or long-standing slopes and 1.30 for all other cases.

**4.0 <u>Monitoring scheme for bench and dump slopes</u>:**

4.1 The study report shall, among others, categorically specify/recommend

i) a specific methodology of slope monitoring suitable to address the potential level of danger prevailing in the mine,

ii) a suitable system of slope monitoring customized to the local needs, detailing type of instrumentation, frequency, pattern of data collection and analysis and organization for monitoring and

iii) different customized trigger points of observed values, like Warning Level, Withdrawal Level, etc., that may be included in trigger action response plan (TARP).

5.0 In addition to the above, the study report may contain any other aspect concerning planning, design and monitoring in the mine which may be warranted in view of the prevailing local conditions as well as features expected to be encountered in future.

6.0 **The Owner and Agent shall ensure that an appropriate scheme for mining and slope monitoring for the mine(s) under their control on the basis of the scientific study inputs/ report is prepared and a copy thereof is kept maintained at the mine office. The workings and operations of the mine shall strictly adhere to the mining scheme so prepared.**

7.0 The scientific study and the scheme as mentioned above in para 6.0 shall be reviewed time to time or whenever there is any significant change in the mine.

8.0 Notwithstanding the above, before reaching the final stage of mining as designed, the ultimate pit slope shall be again assessed by a fresh scientific study conducted based on experience gained, additionally required inputs, geological disturbances encountered, etc., till then.

Accordingly, all Owners, Agents and Managers of all opencast coal mines are advised to follow the above guidelines for the purpose of preparing the report under Regulation 106(2) of CMR - 2017 based on Scientific Study and implementing the same.

16/1/2020

(R. Subramanian)
Chief Inspector of Mines and
Director General of Mines Safety.

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**DGMS(Tech.) Circular No.02 of 2020** **Dhanbad, dated 09/01/2020**

To

All Owners, Agents and Managers of Coal and Metalliferous Mines

**Subject: Guidelines for Systematic Monitoring of Slopes in Opencast Coal and Metalliferous Mines**

Sir,

In pursuance of Regulation 106(2) of the Coal Mines Regulations, 2017, before starting a mechanized opencast working, the owner and agent of the mine have to ensure that the mine, including its method of working, ultimate pit slope, dump slope and monitoring of slope stability, has been planned, designed and worked as determined by a scientific study and a copy of the report of such study has been kept available in the office of the mine. Insertion of a similar provision is in pipeline by making amendment in the Metalliferous Mines Regulations, 1961. Further as per No. DGMS (Technical) Circular/08, dated 23.09.2013, the mine management has to deploy a suitable slope monitoring system in mines customized to the local needs for ensuring timely withdrawal of men and machinery from any area in a mine likely to be affected by an impending slope failure.

However, still there is a lot of diversity amongst different mines in understanding and practices of slope monitoring. Therefore, it was felt necessary to evolve a broad standardization for systematic monitoring of slopes in opencast mines.

In view of the above, a workshop on the subject "scientific study and slope monitoring in opencast mines and way forward" was organized by DGMS on 06.12.2019 at DGMS Western Zone, Nagpur, to deliberate and review, among others, the present status of slope monitoring and finalize a protocol for systematic monitoring of slopes in opencast mines. The workshop was attended by about 79 officials and experts from regulator, various mining industry and research/academic institutions, like DGMS, CMPDI, CSIR-CIMFR, IIT Kharagpur, VNIT Nagpur, SECL, MCL, NCL, WCL, ECL, SCCL, NLC, NMDC, SAIL, MOIL, HCL, UCIL, NALCO, Ultratech Cement Ltd., Maihar Cement, etc., in which 12 technical presentations were made by different experts giving valuable inputs on the subject matter.

Based on various inputs drawn from the detailed deliberations and discussions made in the workshop, the following guidelines are being made for systematic monitoring of slope in opencast coal and metalliferous mines:

## 1.0 Monitoring methodology:

1.1 The owner, agent or manager of every opencast mine shall deploy a suitable slope monitoring system customized to the local needs in his mine for ensuring timely withdrawal of men and machinery from any area in the mine likely to be affected by an impending slope failure, as required under DGMS (Technical) Circular/08, dated 23.09.2013.

1.2 Selection of methodology of slope monitoring, including the nature & frequency of inspections, type of instrumentations, periodicity of capturing data & analysis thereof, etc., as will be suitable to forecast and address the potential level of impending danger in a mine shall be decided based on a scientific study.

1.3 The scientific study report shall, among others, also specify different trigger points of observed values, like Warning Level, Withdrawal Level, etc., based on which a trigger action response plan (TARP) shall be formulated & kept operative in the mine.

## 2.0 Recording and analysis of observational data:

All observations taken for monitoring of slope in a mine shall be recorded and duly signed in a bound-paged register or in tamper-proof electronic form by the competent person responsible for taking the observations. The observational data shall be analyzed by the slope monitoring officer using the analysis technique recommended in the scientific report. Wherever warranted, help of any scientific agency expert in the subject may be taken for the purpose.

## 3.0 Organization for slope monitoring:

3.1 a) The manager of every opencast mine shall have a structured team of trained competent persons for slope monitoring headed by a slope monitoring officer with clearly defined duties and responsibilities. In mine(s) where a strata control officer is already appointed, it may be adequate if the same person is authorized to work as slope monitoring officer.

b) In respect of a group of mines in operation, the Owner/Agent shall create a dedicated "Geo-Technical Cell" with appropriate organization and infrastructure for the purpose of

- keeping a close liaison with the slope monitoring activities being undertaken in various mines,
- reviewing the technique used, instrumentation deployed, frequency for slope monitoring, recording of measurements and analysis, etc.,
- conduct of mock rehearsals and
- training and up-skilling of the engaged organization on slope monitoring in mines

3.2 The manager shall also define duties and responsibilities of different managerial and supervisory personnel in the mine with regard to dissemination of information and action to be taken to make the TARP operative.

3.3 There shall be provided an effective means of communication system in the mine for prompt dissemination of the information amongst concerned officials for timely action.

All Owners, Agents and Managers of coal and metalliferous mines are advised to ensure compliance with this circular.

09/1/2020

(R. Subramanian)
Director General of Mines Safety

सत्यमेव जयते

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No. DGMS/ General Circular/01 Dhanbad dated 30.03.2020.

To,

**The Owner, Agent and Manager of mines concerned.**

**Subject: Uninterrupted mineral production, transportation of mineral etc. to sustain mineral production activities during lockdown period due to COVID-19 pandemic.**

As you are aware, the Central as well as the State Governments have issued various directives to combat the COVID-19 pandemic. The Ministry of Home Affairs, Government of India has issued guidelines vide order no 40-3/2020 DM-I (A) dt 24- 03-2020 to Ministries/ Departments of Government of India, State /Union Territory Governments and State /Union Territory authorities for strict implementation with effect from 25-03-2020. At clause 5 of the said guidelines industrial establishments which require continuous process are exempted from shut down. Subsequently, Ministry of Home Affairs vide order no 40-3/2020- DM -I (A) dt 25-03-2020 has issued an addendum to the guidelines dt 24-03-2020 by adding, inter alia, to clause 5 as under:

Sub clause (c) to clause 5 :

" ( c ) coal and mineral production , transportation , supply of explosives and activities incidental to mining operations ."

Ministry of Mines, Government of India, has also issued advisory to all State Governments with a request to issue necessary instructions to the concerned authorities to allow mining operations during the lockdown period to ensure continuity of operations **at Steel, Aluminium, Copper, Cement and other such plants which require continuous industrial process.**



30/3/2020

Coal and mineral production is essential to ensure that the nation smoothly passes through the present crisis. However, it needs to be ensured that the mine workers, officials and others engaged in mining, transportation and other activities incidental to mining operations take adequate precautions so that they do not get infected and do not become a medium to the spread of the corona virus. It is also required to follow the advisories issued in this regards by the Ministry of Home Affairs Government of India and the SOPs and advisories issued to the State Governments by the Ministry of Health and Family Welfare, Government of India, including ICMR, NDMA and other related agencies.

In this regard, it has been decided in the public interest to issue the following advisory for the well-being of person employed in mines.

1. Ensure proper cleaning and frequent sanitization of the workplace, particularly of the frequently touched surfaces. Ensure regular supply of hand sanitisers, soap and running water or such arrangement.

2. All such mining operations where workers in groups are required to be present in confined space / close proximity where, the social distancing or working distancing cannot be maintained , e.g. in underground manual face working, loading, manual drilling, support work etc., shall be stopped forthwith.

3. Number of persons travelling in cage, or any other system of man riding at a time, should be regulated to the extent that the norms of social distancing is ensured.

4. Only mechanized underground mines, and mechanised opencast mines, where workers are not present in close proximity may be continued.

5. In this regard manager of the mine shall prepare SOP to be followed by the employees, with regard to the precautions to be taken as per advisories issued in this regards from Government against the COVID-19 pandemic and ensure its wide publicity amongst the employees.

6. All workers and officials employed in the mines must be provided with sanitizers, masks and other personal protective equipment needed to protect them from this virus, free of cost.

7. It shall be ensured that the safety standards are not compromised in the wake of this pandemic.



30/03/2020

8. Persons shall be employed only where duly qualified statutory supervision has been provided so that, the safety and health of persons employed in mines are not jeopardized.

9. Provisions of the Mines Act, 1952, and the Rules, Regulations and Bye-Laws framed thereunder must be strictly followed.

It is further suggested that the persons employed at the mine shall be advised to take care of their health and in case of any respiratory symptoms ,fever etc., should leave the workplace immediately and inform their reporting officers or controlling authority, who shall arrange for necessary medical checkup and treatments. They should observe home-quarantine if required as per the guidelines issued by MoH & FW, Government of India available at the following URL: mohfwqov.in/DraftGuideIinesforhomequarantine.pdf.

Your unequivocal and whole hearted co-operation is solicited, so that the smooth supply of coal and essential minerals for the nation is ensured without compromising the safety, welfare and health of persons engaged in mining and allied activities.

Officials of this Directorate are available on phone and email etc, in case you need any assistance or further clarification.

30/03/2020

(D K Sahu)
Director General of Mines Safety (Officiating) &
Chief Inspector of Mines

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खानसुरक्षामहानिदेशालय/Directorate General of Mines Safety

No.

**DGMS Technical Circular No. 03 of 2019**

**To**

**The Owner/Agent/Manager of Coal and Metalliferous Mines.**

**Subject: Guidelines for implementation of Safety Management Plan in mines.**

1.0 The 9th Conference on Safety in Mines in the year 2000 laid the foundation for self-regulation in mines by promoting risk assessment to formulating and implementing Safety Management Plans (SMP). Since then, there has been a consistent thrust from this Directorate for this purpose by way of issuing several advisory DGMS circulars. However, post the recently notified Coal Mines Regulations, 2017 and the Oil Mines Regulation, 2017, the subject matter of SMP has been accorded a statutory berth with the onus to formulate and implement the same having been vested with the Owner, Agent and Manager. A similar provision has been proposed in the Metalliferous Mines Regulations, 1961 which is under amendment.

2.0 SMP is in two distinct parts namely, the formulation and the implementation. Consequent upon the notification of DGMS (Tech) S&T Circular No.5 of 2016, the formulation part of SMP in most large mines in both public and private sectors did witness a positive transformation under the active guidance from this Directorate, from a conceptual state to a document form with principal hazards getting identified along with their mitigating control plans in place.

3.0 However, the experience till date has revealed that all the formulated SMPs have thus far remained only on paper without any auditable documentation on mitigation of the identified principal hazards. Therefore, a technical workshop was organized by this Directorate on the 26th and 27th of November, 2019 at Ranchi to review the progress made and to strategizing implementation of SMP on an auditable mode. The deliberations of the workshop broadly revealed the following status report and shortcomings plaguing the mining companies in this regard.

a) By and large, mines have adopted risk assessments as their preferred vehicle for incorporating consultation in developing and reviewing safety management systems.

b) In a few cases only, the ownership of the SMP document at the level of Nominated Owner of the mine(s) was explicitly visible. In many cases, the involvement of the senior and corporate management was left to be assumed.

c) In some mines, risk assessment was merely as a statutory compliance action without much sensitivity being attached to seriously mitigating the principal hazards.

d) Initial teething troubles on team composition, number of meetings held, involvement of experts, etc., appear to have been reasonably settled. However, qualitatively, the constituted mine level teams appear unfavorably tilted against the contractual component wherever deployed.

e) Invariably in all cases, the devised control plans and procedures were vague, without assigning specific responsibility by name and designation and very often with unrealistic time lines for mitigation.

f) Risk ranking of hazards were often downgraded, without carrying out an objective assessment of existing controls.

g) The terms 'audit' and 'review' in relation to SMP were loosely and arbitrarily being used without detailing the methodology thereof on an auditable scale. Infact, in some mines, review was stated to be on a fixed time interval irrespective and unmindful of the fact that mitigation time as mentioned in the control plans was much more than the review interval as was envisaged.

h) In most cases, the facilitation extended by the corporate management of the mining companies towards enhancement of the techniques of perceiving danger, drawing appropriate control measures, sequential proceduring of measures to be adopted, apportioning responsibilities and realistic timelines for executing procedures, etc., was far from satisfactory.

i) There was practically no visible sign of any training accorded to the mine level personnel to imbibe the vital ethics of scientifically managing an organization to bringing about the required cultural transformation for SMP to cement its due place in the corporate management policy.

j) **Unfortunately, all the efforts till date appeared to have been made to merely formulating SMP and NOT implementing the same on an auditable scale. Not a single mine appeared to have completed even one full cycle of SMP from formulation to implementation on an auditable scale.**

k) Despite the above, the quality of preparing SMP appeared to be upward looking meaning thereby that by repeated cycles of SMP with deployment of latest techniques could further sharpen the skills of the teams engaged on hazard identification.

l) **Therefore, the entire exercise of preparation and implementation of SMP in mines still is left with huge scopes of improvement.**

4.0 In view of the above findings and to accelerating the introduction of the doctrine of self-regulation in mines through SMP, it would be prudent to continue the process in the right earnest, encompassing the following measures.

4.1 **Formulation of SMP**:

a) Corporate management of mines shall initiate immediate necessary steps to enhancing and fine tuning the techniques of perceiving danger, drawing appropriate control measures with framing of sequential proceduring of measures to be adopted, apportioning responsibilities and realistic time lines for executing procedures, etc.

b) Corporate management of mines shall hold structured training programmes on regular basis to sensitize the stakeholders (workmen/supervisors/managers) about their role in formulation and management of SMP.

c) For now, the categorization and/or ranking of risks for hazard identification may be done by using any of the two methods as explained in DGMS (Tech) (S&T) Circular No. 05, dated 2nd April 2016and DGMS (Tech) Circular (MAMID)/01 dated 10th March 2014. However, this is an area into which, the corporate managements could invest adequate resources to engaging appropriate agencies on a continuous scale for bettering various techniques of hazard identification on a scientifically justified basis.

4.2 **Implementation of SMP on an auditable mode**: For breaking the current static status of non-implementation of SMP on an auditable scale in mines, the following pre-requisites are to be carefully evaluated.

4.2.1 That, the formulated SMP is on an acceptable scale with various principal hazards having been identified by proper stake holding group(s) from the mine and with the assistance of experts in the field wherever necessary.

4.2.2 That, for each identified principal hazard, there are one or more mechanisms involved in the control plan, which are well detailed in respect of the control(s) and procedure(s).

4.2.3 That, for each procedure or a set of procedures, the name(s) and designation(s) of persons made responsible for execution of the procedure(s) on a unique or shared basis as the case may be, shall be clearly indicated (herein referred to as the 'person responsible').

4.2.4 That, for every procedure detailed as above, the envisaged time of completion shall **NOT** be shown in **DAYS BUT** only as a **CLEAR DATE**.

4.2.5 That, for the formulated SMP document, a unique number shall be allocated and mentioned at the top of each page for all future reference purposes. The formulated SMP document shall be suitably numbered on each page and also properly indexed item-wise. Care shall be taken to having an appropriate protocol for document numbering and indexing purposes.

4.2.6 That, the formulated SMP document so prepared shall be approved/accepted/vetted in writing at the level of the Nominated Owner of the mine.

4.2.7 That, the approved/accepted/vetted SMP document by the Nominated Owner in writing shall be suitably bound and a copy of the same shall be made out to every stake holder including 'persons responsible' in the control plans.

4.3 **Initial steps of implementation**: For the purpose of implementation, the time-line shall be deemed to commence from the date of approval/acceptance of the SMP document in writing by the Nominated Owner.

4.4 **Major steps of implementation of the approved/accepted/agreed SMP**:

4.4.1 For every **procedure in the control plan**, a **chronological order of mitigative actions** taken shall be created in a document form hereinafter referred to as the '**Workplan**'.

4.4.2 The created workplan is essentially a textual document containing one or more pages of various directions, instructions, etc., in writing as may be made at various levels of management hierarchy during the course of proceeding towards the logical conclusion of the completion of the procedure(s).

4.4.3 Every workplan shall be captioned on top of the cover page with a unique reference number. Below the captioned number, the particular procedure of the approved/ accepted/agreed SMP document for which this workplan is being made along with the page number and the indexed item number as shown thereat, shall be clearly mentioned as the subject of the workplan.

4.4.4 Below the subject, details of the 'person responsible' and the target date as contained in the approved/accepted/ agreed SMP document shall be mentioned.

4.4.5 After this, the 'person responsible' shall initiate in writing, the chronological steps as may be required of him to accomplishing the procedure, by referring the workplan to appropriate levels in the management hierarchy for decisions, sanctions, approvals, etc. From this point onwards, the workplan may take a journey through various levels of the management hierarchy in accordance with the notings contained thereat. At no point in time can anyone

participating in the journey of the workplan take any plea of missing the caption as mentioned above with a clear time line. **Therefore, all such involved levels in the journey are morally and officially bonded to the outcome of the procedure in respect of the time involved at individual levels and the delivery made.**

4.4.6 The final outcome of the workplan shall be the statement of completion of the procedure by the 'person responsible', **presented in writing to the authority which can accept the outcome as such or order appropriate modifications, etc., in writing.**

4.4.7 After completion of the procedure as acknowledged by the accepting authority in writing in the workplan, a mention to this effect shall be made in the control plan of the approved/accepted/agreed SMP clearly indicating the date of completion and the reference number of the workplan.

4.4.8 The workplan so made shall be **preserved for audit/examination**, at a later date.

4.4.9 Likewise, **similar sets of workplans** shall be **prepared in respect of all other procedures in the control plan of** approved/accepted/agreed SMP **for each identified principal hazard and appropriate entries to this effect as mentioned at para 4.4.7 are** made in the approved/accepted/agreed SMP document.

4.4.10 **After all workplans as above** are completed for all the identified principal hazards and appropriate entries made in the approved/accepted/agreed SMP document, the **first cycle of the journey of SMP may be considered as ready for audit**.

4.4.11 Complete internal audit of the SMP shall then be **taken-up initially by the ISO of the company** by constituting a team appropriately for the purpose. **The scope of the audit shall include both formulation and implementation of SMP, along with examination of all supporting documents, workplans, etc.** After satisfactory internal audit, any external audit may also be conducted as may be deemed fit by the management.

4.4.12 **If not accepted by the audit team**, various queries as may be raised by the audit team shall have to be addressed accordingly within a justified time frame as may be fixed by the audit team, to enabling re-audit.

4.4.13 On satisfactory completion of audit, **the SMP may be classified as having completed one complete cycle.** The audit team shall accordingly certify in writing, affixing signatures with date of the audit team members.

4.4.14 The management shall then commence review of the SMP in the second cycle in which, the earlier identified hazards are generally not expected to get repeated.

4.4.15 All such audited and certified SMP shall be **carefully preserved for future references, scrutiny, etc.**

5.0 **Outcome of each cycle of SMP**: After each cycle, the following vital information will be available for critical review and further process refinement in the subsequent cycles.

5.1 Mismatch, if any, on the assessment of time for completion of various procedures at the time of formulation of control plans, with the actual time taken.

5.2 Areas of any generic procedures as may have been decided while formulating SMP, to be appropriately improved with finer detailing.

5.3 Apportioning of responsibilities to appropriate person(s) for easier and effective completion of the allocated procedure(s) in the control plan of the SMP.

5.4 Adequate scope of better understanding of the intricacies of various mining processes, thereby, enhancing managerial/supervisory/functioning skills amongst various stake holders.

6.0 **Conclusions:**

6.1 With repeated cycles of SMP accomplished in serious earnest, various mining systems/ processes/work procedures will automatically get refined to better both process safety and efficiency while also proactively empowering all stake holders.

6.2 **However, the true essence of SMP will be realized only by appropriately digitizing the entire SMP implementation methodology as mentioned above, leading to radical transformation and irreversible betterment of the safety status and various mining systems/processes/work procedures in place in mines.**

7.0 Therefore, all Owners, Agents and Mangers of coal and metalliferous mines are requested to

a) use the aforementioned guidelines to ensure that SMP is carried out meaningfully at the mines for overall enhancement of safety in mines,

b) take steps to removing various shortcomings as mentioned above and to qualitatively improving the required skills for SMP formulation,

c) introduce appropriate digital/IT mechanisms for SMP implementation,

d) submit a return as per the enclosed format, on the 1st day after each quarter of calendar year in respect of the progress made into mitigating the identified principal hazards, to the respective Regional Inspector of Mines, and

e) monitor the progress made in implementation of SMP in mines on a measureable scale in appropriate internal forums including the meetings of the Board of Directors of the company.

23/12/15

(R. Subramanian)
Director General of Mines Safety(Off.)

Encl: As above.

## STATUS REPORT ON PROGRESS MADE INTO MITIGATION OF ALL THE IDENTIFIED PRINCIPAL HAZARDS.

**********

1.0 Name of the Mine:

2.0 Name of the Owner:

3.0 Name of the Agent:

4.0 Name of the Manager:

5.0 Status report for the quarter ending on : (date)

| No. | List of Principal Hazard identified. | Mitigation date as per formulated SMP. | Details of auditable work plans made for mitigation. | Actual date of completion as per workplan. | Remarks, if any. |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | | | | | |
| 3. | | | | | |
| 4. | | | | | |

(Signature with date of the Manager) (Signature with date of the Agent)

(Signature with date of the Owner)

Government of India
भारत सरकार
Ministry of Labour and Employment
श्रम एवं रोजगार मंत्रालय
Directorate General of Mines Safety
खान सुरक्षा महानिदेशालय

**DGMS (Tech) Circular / 02 / 2019 Dhanbad dated 29.11.2019**

**To,**

**Owner, Agent and Manager of All Metalliferous Mines and OEMs of Diamond Wire Saw Machines.**

**Subject: Safety Provisions for Diamond Wire Saw Machines and its Operations.**

**1.** A fatal accident occurred in an Open Cast Marble mine during cutting of Marble block by Diamond Wire Saw Machine, in which a worker working in the vicinity was hit by high speed flying off Diamond beads which emanated from snapped Diamond wire of the Machine, causing serious injuries, to which the worker succumbed latter. After the Fatal Accident, a study was conducted in various Marble and Granite mines where Diamond Wire Saw Machines were in use so as to recommend safety measures to avoid similar accidents and injuries to persons working in the vicinity of Diamond Wire Saw Machine operations in Mines.

**2.** Major mechanical aspects associated with risks involved in Diamond Wire Saw machining operations are moving/rotating elements of the machinery, whiplash of wire rope and high velocity projection of Diamond beads, springs and/or spacers etc due to sudden rope breakage during cutting operation of the machine.

**3.** Safety requirements such as Guards and Fences for moving and rotating elements of the machinery had adequately been covered under Regulation 174(2) of The Metalliferous Mines Regulations 1961. Failure of any rope under tension results in release of energy stored in it which usually leads to broken rope and ends of the rope to whiplash violently posing danger to persons in the immediate vicinity of the breakage. The greatest risk to persons from Diamond Wire Saw machine operation arises from high-velocity projection of the beads at the time of rope breakage. The whiplash normally occurs in the plane of cutting of the rock unless interrupted by other structures.

**4.** To address the risks associated with Diamond wire saw cutting operations in Mines, following safety provisions shall be strictly adhered with:

**4.1. Design of Diamond Wire Saw Machines & Diamond Wire Ropes:**

(a) In addition to requirements covered under Regulation 172 of The Metalliferous Mines Regulations 1961, the procedures described for identifying hazards and estimating & evaluating risks during relevant phases of the Machine Life Cycle and for the elimination of hazards or for the provision of risk reduction mentioned in Indian Standard-IS:16819 (*Safety of Machinery-General Principles for Design-Risk Assessment and Risk reduction*) shall be strictly followed during design and manufacture of Diamond Wire Saw cutting Machines. The remaining hazards and risks, if any, shall clearly be stated along with protective measures to be adopted and danger areas involved in Equipment Manual supplied with machine by OEM.

(b) Suitable Guard behind the drive pulley to stop the wire motion towards the rear of machine and to intercept flying off elements in case of wire breakage shall be provided in the machine.

(c) Plastic coated Diamond Wire Rope shall be used in the machine. Plastic coating on the wire keeps a constant separation between the beads and reduces the likelihood of the flying off of elements (Diamond beads springs and/or spacers) in case of wire breakage. Further, the plastic coating protects the steel cable from abrasive action of cuttings. Adequate numbers of Guide pulleys for rope shall be provided in the machine.

(d) The rope cutting speed and rope tension during operation of the machine greatly contribute to life of the rope. Improper cutting speed and rope tension aggravate fatigue failure of the rope. The manufacturer shall prescribe details of optimum cutting speed and rope tension in the Equipment Manual.

**4.2. Operation and Maintenance:**

(a) Diamond Wire Saw Machine Operators/Technicians shall be adequately trained in safe operation/proper maintenance of Machine and the rope.

(b) When cutting is performed, tracks on which the machine operates shall be placed on properly levelled ground.

(c) Machine Control Panel shall be mounted inside a substantially built and easily transportable operator cabin with adequate seating facility so as to protect the operator from Whiplash of wire rope & flying off elements during rope breakage and also to provide protection from heat, dust and rain etc.

(d) The Operator's cabin with machine's control panel shall be placed by the side of the cut plane and at an adequate distance, depending on the height of the cut. If several cutting operations are carried out on the same bench or quarry floor, or Horizontal cutting operation is carried out, the cabin shall be so positioned that the Operator is not endangered by rope failure and dangers arising thereof.

(e) Proper wedges and/or support(s) shall be provided to prevent uncontrolled movement of block being cut so as to avoid injury to persons in the vicinity and to prevent snapping of Diamond wire rope due to trapping or jamming during the cutting operations.

(f) The Manager, in consultation with Engineer of the Mine, shall specify adequate danger areas for protection from the flying off elements and shall ensure that persons are not deployed within the danger zone/area during operation of the machine.

(g) Detailed Codes of Practice for operation and Maintenance of Diamond Wire Saw Machine shall be framed by Manager of the Mine in consultation with Engineer of the mine and the same shall be enforced.

In the interest of Safety, all the Owners, Agents and Managers of the Mine in which Diamond Wire Saw Machines are being used and OEM of such machines are advised to comply with the aforesaid safety requirements so that accidents due to these causes are mitigated.

28/11/15

(R. Subramanian)
Director General of Mines Safety

सत्यमेव जयते

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Government of India
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Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

**No. DGMS / Exam/Genl/2019/ 01** **Dhanbad, dated the 31st January, 2019.**

**To**

**The Owners, Agents and Managers of all Coal and Metalliferous Mines.**

**Subject: Online payment of Examination Fees under the CMR, 2017 and MMR, 1961.**

Sir,

Earlier, you were requested to give wide publicity in the field including VTCs / GVTCs, regarding online payment of Examination fees through website namely www.bharatkosh.gov.in vide DGMS Circular No. DGMS/Exam/Genl/2018/1, dated 26-10-2018.

Now, it has been decided that from 01st April, 2019 onwards, the fees to be paid in respect of every application for the grant of a certificate including exchange and duplicate certificates both under the Coal Mines Regulations, 2017, the Metalliferous Mines Regulations, 1961 and also for Medical Examination shall only be paid online through "**www.bharatkosh.gov.in**". The applications received at this Directorate on or after 01st April, 2019 shall not be accepted, if fees are paid through any other mode of payment.

8/1/2019

(Prasanta Kumar Sarkar)
Director General of Mines Safety

खान सुरक्षा महानिदेशालय/Directorate General of Mines Safety
भारत सरकार / Government of India
श्रम एवं रोजगार मंत्रालय/ Ministry of Labour & Employment

**DGMS Technical Circular No. 01 of 2019**

**To**

**The Owner/Agent/Manager of all Oil/Gas Mines**

**Subject:** Safe conduct of operations in Workover Oil/Gas Mines.

An enquiry conducted into a recent occurrence of a major accident in an onshore workover oil mine revealed that while a group of seven persons was engaged in workover operations without any statutory supervision in an area which was surcharged with hydrocarbon gas cloud created at the site due to workover operations, when there was a sudden fire because of ignition caused by a mobile telephone operation by one of them, which engulfed the area inflicting severe burn injuries to 06 (six) of them to which one succumbed instantly while the remaining 05 (five) persons succumbed during the course of treatment in hospital over the next 20 days.

The enquiry revealed that this accident would have been averted had

a) a separator vessel been provided on stream during mud circulation operations as a part of well activation procedures to separate HC gas and other fluids flowing out as well produce and for safe conduit/handling and disposal of gas after burning in a suitable flare stack, thus effectively preventing the formation of HC gas cloud about the rig and the activation tank, as required by the provisions of Regulation 62(2)(c) and Regulation 129(7)(a) & (b) of the OMR, 2017 read with clause 14.11(f) of the Standing Operating Practices framed for workover operations onshore in January, 2012 by M/s ONGC,

b) the workover operations for well activation been kept suspended in the absence of any direct supervision after the Installation Manager left the premises thus ensuring that well servicing operation is done only under the direct supervision of a competent person authorized for the purpose, as required under the provisions of Regulation 77(d) of the Oil Mines Regulations, 2017,

c) the carrying and use of mobile telephone in workover areas by persons employed been prevented by effective supervision thus not negligently or willfully do anything likely to endanger life or limb in the mine or negligently or willfully omit to do anything necessary for the safety of the mine or of the persons employed therein, as required under provisions of Regulation 133 read with Regulation 96(3) of the Oil Mines Regulations, 2017, and

d) the persons employed in workover operations been provided with Basic Vocational Training on various risks and dangers associated with workover operations, as required under Rule 6 of the Mines Vocational Training Rules, 1966.

Accordingly, a national level technical workshop titled "Safe Practices in Onshore Workover and Well Testing Operations" was organized by the Ahmedabad Asset of M/s ONGC Ltd under the aegis of this Directorate on the 29th of June 2019 at Ahmedabad and which was well attended by representatives from various oil/gas companies with operational mines. In accordance with the deliberations of the workshop and also detailed discussions with various stake holders, the following recommendations were arrived at in respect of any Workover Oil/Gas mine in operation.

1. It shall be ensured that person(s) deployed in the workover area within 30m from any tank, separator, oil well, oil/gas manifold at the installation including in Zone -2 hazardous area, do not carry/possess mobile phones, any electronic device, cigar, cigarette, biri/other smoking apparatus or any match or kind which is capable of producing a light, flame or spark, excepting intrinsically safe apparatuses or such devices which are housed in a flame proof enclosure.

2. Before employing any person at the installation, it shall be ensured that such persons have undergone adequate and appropriate training under the Mines Vocational Training Rules, 1966 on safe conduct of various operations. Such persons may also be imparted requisite training on behavioral safety.

3. It shall be ensured that no person is permitted to enter into any place in the workover area which is likely to contain dangerous levels of hydrocarbon gases, without wearing suitable fire-proof whole-body vests/jackets, to protect from sudden fire.

4. Whenever any operation connected to the conduct of workover are carried out, continuous presence of an official/Installation Manager shall be ensured at site for the purpose of proper management, control, supervision and direction of all workover operations.

5. Before commencement of operation at the installation, it shall be ensured by the Manager that a thorough Job Safety Analysis is carried out and various attendant issues arising thereof are addressed in accordance with law.

6. There shall be provided a system for effective handling, conduit and/or safe disposal of hydrocarbon gases through a properly constructed and maintained flare stack, thereby preventing accumulation and discharge into atmosphere.

7. A system of continuous monitoring and detection for hydrocarbon gases at all pre-defined locations by the Manager for the purpose, shall be provided in addition to monitoring by portable spot gas detection systems on hourly basis or at shorter intervals as may be decided by the Manager. A record of such monitoring/detection by portable spot gas detection systems shall be kept in a register kept for the purpose and shall be signed and dated by the person making the measurement. In case of the continuous monitoring and detection system, the measured readings may be kept in non-editable electronic form.

8. It shall be ensured that suitable protective systems such as Automatic Fire Detection and Suppression System (AFDSS), engine coolant temperature sensors, engine oil pressure gauge, over-heating tripping system and exhaust manifold & turbo charger guards, are provided and maintained on every internal-combustion (IC) engine. It shall also be ensured that the exhaust of every IC engine including exhaust pipe, muffler/silencer, are adequately insulated/protected to prevent contact with inflammable fluids.

9. It shall be ensured that every Draw Works is provided with a Fail-Safe braking system so as to get automatically applied in case of any pneumatic/hydraulic component failure.

10. It shall be ensured that equipment maintenance shall be carried out as per the procedure and schedule as per OEM guidelines/recommendations.

11. It shall be ensured that the entire workover area is kept under effective CCTV surveillance to monitor all operations closely.

12. Care shall be taken to ensuring that various SOPs made in connection with workover operations shall be in accordance with OMR 2017 and relevant OISD guidelines issued from time to time.

Therefore, in the interest of safety and specially in the wake of such accident as mentioned above, the Owner, Agent and Manager of all workover oil/gas mine are advised to strictly comply with the above recommendations.

30/10/24

(R. Subramanian)
Director General of Mines Safety(Off)

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भारत सरकार
Government of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS (Legis)/Circular No/02 Dhanbad, 24/05/2019

To,

All Owner, Agents and Managers of Mines.

**Subject:- Equal employment opportunities for women in mines and exemption from the provisions of section 46 of the Mines Act, 1952 (Revised)-Reg.**

Sir,

The Central government exempts the women employed in any mine aboveground including opencast workings and in any mine belowground from the provisions of Section 46 of the Mines Act, 1952 vide following Gazette notification published in the Gazette of India:

| Sl No. | Gazette notification | Subject | Published in Gazette of India in | Date of publication |
|---|---|---|---|---|
| 01. | 393{S.O.506(E)} | Exemption for the women employed in any mine above ground and in mine below ground from the provision 46 of the Mines Act, 1952. | Part II, Section 3, Sub-Section (ii) | 29th January, 2019 |

The copy of the above notification may be retrieved from egazete.nic.in website.

The Owner or mine management shall frame a standard operation procedure (SoP) for adoption and implementation during employment of women in underground mines and between 7 pm and 6 am in above ground and opencast mines, based on the Annexed guidelines.

Yours faithfully

Utpal 23/5/2019

(Utpal Saha)

Director General of Mines Safety.

**Annexure-I**

## Guidelines for framing Standard Operating Procedure (SoP) for adoption by the mine owner / mine management during employment of women in their respective mines:

Every mine owner or mine management shall frame Standard Operating Procedure for adoption during employment of women in underground mines and between 7 pm and 6 am in aboveground & opencast mines as per the Mines Act, 1952 and shall also be accountable for its implementation in true letter and spirit. Desired SoP shall be framed in locally spoken and understood language and must provide for following bare minimum needs:

### A. Infrastructure

- Appropriately located functional washrooms for women.
- Crèche room (with Breastfeeding facility) with adequate staff.
- Appropriately located separate rest shelter with security and wash room facility.
- Guards (female) at isolated places with adequate shelter.
- Lighting at work places, pathways and rest rooms.
- Closed circuit televisions at conspicuous places with backend support.
- Phone/ sensors / emergency alarm at work places, pathways and rest rooms with in-built system for effective response.
- Display at any conspicuous space in local language, the penal consequences of sexual harassment at workplace and the order constituting internal Complaints Committee (ICC) under the Sexual Harassment Act.
- First Aid Rooms with female nurse.
- Separate transportation facility through GPS enabled vehicle having female guards for transporting women from home to work place and back during night and also for transportation to respective work places where ever such provision exist for other workers.
- Arrangements for providing prior intimation of extreme weather condition at work places.

### B. Specified jobs / locations

- Identifying work places and jobs on the basis of location, physical & mental strength required and suitability of work environment for women's health including reproductive health.
- Providing information about hazards associated with respective work places and necessitating written consent from women employees before deployment.

### C. Administration

- Gender neutral administration.
- Performance based transparent evaluation system for promotion, job allocation and deployment.
- Notifying sexual harassment at workplace as misconduct in service rules with provision for rapid closure of cases and stringent penalties.
- Constitution of Internal Complaints Committee and framework for addressing complaints of sexual harassment in confidence.
- System for insulating complainants against retaliation.

- Systematic training on gender sensitivity for all, self defence for women employees, how to deal with mental, physical and sexual harassment.
- Provision for free access to legal aid in cases of crime against women.
- Holding workshops and community talks for sensitising, enhancing cooperation and cohesion among workers at respective work places at frequent intervals and helping employees to develop their own mechanism for dealing with issues related to gender bias and harassment of all kinds.
- Holding workshops on provisions of the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 for members of Internal Complaints Committee.
- Publishing the number of cases filed, disposed off and quantum of penalties awarded in each disposed off cases related to sexual harassment at workplace for wide publicity.
- Adopt policy that prohibited unwelcome behaviour constituting sexual harassment at workplace; prevented sexual harassment through orientation, awareness and sensitization session; and encouraged women employees to raise issues of sexual harassment at specified forum.

## D. Relaxation for specific reasons

- Relaxation in reporting time, duration of continuous work, as deemed necessary etc for pregnant and lactating women, during monthly menstrual period.

## E. Duties and responsibilities

- Owner's Obligation in creating safe working environment for women, constituting Internal Complaints Committee (ICC) under Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 and all the above mentioned provisions. Duty of every person employed in mine in respect of protecting dignity of women.
- Deployment of women at isolated and faraway places of work with all precautionary measures.
- Preparing handout / handbook on rights and obligation of every employee.
- Provisions of crèche and Maternity Benefit Act.
- Duties and responsibilities of persons in the management / administration for creating an enabling work environment.
- Duty of every person employed in mine in respect of protecting dignity of women.
- Deployment of women during the hours of 6 AM and 7 PM in underground mines will be in groups, as notified by the Government.

## F. Inspection schedule

- Developing a check list for effective implementation of control measures.
- Inspection by top management.
- Inspection by managements of sister concern or friendly neighbourhood.
- Inspection by regulatory agencies of the State and Central Government.
- The employer shall send a fortnightly report to the Regional Inspector of Mines about the details of women employees engaged in mines and shall also report occurrence of any untoward incident related to women employees to the

Inspector of Mines and local Police station as well. The Regional Inspectors and Chief Inspector shall ensure strictly compliance of the provisions of SoPs framed by employers in reference to women employees through inspection from time to time and take appropriate action against mine owners or mine managements for non-compliance.

## G. Feedback and revision for effectiveness

- Arrangements for feedback from women employee at regular interval and review of existing infrastructure and other facilities for safe deployment.
- Provision for risk assessment in case of change in working condition.

रजिस्ट्री सं० डी० एल०-33004/99 REGD. NO. D. L.-33004/99

भारत का राजपत्र
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## श्रम एवं रोजगार मंत्रालय

## अधिसूचना

नई दिल्ली, 29 जनवरी, 2019

का.आ. 506(अ).—केंद्रीय सरकार खान अधिनियम, 1952 (1952 का 35) की धारा 83 की उप-धारा (i) के अधीन प्रदत्त शक्तियों का प्रयोग करते हुए, किसी भी भूमि के उपर खान और किसी भी भूमि के नीचे खान में नियोजित स्त्री को खान अधिनियम, 1952 की धारा 46 के उपबंधों से निम्नलिखित शर्तों पर छूट प्रदान करती है:—

(क) किसी भी सतही खान में नियोजित स्त्री के मामले में, —

(i) खान का स्वामी सतही खान, जिसमें विवरत खनित सम्मिलित है, में संध्या 7:00 बजे से प्रात: 6:00 बजे के बीच स्त्री को अभिनियोजित कर सकता है;

(ii) यह अभिनियोजित संबंधित स्त्री कर्मचारी की लिखित सहमति के उपरान्त किया जाएगा;

(iii) अभिनियोजित स्त्री को व्यावसायिक स्वास्थ्य, सुरक्षा और स्वास्थ्य संबंधित पर्याप्त सुविधा तथा सुरक्षा प्रदान की जाएगी;

(iv) स्त्री का अभिनियोजन मुख्य खान निरीक्षक द्वारा समय-समय पर, इस संबंध में जारी किए गये मार्गदर्शिका के आधार पर मानक प्रचालन प्रक्रिया को विरचित करने तथा कार्यान्वयन की शर्त पर किया जाएगा;

(v) स्त्री का अभियोजन एक पाली में कम से कम तीन के समूह में किया जाएगा;

(ख) किसी भी भूमि के नीचे खान में नियोजित स्त्री के मामले में,—

(i) खान का स्वामी भूमि के नीचे खान में जहाँ लगातार उपस्थिति की आवश्यकता अपेक्षित नहीं है, प्रात: 6:00 बजे से संध्या 7:00 बजे के बीच स्त्री को तकनीकी, पर्यवेक्षी तथा प्रबंधकीय कार्य पर नियोजित कर सकता है;

(ii) यह अभिनियोजन संबंधित स्त्री के लिखित सहमति के उपरान्त किया जाएगा;

(iii) अभिनियोजित स्त्री को व्यावसायिक स्वास्थ्य, सुरक्षा तथा स्वास्थ्य संबंधित पर्याप्त सुविधा तथा सुरक्षा प्रदान की जाएगी;

(iv) स्त्री का अभिनियोजन मुख्य खान निरीक्षक द्वारा इस संबंध में समय-समय पर जारी किए गये मार्गदर्शिका के आधार पर मानक प्रचालन प्रक्रिया को विरचित करने तथा कार्यान्वयन की शर्त पर किया जाएगा;

(v) स्त्री का अभिनियोजन कम से कम तीन के समूह में किया जाएगा:

[फा. सं. जेड-16025/45/2017-आईएसएच-II]

कल्पना राजसिंहोत, संयुक्त सचिव

## MINISTRY OF LABOUR AND EMPLOYMENT

## NOTIFICATION

New Delhi, the 29th January, 2019

S.O. 506(E).—In exercise of the power conferred under sub-section (1) of section 83 of the Mines Act, 1952 (35 of 1952), the Central Government hereby exempts the women employed in any mine above ground and in any mine below ground from the provisions of section 46 of the Mines Act, 1952, subject to the following conditions, namely:—

(a) in the case of women employed in any mine above ground,—

(i) the owner of a mine may deploy women between the hours of 7 pm and 6 am in the mine above ground including opencast workings;

(ii) the deployment of women shall be after obtaining the written consent of the concerned woman employee;

(iii) the women so deployed shall be provided with adequate facilities and safeguards regarding occupational safety, security and health;

(iv) the deployment of women shall be subject to the framing and implementation of Standard Operating procedures on the basis of the guidelines issued in this regard by the Chief Inspector of Mines from time to time;

(v) the deployment of women shall be in a group of not less than three in a shift.

(b) in the case of women employed in any mine below ground,—

(i) the owner of a mine may deploy women between the hours of 6 am and 7pm in technical, supervisory and managerial work where continuous presence may not be required.

(ii) the deployment of women shall be after obtaining the written consent of the concerned woman employee;

(iii) the women so deployed shall be provided with adequate facilities and safeguards regarding occupational safety, security and health;

(iv) the deployment of women shall be subject to the framing and implementation of Standard Operating Procedures on the basis of the guidelines issued in this regard by the Chief Inspector of Mines from time to time;

(v) the deployment of women shall be in a group of not less than three.

[F. No. Z-16025/45/2017-ISH-II]

KALPANA RAJSINGHOT, Jt. Secy.

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सत्यमेव जयते
भारत सरकार
Government of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS/Exam/Genl/2018/ 01 Dhanbad, dated- 26 /10/2018

To,

The Owners, Agents and Managers of all Coal and Metalliferous Mines.

**Subject: - Online payment of Examination Fee under the CMR, 2017 and MMR, 1961.**

Sir,

The Examination fees under the Coal Mines Regulation, 2017 (earlier CMR, 1957) and the Metalliferous Mines Regulations, 1961 are being paid by the applicant by way of either Indian Postal Order (IPO) or Demand Draft (DD) of Banks.

In pursuance of the policy of the Govt. to promote e-governance and digital transaction, a system of online payment of Examination fee has been introduced. The payment is enabled through website namely www.bharatkosh.gov.in. In this regard you are request to visit DGMS website "www.dgms.gov.in for illustration of the payment process.

You are requested to give wide publicity in the field including through VTCs/GVTCs, regarding online payment of Examination fees.

Yours faithfully

26.10.18

(Prasanta Kumar Sarkar)
Director General of Mines Safety.

सत्यमेव जयते

भारत सरकार
Government of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS (S&T)/(Tech.) Circular No. 01 Dhanbad, Dated 13-08-2018.

To,

All Owners, Agents and Managers of coal and metalliferous mines

**Sub: Standards and Safety Provisions of Diesel Equipment for using in belowground coal and metalliferous mines.**

## 1.0 Background:

Use of diesel equipments in belowground coal and metalliferous mines in India is increasing in recent past, due to its advantages like flexibility in operation, less interdependency with other systems, higher mobility and high power, etc. Diesel operated shuttle/ram cars, LHDs, free steered vehicles are under operation in mechanised belowground coal mines and diesel operated LPDTs/trucks, high capacity loaders/LHDs, drills and other miscellaneous equipments are being used in underground metalliferous mines. However, use of diesel equipment in belowground mines is having inherent health and safety hazards like diesel emissions, noise, dust, fire of fuel and lubricants, explosion of inflammable gasses, collision of the vehicles, caught in between, etc.

In view of this, the eleventh National Conference on Safety in Mines, which was held in New Delhi on 4th & 5th, July, 2013, recommended to appoint an expert Committee to examine and frame standards and safety provisions for diesel equipments for using in belowground Coal and Non-coal Mines.

## 2.0 Constitution of Committee:

Accordingly, DGMS has constituted a Committee in the month of February, 2017 with representatives from coal companies and metalliferous mines companies, academic Institution, and officers of DGMS under Chairmanship of Dy. Director General of Mines safety (Mech.), DGMS.

The Committee, based on the inputs, inferences drawn from several meetings with stakeholders on the above subject, recommended standards and safety provisions of diesel equipments for using in belowground coal and metalliferous mines.

## 3.0 Standards and Safety Provisions:

This standard specifies design requirements of diesel equipments and examinations, testing, maintenance & monitoring of the equipments for its safe operation/use in underground coal and metalliferous mines. It also specifies minimum ventilation requirements, threshold limits of noxious and inflammable gasses and Diesel Particulate Matter (DPM) and its monitoring in mines, requirements of roadways for diesel equipment, training and competencies required for the personnel for operating, testing, maintaining the equipments, etc.

In view of the above, the standards and safety provisions of diesel equipments for using in belowground coal and metalliferous mines has been enclosed as Annexure for strict compliance.

13.08.18

(Prasanta Kumar Sarkar)
Director General of mines Safety

Encl.: As above

Annexure to DGMS (S&T)/(Tech.) Circular No. 01 Dhanbad, Dated 13/8/2018

**Sub: Standards and Safety Provisions of Diesel Equipment for using in belowground coal and metalliferous mines.**

## 1.0 General design and Construction

Every diesel equipment to be used in underground mines shall be of good construction, suitable material, adequate strength, free from visible defects and shall be properly maintained. The diesel equipment and each accessories thereof, except the tyres (which shall be of anti-static material), shall so far as is practicable be constructed of non-inflammable material and any inflammable material, if used, shall be shrouded with a substantial non-inflammable covering.

## 1.1 Ergonomic and anthropometric requirements for operator and passenger compartments in the diesel equipment

1.1.1 All diesel operated equipment shall be provided with cabin/canopy for operator, of sound construction, suitable material and adequate strength. Such operator cabin shall be provided with 'Falling Object Protective Structure' (FOPS) and "Roll Over Protective Structure" (ROPS) in accordance with ISO – 3449:2005 and ISO – 3471:2008 respectively or its revised versions or any internationally accepted standards.

1.1.2 Passengers' compartment shall be of sound construction, suitable material and adequate strength so that the passengers would not be injured in case of dangerous occurrence or accident.

1.1.3 Protection shall be provided to avoid possible ingress of material/objects from the surroundings of the equipment into the operator's and passengers' compartments.

1.1.4 Safe access to the operator and passenger compartments shall be provided. The entrance to any compartment shall be designed to prevent personnel being thrown - out of the equipment.

1.1.5 All diesel operated equipment with closed cabin shall be provided with an emergency exit.

1.1.6 The operator and passengers' compartments shall be designed to prevent any part of a person's body projecting outside the envelope of the compartment, or coming into accidental contact with the roof, side of the roadway or with moving parts of the equipment.

1.1.7 The design of the operator's space must allow for free movement and comfortable operating postures for the operator. Any manoeuvres necessary for the operation of the equipment should be able to be performed safely and without fatigue or discomfort. Sufficient leg space both vertically and horizontally is essential for comfort and safety in the operation of foot controls.

1.1.8 The operator seat shall be ergonomically designed to permit safe operation. The design of the seat (s) shall have provision for horizontal, vertical and/or swivel adjustment to accommodate operator(s). Compartment space shall be sufficient to allow for the full range of adjustment required to operate the equipment safely and comfortably. The seat(s) shall be covered and padded so as to minimise discomfort.

1.1.9 The seat and it's suspension shall be so designed to reduce vibration transmitted to the operator to the lowest level that can be reasonably achieved.

1.1.10 Seat belt(s) shall be fitted to every operator and passenger's compartment of the equipment.

**1.2 Noise:** The operator and passengers shall not be exposed to noise level that exceeds an eight hour equivalent continuous sound pressure level of 85 dB(A) and wherever it exceeds 85 dB(A), Personnel Protection Equipment (PPE) of adequate strength shall be used by the operators and passengers.

**1.3 Visibility:** The operator's field of view shall comply with the acceptance criteria specified in ISO 5006.3:2006 when tested in accordance with ISO 5006.1:2006 and evaluated in accordance with ISO 5006.2:2006 or its revised versions or any internationally accepted standards.

**1.4 Vibration:** The vibration exposure limits of the operator and passengers shall comply with the acceptance criteria specified in ISO 2631:2014 or its revised version or any internationally accepted standards.

**1.5 Controls and display system at operator cabin**

1.5.1 Controls shall be laid out and designed to allow easy and safe operation based on the principle that a given direction of movement of any control produces a consistent and expected effect. The surfaces of frequently used pedals shall be fitted with skid resistant type materials.

1.5.2 Marking of all controls shall be indelible and illuminated to enable the operator to see gauges necessary for safe driving without the use of a cap lamp.

1.5.3 The distance between control levers, adjacent foot pedals, knobs, handles, operator's body and other machine parts shall be sufficient to allow unhindered operation without unintentional actuation of adjacent controls.

1.5.4 The controls shall be of suitable design and construction and arranged so that they are able to be operated with ease from the operator's seat and within the operator's force limits.

**1.6 Guards and Shields**

1.6.1 Shields shall be fitted to all vital components of the equipment to prevent its damage.

1.6.2 Guards or shields shall be provided in the vicinity of exhaust and turbocharger to prevent fuel or oil spraying on hot surfaces.

1.6.3 All dangerously exposed moving parts of the equipment shall be provided with suitable guards of substantial construction to prevent injury to personnel.

1.6.4 All pipes and hoses of fuel oil and lubricants shall be covered so that oil from any leakage cannot contact any exposed metal surface where the temperature exceeds $120^0$C under any condition of the equipment.

**2.0 General safety provisions**

**2.1 Braking system**

2.1.1 Efficient braking systems shall be provided for every movable equipment.

2.1.2 The following brakes shall be provided in the every equipment conforming to the standard ISO 3450: 2011 or its revised version or any internationally accepted standards:

a) Service brake - to be used as the primary braking system during normal operation of the equipment.

b) Emergency brake - to be applied by the operator in the event of a failure of the service brake.
c) Parking brake - used to prevent movement of stationary equipment.

Provided that at least one of the brakes shall be "fail safe", i.e. the spring applied-hydraulically released (SAHR).

2.1.3 The brakes should be activated automatically if:

a) Cabin door is not fully closed, if door is provided
b) Engine oil pressure is low,
c) Hydraulic brake pressure is low,
d) Steering control valve fault is active, if provided
e) Engine is shut down, and
f) Whenever transmission comes to neutral position inadvertently.

## 2.2 Warning Devices

2.2.1 All diesel equipments shall have an audio warning device of giving adequate audible warning signal and provided at suitable location conveniently near to the operator.

2.2.2 All equipments shall be fitted with suitable pre-start warning alarm. A mechanically operated device, like gong hammers, of giving adequately audible warning signal, in addition to any other type of horn, shall be provided.

2.2.3 All equipments shall be fitted with audio visual alarm (AVA). In case of coal mines, the AVA shall conform to DGMS Tech. Circular (Electrical) Approval No. 21, dated 05.10.2015 or its revised version.

2.2.4 A warning device shall be provided in the operator's cabin, to indicate when the rear dump body is elevated.

2.2.5 In case of lifting equipment, audio warning device shall be provided to give warning during lifting and lowering of platform.

## 2.3 Lighting

2.3.1 Efficient and suitable headlights capable of showing any obstruction in the roadway atleast upto 60m away from the equipment shall be provided.

2.3.2 A suitable cabin light shall be provided, so that all controls and instruments are visible to the operator.

2.3.3 A cap lamp shall be provided in the operator's cabin for emergency.

2.3.4 Equipment normally operated in both directions shall be equipped with headlights for both directions. The reversing lights shall get switched ON automatically when the equipment engages in reverse gear.

2.3.5 Red Retro- Reflective Reflectors shall be provided on four sides of the equipment at suitable positions.

## 2.4 Fire Suppression system

2.4.1 All Diesel operated equipment shall be provided with suitable type of Automatic Fire Detection and Suppression System conforming to DGMS (Approval) circular. No.02 of 2013 or its revised version.

2.4.2 The fire suppression system shall provide automatic fire detection and suppression for all the following parts of the equipment:

(a) The engine, transmission, hydraulic pumps and tanks, fuel tanks, exposed brake units, air compressors and battery areas, as applicable, on all diesel-powered equipment; and

(b) Fuel containers and electric panels or controls used during fuel transfer operations on fuel transportation units.

2.4.3 The fire suppression system shall include a fire alarm and system fault annunciator that can be seen and heard by the equipment operator.

2.4.4 The fire suppression system shall provide for automatic engine shutdown when the alarm alerts the operator. Engine shutdown and discharge of suppressant agent may be delayed for a maximum of fifteen seconds after the fire alarm annunciator alerts the operator.

2.4.5 Manual actuators: At least two manual actuators shall be provided with at least one manual actuator at each end of the equipment. If the equipment is provided with an operator's compartment, one of the manual actuators shall be located in the compartment within easy reach of the operator. For stationary equipment, the two manual actuators shall be located with at least one actuator on the stationary equipment and at least one actuator at a safe distance away from the equipment, and in air intake.

## 2.5 Control devices and instruments

Every equipment shall be provided with the following control devices and instruments including gauges for safe operation. The controls shall be arranged in the operator cabin so as to be within easy reach of the operator from his operating position.

### 2.5.1 Controls

a) Engine throttle control.
b) Engine start-stop control.
c) Forward-reverse control.
d) Brake controls including emergency brake.
e) Emergency stop function.

### 2.5.2 Instruments and gauges

a) Engine hour meter
b) Engine lube oil pressure gauge
c) Engine coolant temperature gauge
d) Fuel level indicator
e) Transmission oil temperature gauge
f) Transmission oil pressure gauge
g) Hydraulic oil temperature gauge
h) Exhaust outlet temperature gauge (for equipment used in coal mines)
i) Air pressure gauge for brake system, wherever applicable
j) Filter clog indictors for air and oils
k) Engine RPM meter
l) Audio-visual signals or panel lights for:

i. Low engine oil pressure
ii. Coolant temperature high

## 2.6 Electrical safety provisions

The following safety provisions shall be provided in all Diesel equipments:

2.6.1 All electrical components and accessories shall be Flame proof/Intrinsically safe or both conforming to relevant IS/ IEC standards for use in below ground coal mines.

2.6.2 Suitable Ingress Protection shall be provided to prevent ingress of dust and water/ moisture entering into the interior of the electrical apparatus.

2.6.3 The circuit voltage for remote control and electrical interlocking of apparatus shall not exceed 30 Volts.

2.6.4 Necessary protection against over-current and short circuit shall be provided in all electrical circuits/individual apparatus.

2.6.5 All cables shall comply to the provisions of the DGMS Tech. Circular (Electrical) No. 12, dated 25.05.2015 and corrigendum issued vide DGMS Tech. Circular (Electrical) Approval No. 01, dated 19.02.2016 in addition to the special requirement, if any, specifically for safe operation of the equipment or its revised version, for use in below ground coal mines.

2.6.6 Strapping of electrical harnesses to hydraulic and fuel lines is not permitted.

2.6.7 The battery shall be housed in a compartment that provides adequate clearance between the battery terminals and any lid. The cover provided over battery terminals shall be insulated underside. Battery compartments shall be properly ventilated and located so that it does not form part of an access pathway or platform during maintenance.

2.6.8 Equipment shall be provided with a clearly identified lockable isolation switch as close to the battery as practicable, which shall isolate the battery and shut down the engine when switched off as required under DGMS Circular No. 2 of 2017, dated 15.6.2017, issued on "Lock out and Tag out- energy shut down procedures".

2.6.9 To avoid risk of ignition due to electrostatic charge during use, maintenance or cleaning of the equipment, the selection of material and area of exposure shall be within the limits as per the relevant recommendations, such as ISO 10605:2008.

2.6.10 No part of the equipment/machine shall be made of light metals or its alloys which causes incendive sparking due to impact or friction.

## 2.7 Additional safety provisions for all tyre mounted equipments

2.7.1 Articulation safety lock shall be provided in articulated steering equipment. All articulated equipment shall be equipped with a safety bar or a device, which can readily be fitted without special tools, to prevent movement of the articulation joint during maintenance work in the vicinity of this joint.

2.7.2 Load locking valve/hose fail check valve shall be provided on all lifting cylinders to keep Bucket/dump body/lifting platform or any other lifted object stationary in the event of pressure loss of hydraulic oil. During maintenance underneath the extended cylinder, an additional mechanical locking device shall be provided.

2.7.3 There shall be provision for installing wheel chocks on the equipment.

2.7.4 Every equipment shall be provided with emergency steering, which can allow the operator to safely steer the equipment in case of emergency.

2.7.5 Towing arrangements of equipment:

a) The following arrangements shall be provided for towing of the equipment in case of the equipment is inoperable/breakdown:

i. a suitable rigid towing points on both sides, i.e. front and rear
ii. a means of releasing emergency brakes.
iii. a means of steering or guiding the equipment.

b) The equipment towing attachment including coupling pins and other associated components shall be designed and tested to a minimum factor of safety 3 (three) times the maximum tractive effort of the equipment.

2.7.6 Wheel rims shall be of heavy duty to operate equipment on the uneven load conditions, rough roads and corrosive environment present in mines.

2.7.7 Pressure check points shall be provided to measure brake system pressure in case of hydro-static braking.

2.7.8 Brake operation indication lights shall be provided at suitable locations.

## 2.8 Additional safety provisions for Personnel Carriers

2.8.1 Personnel carriers shall be equipped with emergency buzzer in the personnel compartment in order to warn the operator to stop the equipment in case of emergency. The buzzer shall give audible alarm in the operator cabin.

2.8.2 The Personnel carrier shall be provided with downhill, uphill, neutral and/or hydrostatic braking system.

2.8.3 Deadman's switch/device shall be provided in the operator's cabin to automatically shutdown the equipment, if the operator becomes incapacitated.

2.8.4 Steps, rungs, ladders, platforms and walkways shall be provided with non-slip surfaces, and shall minimize rock and soil retention. Hand holds shall be provided inside the compartment for personnel.

2.8.5 Personnel compartment shall have adequate ventilation and illumination.

2.8.6 Personnel carrier shall be provided with lockable gate.

2.8.7 Provision shall be made for transportation of an injured person on stretcher in all personnel carriers.

## 2.9 Additional safety provisions for Lifting Equipment

Every Lifting equipment shall have-

i) an emergency stop button on platform to quickly stop the motion of the mobile elevating platform
ii) supporting legs, wherever required
iii) railings and work platform gates with locking provision
iv) an additional mechanical locking device for work underneath elevated platform
v) load lock valve/check valves in all lifting cylinders
vi) limit switches for lifting and lowering of platform.

## 2.10 Additional safety provisions for Fuel bowsers

2.10.1 The Fuel bowser shall have approved license from Petroleum and Explosives Safety Organization (PESO), where ever applicable.

2.10.2 Fuel tank of the bowser shall be mounted on the chassis by means of fabricated M.S. saddles.

2.10.3 Fuel bowser compartment(s) shall be fitted with discharging faucet ending in a common manifold and heavy duty shut off valve located inside the tank, as per recommendations of PESO.

2.10.4 Opening lever of the valves of the bowser shall be housed in a control box at the rear part of the tanker with locking arrangement.

2.10.5 Top filling pipe of the bowser shall be drawn near to the bottom of the tank with spill proof device complete with leak proof connector with filling hose, and provided with suitable cap with chain.

2.10.6 Internal bulk heads of the bowser shall be stiffened to take care of surge pressure.

2.10.7 The bowser shall have filters with air eliminator for correct meter reading.

2.10.8 Tank of the bowser after completion of fabrication, shall be properly cleaned and treated with two coats of zinc chromate red oxide primer and finished with two coats of synthetic enamel paint.

## 2.11 Additional safety provisions for Explosive Carrier

2.11.1 Every Explosive Carrier shall have valid license from PESO.

2.11.2 The equipment shall not be used for transport of explosives unless it is in a fit condition and complies with the Explosives Rules, 2008.

2.11.3 All electrical wirings shall be protected with a conduit. An isolation switch for battery shall be located in an accessible position.

2.11.4 The equipment shall not be used for carrying passengers

2.11.5 Before the equipments are serviced, an authorized person shall inspect and certify that the equipments are free from explosive residues and the same shall be recorded in soft/hard copy and kept available at mine office.

## 2.12 Additional safety provisions for Explosive charging Equipment

2.12.1 Ammonium Nitrate Fuel Oil (ANFO) loading tanks shall be located so that they are not liable to potential impact damage from uncontrolled movement of the charging unit. Any spillage which may occur during loading does not fall onto any electrical connections, hot surfaces, flammable fluid tanks or filling points.

2.12.2 The hoses used for pumping of explosives shall be fire resistant and anti-static (FRAS).

2.12.3 Storage areas for packaged explosives shall be located so that they are not liable to be potential impact damaged from uncontrolled movement of the charging machine.

2.12.4 If an operator is required to work outside his compartment, the working point shall have-

(a) provisions for stopping and starting the engine.
(b) provisions for activating the fire suppression system.

## 2.13 Additional safety provisions for Diesel Locomotives

Diesel Locomotives shall conform to IS 9999:1981(Reaffirmed 2009) or its revised version along with DGMS - governing conditions for use of Diesel Locomotives in underground mines.

# 3.0 Construction and safety provisions of diesel engine to use in belowground mines

## 3.1. Design of the engine

The engine shall have following requirements-

3.1.1. good intake air cleaning system

3.1.2. fuel filtration system and water separators

3.1.3. well maintained engine cooling system

3.1.4. turbochargers and after coolers, if required

3.1.5. efficient high pressure fuel injection system

3.1.6. minimum engine emissions and Diesel Particulate Matter (DPM).

## 3.2. Engine Compartment

Engine compartment shall comply with the following:

3.2.1 The location of systems such as fuel, hydraulic oil, lubricating oil, other oils, and electric power within the engine compartment should be avoided wherever possible. It shall be shielded from hotspots and against possible damage. Fire wall or a barrier shall be installed to separate the engine compartment from the hydraulic components.

3.2.2 All hoses shall be fire resistant type and be routed away from hot engine surfaces. All pipes and hoses should be covered so that leaked oil cannot contact any exposed heated metal surface under any condition of equipment use. If this is not possible, the exposed metal surface shall be shrouded or heat shielded to reduce the temperature.

3.2.3 The transmission belts used in the diesel engine shall be fire resistant and anti-static (FRAS) type.

3.2.4 All engine exhaust systems shall be installed such that flames or glowing particles shall not be emitted from the engine compartment under any condition of equipment use.

3.2.5 The discharge from any engine breather shall be directed away from external surfaces of the engine system, so that it will not foul such surfaces with oil.

3.2.6 The temperature of any surface of the engine that comes into contact with the mine atmosphere shall not exceed 150°C under any condition of operation.

## 3.3. Cooling System

3.3.1. Every engine shall be provided with efficient cooling system.

3.3.2. Radiator caps provided for cooling systems shall be fitted with a means of safely relieving pressure to prevent scalding of personnel. Radiator caps shall be guarded against damage by foreign objects.

## 3.4. Fuel System

3.4.1. All fuel lines shall be heat resistant, corrosion resistant double braided hoses or metal pipes. All fuel lines shall be properly secured.

3.4.2. Fuel filter elements shall be enclosed within suitable containers.

3.4.3. All fuel tanks shall be substantially constructed and protected against damage by collision.

3.4.4. All fuel tanks shall be fitted with non-leaking caps which shall be effective irrespective of the inclination of the equipment and the caps shall be secured to the tank.

3.4.5. For high capacity equipment, diesel dispensing shall be of high volume diesel transfer facility, which includes fuel receiver with non-return valve, breather and other related accessories, to avoid spillage of fuel.

## 3.5. Engine protection system

3.5.1. The engine shall be equipped with suitable sensors to monitor and control engine performance, temperature and level of coolant and lube oil pressure, etc. When the sensor value differs from the preset parameter value limit, the engine protection system shall force the engine to decrease torque and warn the operator.

3.5.2. Every engine shall be provided with suitable sampling points for monitoring of engine lubricating oil pressure, engine speed, engine coolant temperature, inlet manifold vacuum, exhaust back-pressure and gas stream emissions both before and after exhaust treatment, temperature of emissions, etc.

## 3.6. Intake System

3.6.1. The location and installation of intake filter housings shall be situated away from heat sources (like exhaust) and dust sources (like tires).

3.6.2. Every underground diesel engine shall be equipped with a two-stage intake filter system.

3.6.3. Engine intake filter choke indicators shall be provided and located suitably for its easy monitoring by operator.

## 3.7. Exhaust System

3.7.1. (i) In case of coal mines, exhaust system shall consist of exhaust pipe from the exhaust manifold, exhaust conditioner, flametrap, spark arrester, exhaust cooling/dilution system and silencer. The exhaust system shall be provided with monitoring and shutdown devices.

(ii) In case of metalliferous mines, exhaust system shall consist of exhaust pipe from the exhaust manifold, exhaust conditioner, exhaust cooling/dilution system and silencer. The exhaust system shall be provided with monitoring and shutdown devices.

(iii) If any existing equipment is not having exhaust cooling/dilution system, within 12 months of issue of this standard, the equipment shall be incorporated with the exhaust cooling/dilution system.

3.7.2. The exhaust pipe shall be double walled construction to reduce exhaust surface temperature and manufactured with stainless steel to resist corrosion.

3.7.3. The exhaust conditioner/catalytic convertor shall be capable to dilute and render the exhaust gases harmless.

3.7.4. The final diluted exhaust gases shall be discharged in such a manner that they are directed away from the operator's compartment and also away from the breathing zones of persons.

3.7.5. The temperature of the cooled/diluted exhaust gases discharged in to atmosphere shall not exceed 85°C. In case of metalliferous mines, the temperature shall be measured at 1 m away from the discharge point.

## 3.8. Testing of Engines

3.8.1. Type testing of diesel engine shall be conducted by OEM at any Government approved test house or NABL accredited laboratory subject to confirmation of its ability to conduct such tests or International accredited laboratory/recognized laboratory of country of origin, conforming to BS-III emission norms of Construction Equipment Vehicles (CEV) or its revised versions issued by the Government of India from time to time or its equivalent standard of the country of origin. The test certificate of the same shall be kept available at mine office.

3.8.2. A specification plate shall be provided for each diesel engine system, permanently affixed either to the system or, if impracticable, adjacent to the system in an easily seen position. The specification plate shall include the following information:

a) Engine system protection rating
b) Designation and year of the standard followed
c) Name of the diesel engine system manufacturer
d) Date of manufacture of the diesel engine system
e) Serial number of the diesel engine system
f) Maximum compound, transverse and longitudinal angles of operation
g) Maximum concentrations of undiluted exhaust gas emissions measured during type testing.

3.8.3. The diesel engine system manufacturer shall supply the following documents to each purchaser alongwith consignment:

a) The general arrangement drawing
b) A letter of compliance for explosion protection and Standards followed- in case of coal mines.
c) Make and model of the engine
d) Serial number of the engine
e) Date of the routine assessment and the letter of compliance. A summary of results from routine testing, including gas testing.
f) Details of maintenance requirements, specifications and any other drawings/documentation necessary to maintain the diesel engine system in compliance with this Standard.

3.8.4. Wherever required, warning labels shall be fitted to each diesel engine system, at clearly visible locations, to identify major hazards that may cause injury to persons. Labels shall be permanently fixed and indelibly marked.

## 4.0 Additional construction and safety provisions for diesel engines used in underground coal mines and metalliferous mines in which Regulation 142 of Metalliferous Mines Regulations, 1961(or as amended from time to time) is applicable

4.1 Every diesel engine system used in underground coal mines shall be designed conforming to National standard (when formulated) or any internationally accepted standard for Explosion-protected diesel engine and shall be approved by Chief Inspector of Mines under Regulation 208(3) of Coal Mines Regulations, 2017 or as amended from time to time.

4.2 The diesel engine used in underground coal mines shall be Explosion-protected, i.e., designed, manufactured and maintained such that it will not propagate or generate flame or sparks, which could initiate an explosion of the surrounding inflammable atmosphere, if any.

4.3 The engine shall be compression ignition, diesel-fuelled and water-cooled type. It may be naturally aspirated, turbo-charged and/or super-charged. The diesel engine systems shall also be designed for a limited time safe operation in atmospheres containing up to 1% methane.

4.4 The equipment shall be fitted with at-least one automatic methane detector to detect the general body concentration of methane around the vehicle. The detector shall automatically activate a visual alarm to warn the operator when the concentration of methane exceeds 0.5% and shall shut off the engine when the concentration of methane exceeds 0.75%.

4.5 In case of such shutdown and if the equipment is required to be retrieved to a safe location, Manager shall frame suitable SOP for its retrieval.

4.6 All rotating components external to the engine (e.g., fan hubs, fan blades, pulleys) shall not be made of light metal and its alloys (which is incendive to sparking) and the use of non-metallic materials for external components of a diesel engine system shall be kept to a minimum (where such materials are used, they shall be shielded and routed away from heat sources). Cooling fans and rotating parts shall be guarded.

4.7 Air inlet systems shall be fitted with an inlet flametrap, an air filter assembly and an inlet manifold vacuum monitor.

4.8 The flametraps provided at the inlet and exhaust shall be capable of preventing the propagation of an explosion. Where a water-based flametrap is fitted, tests shall be conducted to ensure the engine exhaust system remains explosion protected at all angles of inclination during operation.

4.9 The ignition system of the diesel engine shall be of either pneumatic or hydraulic or any other explosion-protected system. The system shall be readily available all the times. A suitable standby portable type of such system shall be made available.

4.10 Compressors forming part of a diesel engine system shall be water cooled. Hoses that are attached to a compressor delivery port shall be of Poly tetra fluoro ethylene (PTFE) steel-wire reinforced braided construction or equivalent heat-resisting material. There shall be no valves between the un-loader and the compressor.

4.11 The following Safety shutdown systems for fail-to-safety, shall be provided:

i. Low oil pressure
ii. High coolant temperatures
iii. Loss of engine coolant
iv. Manual fuel shut-off
v. Exhaust gas temperature
vi. Low-water level device
vii. Sensing device for a fume dilution system
viii. Spark arrestor sensing device
ix. Device to ensure the safe operation of a particulate filter, and
x. Emergency stop system.

In case of shut down of the engine due to any of the above safety shutdown systems, the engine shall not be able to be restarted until the fault is rectified, except for the allowed automatic override features, like, low oil pressure and low coolant pressure. Where the automatic override is provided, period of override shall not exceed the engine manufacturer's specifications.

4.12 Warning labels shall not be manufactured from light metal and its alloys (which is incendive to sparking).

4.13 Undiluted exhaust gas emissions of equipment after treatment shall not contain more than—

(a) 0.010% (100 PPM) by volume of NO2;
(b) 0.09% (900 PPM) by volume of NO;
(c) 0.11% (1100 PPM) by volume of CO; and
(d) 0.20% (2000 PPM) by volume of CO, while 1% CH4 is injected into the intake.

## 5.0 Specifications of diesel fuel and lubricants

Diesel fuel of proper quality shall be used for satisfactory engine performance, longevity of the engine and acceptable exhaust emission levels.

## 5.1 Quality of diesel fuel

5.1.1 Specifications of diesel fuel used in the diesel equipments shall conform to Bharat Stage III- Construction Equipment Vehicular Emissions Norms or its revised versions issued by the Government of India from time to time.

5.1.2 The supplier of the fuel oil shall certify in writing that the diesel fuel supplied by him meets the requirements mentioned under Para 5.1.1 above and shall provide a copy of the certificate to the user with every consignment.

5.1.3 User shall ensure that the diesel fuel received at the mine is free from water content. Before using the diesel fuel in the equipments, user shall ensure that the diesel fuel conforms to the above mentioned standards and obtain certificate from the supplier to this effect.

5.1.4 The user and supplier shall jointly collect the samples of the fuel oil once atleast in every three months and get it tested at any Govt. approved or NABL accredited laboratory. The fuel oil shall not be used unless it meets the requirements of above mentioned standards/norms.

**5.2** All the lubricants used in the diesel equipment shall conform to relevant National/International standards.

## 6.0 Emission Pollutants and Limitations

## 6.1 Permissible Limits of Diesel Particulate Matter (DPM)

The owner, agent and manager of every mine shall take such steps as necessary for minimising emission of Diesel Particulate Matter (DPM) from the exhaust of every diesel equipment and for the dispersal and dilution of DPM which enters the mine air at any work place belowground and for ensuring exposure of workers to DPM limited to an extent that is reasonably practicable but in any case not exceeding the limits prescribed below :

a) A miner's personal exposure to Diesel Particulate Matter (DPM) in an underground mine shall not exceed an eight-hour time weighted average (TWA) airborne concentration of 100 micrograms of Elemental Carbon per cubic meter of air ($100_{EC}\mu g/m^3$).

Provided that the allowable limit of TWA of EC in DPM may be $120_{EC}\mu g/m^3$ for a period of one year from the date of coming into force of this standard.

b) The airborne concentration of DPM shall not exceed 3 times the TWA value (i.e. 300ECµg/m3) for more than 30 minutes and shall never exceed 5 times the TWA value (ie, 500ECµg/m 3 ) at any place in an underground mine.

## 6.2 Monitoring of Diesel Particulate Matter (DPM)

6.2.1 The owner, agent or manger of every mine shall once at least in every three months or whenever the Regional Inspector so requires by an order in writing, monitor full-shift personal exposure of all workers exposed to diesel particulate matter(DPM), under actual mining conditions:

provided that, if any measurement of DPM shows concentration in excess of fifty percent or seventy five percent of the allowable concentration as specified in Para 6.1 above, the subsequent measurements shall be carried on at intervals not exceeding one month or fifteen days respectively:

provided further that, such measurements shall also be carried on immediately upon the commissioning of equipment or machinery or upon any major alteration in ventilation that is likely to bring about any substantial change in the level of DPM.

6.2.2 The DPM shall be measured by a person authorised for the purpose with a suitable instrument capable of measuring concentrations of elemental carbon (EC) in near real-time, which replicates NIOSH 5040 or equivalent or by collection of samples and the samples shall be analysed at any Govt. approved or NABL accredited laboratory following a procedure equivalent to NIOSH 5040. The samples drawn shall as far as practicable be representative of the levels of DPM exposure of work-persons.

6.2.3 When the DPM monitoring results have established that the permissible limit of EC concentrations being exceeded at any place, immediate steps shall be taken to minimize the emission of DPM and to notify the Regional Inspector. If however, the average concentration of DPM in a series of 2 samples in successive working shifts exceeds the "permissible limits" the relevant operation causing excessive DPM shall cease. The operation(s) shall not be resumed until improvements have been made in the generation and dilution/removal of DPM and fresh sampling carried out immediately on resumption of the said operation(s) has established that such improvements have reduced the DPM concentration below the "permissible limit".

6.2.4 The measurements shall be recorded and maintained in the form of soft copy or a register kept for the purpose, signed and dated by the person taking measurements and counter signed by the Manager.

## 7.0 Ventilation requirements

**7.1** No diesel equipment shall be operated in any working place :

i. where the velocity of air current is less than 45 m/min,

ii. where presence of inflammable gas in the general body of air at any place exceeds 0.1% in case of I degree gassy coal mines and any metalliferous mine in which

Regulation 142 of Metalliferous Mines Regulations, 1961 is applicable or 0.75% in case of II and III degree gassy coal mines,

iii. whenever the ventilation therein interrupted for any reason whatsoever,

iv. where the concentration of any noxious gas at any point in the roadway exceeds the concentration specified in the table below:

| Sl. No. | Gas | Maximum Allowable concentration | |
|---|---|---|---|
| | | **Percentage (%) by volume** | **PPM** |
| 1 | Carbon Dioxide | 0.5 | 5,000 |
| 2 | Carbon Monoxide | 0.005 | 50 |
| 3 | Nitric Oxide (NO) | 0.0025 | 25 |
| 4 | Nitrogen Dioxide ($NO_2$) | 0.0005 | 5 |
| 6 | Sulphur dioxide ( $SO_2$) | 0.0005 | 5 |
| 7 | Hydrogen sulphide ($H_2S$) | 0.0005 | 5 |
| 8 | Aldehydes | 0.001 | 10 |

v. where wet bulb temperature at any place therein exceeds $33.5^0$C:
provided that, if the wet bulb temperature at any place in the roadway exceeds $30.5^0$C, arrangements are made to ventilate the same with a current of air moving at a speed of not less than 1 meter per second.

**7.2** Owner, Agent or Manager of the mine shall ensure that there shall be adequate quantity of air in each working place in which a diesel equipment is operated, to dilute the engine exhaust gases to the lowest practicable levels, and this volume flow shall not in any case be less than the minimum quantity of air specified in this standard.

**7.3** Additional quantity of air required for each diesel equipment shall not be less than 0.06 cubic meters per second per kilowatt of the maximum rated engine output specified by the manufacturer.

**7.4** If more than one diesel equipment is operated in any ventilation circuit of a mine at the same time, the total quantity of air in that circuit shall not be less than the aggregate of the volume requirement for the individual diesel units:

Provided that while calculating the aggregate volume requirement in any given ventilation circuit, light four wheel vehicles and other diesel units of small engine capacity which are operated intermittently may be disregarded.

**7.5 Examination of roadways for adequacy of Ventilation**

7.5.1 (a) At least once in every shift during the diesel equipments are in normal operation, the atmosphere of the roadways, in which the equipments are operated, shall be tested for the presence of the noxious and inflammable gasses. The tests for noxious gasses shall be carried out in the roadways approximately at 1.5 m above the floor level and 1 m from the diesel equipment exhaust on the return side.

(b) Such tests shall also be done in the roadways at following places;
i. At each end of the roadway, or part thereof, in which equipments are operated; and
ii. At other points, as may be fixed by the manager.

7.5.2 The above measurements shall also be taken whenever any alteration is made in the quantity of air circulating in the roadway or part thereof.

7.5.3 The measurements shall be recorded and maintained in the form of soft copy or a register kept for the purpose, signed and dated by the person taking measurements and counter signed by the Manager.

7.5.4 During any such examination, if the percentage of inflammable or the noxious gasses are found more than the limits specified above, the person making the inspection, shall immediately report the fact to the official in charge of the district, who after confirming the presence of the gas as above, shall discontinue the use of any diesel equipment in that roadway. After the said discontinuance, no equipment shall be re-operated in the roadway unless the manager, after satisfying himself and certifying in writing that the content of gas in the roadway or part thereof has been reduced below the specified limits.

7.5.5 Every such discontinuance shall be recorded in the form of soft copy or a register kept for the purpose and signed and dated by the Manager.

7.5.6 During any such examination, if the concentration of the noxious and inflammable gasses in general body of air, is found to be more than prescribed limits, immediate steps shall be taken to dilute the said concentration below the said limits.

7.5.7 In II and III degree gassy coal mines, presence of inflammable gas in the general body of air shall be monitored continuously with suitable systems and the diesel equipment operating therein shall be shut down by the systems automatically or give audio-visual warning in the event of concentration of the gas exceeds the prescribed limits.

## 7.6 Air Sampling

7.6.1 Once at least in every week, samples of the general body of air shall be taken-

i. at a point at the end of every road in which any diesel equipment is operated;
ii. at such other suitable points as may be fixed by the manager;
iii. at any place and time, as may be specified by Regional Inspector.

7.6.2 Every sample, taken as above, shall be analysed, within three (3) days of taking thereof (without taking into account any rest day or day of general holiday) to determine the percentage of noxious and inflammable gasses therein. Particulars of every such analysis shall be recorded in the form of soft copy or a register kept for the purpose.

## 8.0 Safe operation of diesel equipment

## 8.1 Transport Rules

8.1.1 Transport rules shall be framed with regard to the operation of diesel equipment in the mines. The transport rules, inter alia, shall contain:

i) Code of safe practices and standard operating procedures of the diesel equipments used in the mine.
ii) The minimum required width and height of the roadways in the mine in which the equipments may be operated.
iii) The permissible maximum load to be carried by the equipments.
iv) The areas in the mine, in which speed restrictions on equipment shall apply.
v) The roadways, in which person to be transported and the material to be carried and the type of the equipments to be used for the purpose, etc.
vi) Traffic rules of the equipments.

8.1.2 Copies of the Transport Rules shall be circulated to all operators of the equipments, concerned supervisors and officers of the mine. The traffic rules, permissible maximum load and speed of the equipments shall be posted at all conspicuous places along the route, in which the equipment is operated, transfer/ loading points, garage, charging stations and miners' station.

## 8.2 Operation of diesel equipment

8.2.1 No equipment shall be operated, except for repairs and test, otherwise than by a person who has been authorized by manager to be driver/ operator of the equipment. Provided that, he shall be,-

a) Trained (preferably by OEM) and certified to be competent in the operation of type of equipment in question.

b) provided with full instructions in writing with regard to the permissible haul roads and speed as per transport rules, and

c) familiar with all precautions necessary for safe operation of the equipment.

8.2.2 Even during the repairs or tests, the equipment shall not be operated, except by a competent person, authorized for the purpose.

8.2.3 Starting system of every diesel equipment shall have a suitable locking provision and its key shall always be under the charge of the operator or any authorized person.

8.2.4 At the commencement of every shift, the operator of every diesel equipment shall personally carry out necessary pre-start examinations paying special attentions to brakes, steering, accelerator, warning devices, lights, etc. to ensure that it is in safe working order.

8.2.5 If any fault is found in the equipment during the above examinations or during its operations/or otherwise, and also, in the event of any irregularity in the running or sound of the engine in particular, any excessive emission of smoke, any open sparking, any stoppage in the circulation of water or any leakage of fuel, the equipment shall be immediately be taken out of service and the same shall be brought to the notice of shift supervisor/officer, and the equipment shall not be put in further use unless it is attended and the fault is rectified to satisfactorily.

8.2.6 The result of every such examination, and also of every action taken to rectify the faults or irregularities noticed in the equipments shall be maintained in a soft copy or record kept for the purpose.

8.2.7 The engine of a equipment shall not be kept running, when the equipment is stationary except,-
a) during starting,
b) during brief halts,
c) while being tested.

8.2.8 Any material being transported in a trolley/trailer shall be securely tied to it so that there is no danger of the falling of material.

8.2.9 Unless authorized in writing, no person, other than the driver/operator shall be transported in any diesel equipment, trolley, or trailer attached thereto other than a equipment or a carriage duly approved for man-riding.

8.2.10 No person shall be allowed to ride over and work on an elevated bucket or any other part of equipment.

## 8.3 Training

8.3.1 Before engaging any person on maintenance, repairs, examinations, tests and operation of diesel powered equipment in the mine, he shall be trained, tested and certified to be competent by OEM and authorised by the Manager for the purpose.

8.3.2 The training shall be carried out by OEM or authorised instructor(s) on topics related to safe operations, maintenance of fire-protected and explosion-protected diesel engine systems and gas testing.

8.3.3 Similarly, mine workers conducting ventilation related sampling and measurements shall also be trained on related topics.

8.3.4 Mine management shall provide refresher training annually to all miners who can reasonably be expected to be exposed to the diesel emissions. The training shall cover the health risks associated with exposure to DPM as well as the methods used in the mine to control DPM concentration and procedures for changing and disposal of DPM filters provided in equipment.

8.3.5 Training on the following topics shall also be imparted to the concerned persons in the mines:

a) DPM filters and cleaning of DPM filters, measurement and control of DPM.

b) Use of PPE

c) Mine environmental monitoring systems and sensors of different gas monitors/detectors.

d) Engine fundamentals, which shall include an introduction to the function of a diesel engine and recognition of all major components and their functions;

e) Diesel emissions, which shall include an introduction to diesel emissions and their adverse health effects;

f) Factors that affect diesel emissions, which shall include a detailed presentation of engine faults and diesel fuel quality, and their effects on emissions, as well as instruction in the preventive actions that can be taken to minimize emissions levels;

g) Emissions control devices, which shall include a detailed presentation of the different emissions control devices employed to reduce emissions, and details about actions the equipment operator must take to keep the devices in working order;

h) Diagnostic techniques, which shall include a presentation of techniques that can be employed by the equipment operator to assure the equipment is in safe operating condition, and instruction in how to recognize and diagnose certain engine faults that may cause increases in emissions;

i) The preoperational inspection, which shall include a presentation of the purpose, benefits, and requirements of the preoperational inspection;

j) Ventilation, which shall include an introduction to special ventilation requirements for areas of the mine in which diesel-powered equipment will operate;

k) Fire suppression systems, which shall include an introduction to the use and function of fire suppression systems, and when and how to manually activate a fire suppression system;

l) Safe Operating procedures, which shall include a detailed presentation of the driving rules, safe driving speeds, traffic control devices, and equipment limitations and transport rules.

m) Emergency procedures, which shall include discussion of emergency situations such as fire, diesel fuel spills, component failure, and loss of ventilation air. This instruction shall also include emergency escape procedures and discussion of the potential use of the diesel-powered vehicle as an emergency escape vehicle in case of a mine emergency situation; and

n) Record keeping and reporting procedures, which shall include a presentation on required record keeping and reporting procedures for problems or unsafe conditions, high emissions levels, and preoperational inspections made by the equipment operator.

8.3.6 Certificate of qualification: The mine management shall issue to the equipment operator a new certificate of qualification once in every two years on successful completion of training and assessment. The mine management shall keep at the mine site a copy of the most recent certificate of qualification issued and make it available for inspection by Chief Inspector of Mines or any Inspector of Mines.

## 9.0 Roadways for Diesel equipments

### 9.1 Construction and Safety provisions of Road ways

9.1.1 So far as reasonably practicable, the floor of every roadway, in which any diesel equipment ply, shall be kept even, firm, free from debris/mud, water and not conducive to skidding.

9.1.2 Unless exempted in this behalf in writing by the Chief Inspector of Mines/Regional Inspector, track less equipment shall not be operated on any length of roadway of which gradient exceeds 1 in 6 and for track (rail) mounted, the gradient shall not exceed 1 in 15.

9.1.3 Floor of roadways should be designed to bear the maximum ground pressure exerted by the heaviest equipment that ply on the roadway.

9.1.4 Proper drains shall be constructed along the sides of the roadways so as to keep the floor of the roadway free from water.

9.1.5 Man holes shall be provided at intervals of not more than 20 meters on the side of the roadway.

9.1.6 All the roadways in which diesel equipments ply shall be adequately illuminated.

9.1.7 Reflective warning notices and sign boards shall be posted along the roadways at appropriate places, like level crossings, steep gradients, curves and junctions.

9.1.8 No person shall be allowed to walk/present in the roadways while the equipments are plying in it.

### 9.2 Clearances from roof and sides

9.2.1 No equipment shall ply in any roadway, where the clear space from roof is less than 300 mm, if the equipment is provided with a canopy/ closed cabin for the operator, or in any other cases, not less than 1.8 m from the footboard of operator.

9.2.2 Every roadway, in which only one equipment ply, an unobstructed space of not less than 1.5 m, in addition to the width of the equipment, shall be provided along the width of the roadway.

9.2.3 In every roadway, in which more than one equipment ply, crossing points shall be provided at intervals not exceeding 300 m. At every such crossing point, a clear space of not less than 1.5 m along the width shall be provided after allowing clearance for safe crossing of two equipments.

9.2.4 Radius of curves and clearances at the junctions of the roadways shall not be less than the minimum required for turning the equipment as recommended by the manufacturer, otherwise the radius of curve shall provide a clear space of not less than 1.5 m over the minimum turning radius required by the equipment.

9.2.5 The roadways shall be adequately supported to prevent any roof and side falls.

### 9.3 Examination of Roadways

9.3.1 Every roadway, in which any diesel equipment is operated, shall be placed under sole charge of a competent person, who shall once at least in every 24 hours, examine every such roadway with regard to,-

a. clearance and free from obstruction
b. condition of its roof and sides
c. ventilation
d. illumination level in roadways
e. presence of coal dust in case of coal mines
f. condition of track in case of locomotives, monorails, etc.
g. general safety.

9.3.2 The competent person, making the above examinations shall record the results thereof in a soft form or in a record kept for the purpose, signed and dated by him and counter signed by manager.

## 10.0 Maintenance and Testing

10.1 Suitable maintenance schedules and activity wise SOP's shall be framed and implemented for every diesel equipment by considering the OEM recommendations.

10.2 All the repairs, scheduled maintenances and testing shall be carried out by competent person(s) under the supervision of an authorized supervisor/engineer.

10.3 Procedures and schedules for inspection, maintenance and testing of all fire suppression systems shall be framed and implemented.

10.4 Nitrogen charging in accumulators and suspensions shall be carried out as per the DGMS Technical circular no. 02 of 2012 or its revised version.

### 10.5 Brake testing

10.5.1 Once at least in every seven (7) days, and also immediately after any repairs or adjustments have been carried out on it, the braking system of every equipment shall be examined and tested by a competent person conforming to ISO-3450:2011 or its revised version or any internationally accepted standard.

10.5.2 Every person, making any inspection, examination or test, as above, shall forthwith record the particulars thereof in the Test report as per Clause no 7.0 of ISO

3450:2011 or its revised version or any internationally accepted standard and shall sign and date the same.

10.5.3 The test shall be conducted as under:

**(a) Deceleration Test:** When the Diesel Equipment, is in a loaded condition,

(i) By direct mechanical action and

(ii) By every other means provided

Explanation: The declaration test shall be carried out as follows:

Apply the service brake as the diesel equipment with load passes a marked point at a selected speed, the distance travelled in coming to rest should be measured and recorded. The maximum permissible distance shall be obtained from the manufacturer conforming to the standard. While seeking this information of normal trailing load and gradient should be furnished to the manufacturer.

**(b) Stand still tests (Parking Brake)**

Explanation: The Stand still test shall be carried out as follows:

When the Diesel Equipment is in loaded condition on maximum gradient and its diesel engine is stopped with applied parking brake of any means provided other than direct mechanical action, the equipment shall be stationary (no creep) for the period of at least 10 minutes.

10.6 Testing of steering function and emergency steering function shall be carried out fortnightly and a record thereof shall be maintained.

10.7 Non-destructive testing of all the load carrying members of the equipments, where safety of the persons is involved, and whole body vibrations study shall be conducted for operator comfort, once in every one year conforming to any internationally accepted standards, from any Govt. approved test house or NABL accredited laboratory subject to confirmation of its ability to conduct such tests.

10.8 Noise survey shall be conducted conforming to the DGMS circulars No. 18 of 1975 and 5 of 1990 or its revised version and accordingly suitable action shall be taken to reduce the equipment noise.

10.9 Inspection and testing of all pressure vessels shall be conducted once in every three years conforming to DGMS circular no. 7 of 2003 or its revised version.

10.10 Engine blow-bye measurement shall be conducted as per the recommendations of OEM.

10.11 Oil sample condition based monitoring (CBM) shall be conducted as per the recommendations of OEM at any Govt. approved Test house or NABL accredited laboratory subject to confirmation of its ability to conduct such tests.

10.12 Undiluted exhaust gas monitoring shall be carried-out once atleast in every month conforming to the prescribed values and accordingly preventive maintenance is to be carried-out.

10.13 Proper protection equipment shall be used to avoid flying of rim accessories. Person(s) shall be kept away from lifting object trajectory while inflating the tyres. Precautions shall be taken during tyre inflation conforming to DGMS circular Tech. 9 of 1979 or its revised version.

10.14 The competent person(s) making the inspection/examination, maintenance and testing aforesaid shall record the results thereof in a soft form or register kept for the purpose, signed and dated by him and counter signed by manager.

10.15 All sensors of the diesel engine system shall be regularly tested and routinely calibrated/replaced to ensure correct operation as per the recommendations of OEM.

10.16 All electrical items associated with the equipment shall be checked by a competent person authorized for the purpose and the observations shall be recorded daily in a register kept for the purpose or in electronic form with due authentication.

10.17 **Additional conditions for Maintenance and Testing of Diesel engines used in underground coal mines and metalliferous mines in which Regulation 142 of Metalliferous Mines Regulations, 1961(or as amended from time to time) is applicable**

Apart from the above mentioned maintenance and testing procedures, the following conditions for maintenance and testing of diesel engine systems used in underground coal mines and metalliferous mines in which Regulation 142 of Metalliferous Mines Regulations, 1961 or as amended from time to time, is applicable, shall be carried out to ensure diesel engine systems remain explosion-protected or fire-protected condition over their life cycle.

10.17.1 A safety file (History record) for each Diesel Engine system mentioning its serial number and details shall be initiated by the manufacturer and every maintenance activity shall be recorded and maintained by the user. These safety files shall be kept available at mine office.

10.17.2 Hydrostatic testing of all explosion-protected components, testing of shutdown systems and calibration of sensors (other than methane sensors) of the diesel engine, shall be conducted once in every two years conforming to the National standard (when formulated) or AS/NZS 3584.3: 2012 (or its revised version) or internationally accepted standard, at any Govt. approved Test house or NABL accredited laboratory subject to confirmation of its ability to conduct such tests and record thereof shall be kept available at mine office.

10.17.3 The service facility in the mine shall be provided with required tools and tackles along with the following measuring apparatus to maintain the fire-protection and explosion-protection properties of the Diesel engine system:

(i) Straightedges
(ii) Feeler gauges
(iii) Thread gauges
(iv) Inside and outside micrometers
(v) Dial gauges
(vi) Depth gauges
(vii) Callipers, inside and outside
(viii) Surface roughness/finish instrument
(ix) Diesel engine tachometer
(x) Injection timing instrument
(xi) Surface temperature thermometer
(xii) Coolant temperature thermometer
(xiii) Exhaust temperature thermometer
(xiv) Manometer—exhaust back-pressure
(xv) Manometer—inlet vacuum

(xvi) Gauges—lube oil pressure and temperature
(xvii) Hydrostatic test set with calibrated pressure gauge
(xviii) Barometer—atmospheric pressure
(xix) Psycho meter—relative humidity
(xx) Analysers to measure gaseous emissions and diesel particulate matter (smoke)
(xxi) Torque wrenches.

10.17.4 Methane sensor(s) provided on the equipment shall be calibrated and tested for its efficacy with suitable testing kit conforming to DGMS (Tech) circular no.09 of 2002 at any Govt. approved Test house or NABL accredited laboratory subject to confirmation of its ability to conduct such tests.

10.17.5 (a) A person authorized for the purpose shall ensure that the undiluted exhaust gases produced, under all standard conditions of engine speed or load, by the engine of a diesel equipment in underground mine is sampled and analysed —

(i) at intervals of not more than 500 hours as measured by the diesel unit hour meter, or at intervals not exceeding three months if the unit does not have an hour meter;

(ii) after any maintenance work is done on the turbocharger or fuel injection system on the engine of a diesel unit (other than cleaning or replacing filters); and

(iii) when required to do so by an Inspector.

(b) The samples shall be tested at any government approved Test house or NABL accredited laboratory. These reports shall be kept available in the mine office.

(c) The manager of an underground mine shall ensure that if sampling of undiluted exhaust gases from engine of a diesel equipment shows the content of contain carbon monoxide or oxides of nitrogen is more than the quantities prescribed in para 4.13 of this standard, the diesel equipment shall not be returned to service until the exhaust emissions are reduced to levels below those specified and as low as is practicable.

## 11.0 Precautions while transportation, storage and filling of fuel in underground mines

### 11.1 Filling station

11.1.1 No equipment shall be re-filled with fuel oil, except at a filling station authorized by the manager.

11.1.2 Underground diesel fuel storage facilities in the filling station shall meet the following general requirements:

a) Permanently affixed underground diesel fuel storage tanks are prohibited;
b) The fuel oil shall be stored in a suitable mechanically strong/leak proof, spill proof and non-flammable tank and kept in the filling station and,
c) The stock of fuel oil stored in underground shall at no time exceed the consumption of the equipments over a period of 48 hours or maximum 1800 litres, whichever is minimum.

11.2 **Location:** An underground diesel fuel filling station shall be located:-

a) At least 50m away from shafts, inclines/declines, haulage roadways, maintenance workshops and reserve stations;
b) At least 15 m away from trolley wires, haulage ways, power cables and electric equipment not necessary for the operation of the storage and filling facility; and
c) In an area that is as dry as practicable.

11.3 **Construction**: Construction of an underground diesel fuel storage facility in the filling station shall be:

a) mechanically strong, leak-proof, spill proof and constructed of non-combustible materials;

b) ventilated directly into the return air course using non-combustible materials;

c) equipped with an automatic fire suppression system that complies with DGMS general order for the fuel storage tanks, containers, safety cans, pumps, electrical panels and control equipment in fuel storage areas.

d) Maintained with adequate stock of dry sand/lime stone dust for extinguishing fire;

e) Marked with conspicuous signs designating as combustible liquid storage.

f) Audible and visual alarms to warn of fire shall be provided at the protected area and at a surface location that is always staffed when persons are in underground. A means shall also be provided for warning all endangered persons in the event of fire.

g) Manual actuators: Fire suppression systems shall include two manual actuators with at least one located within the fuel storage facility and at least one located a safe distance away from the storage facility and in intake air.

h) The fire suppression system shall remain operative in the event of electrical system failure.

i) Monitoring of system: If it is electrically operated, the system's detection and actuation circuits shall be monitored and provided with status indicators showing power and circuit continuity. If not electrically operated, the system shall be provided with a means to indicate the functional readiness status of the system.

j) Weekly visual inspection. Each fire suppression device shall be visually inspected at least once every week by a person authorised for the purpose.

k) Maintenance, testing and record keeping: Each fire suppression device shall be maintained and tested in accordance with the provisions of this standard. Maintenance, testing and inspections of the device shall be recorded in the register kept for the purpose or in soft form.

11.4 **Transportation of diesel oil**

11.4.1 Diesel fuel shall be transported only in containers specifically designed for the transport of diesel fuel. Any container, other than a safety can, shall be permanently fixed to the transportation unit. The container shall be provided with a device for venting & self-closing cap and shall not exceed a capacity of 1800 liters. Two fire extinguishers shall be provided at each end of the transportation unit. Empty containers shall be returned to the surface as promptly as possible.

11.4.2 No person shall transfer fuel to a diesel engine, except by means of a pump and hose. Safety cans shall be used only for emergency fuelling. Safety can shall be clearly marked, have a maximum capacity of 18 liters, be constructed of metal, and equipped with a nozzle and self-closing valves.

11.4.3 While transferring fuel from one container to another or from a container to a equipment, care shall be taken to prevent spillage, and any fuel, if slipped, shall

forthwith be removed by means of a suitable non-inflammable absorbent. All oily and greasy waste shall forth with be deposited in a closed incombustible receptacle, and removed from the mine as soon as possible.

11.4.4 Re-fuelling of any equipment shall not be carried on, and fuel oil shall not be transferred from any container, or handled, while any internal combustion engine is running inside the filling station, or within a radius of 15m thereof.

### 11.5 General Safety Requirements

11.5.1 The silled floor of the filling station shall drain into a covered sump or sufficient size to hold 1 ½ times the maximum quantity of the fuel and lubricant stored.

11.5.2 No person shall smoke, or use any light or lamp, other than a locked safety lamp, or an electric lamp, adequately protected, in any filing station, or within a radius of 15m of any filling station.

11.5.3 No person shall service any equipment in a filling station.

11.5.4 Welding or cutting shall not be done within 15 m of an underground diesel fuel storage facility. Cutting or welding shall not be performed on or within containers or tanks that have contained combustible or flammable materials until such containers or tanks have been thoroughly purged, cleaned or inerted, and a vent or opening is provided to allow for sufficient release of any built-up pressure before heat is applied.

11.5.5 Diesel fuel shall not be transferred to the fuel tank of diesel-powered equipment while the equipment's engine is running.

11.5.6 Safe Operating Procedures shall be framed and kept posted in the form of a notice, clearly visible, in every filling station.

## 12.0 General Conditions

12.1 Fire resistant high pressure hydraulic hoses with its end fittings used in mines shall conform to DGMS gen. order No.DGMS/Mech/Tech.Cir.(Approval) No.04, dated 13.02.2015 or its revised version.

12.2 In case of coal mines, fire resistant hydraulic fluid shall conform to DGMS gen. order No.DGMS/Mech/Tech.Cir.(Approval) No.02, dated 13.02.2015 or its revised version.

12.3 Adequate number of competent persons including Fitter, auto-electrician, operator, supervisors and Engineers (Electrical, Mechanical & Mining) etc. shall be appointed in mine to take care of installation, maintenance, testing and safe operation of diesel equipment.

12.4 An engineer shall be authorized exclusively to hold charge of Diesel engine system, and to be responsible for its installation, maintenance and safe working.

12.5 All circulars/General approvals issued by DGMS from time to time, relevant to the equipment shall be complied with.

12.6 Chief Inspector of Mines may by an order in writing and subject to such conditions as may be specified therein require any modifications or additional requirements to be included in this standard on merit of the case.

13.08.18

(Prasanta Kumar Sarkar)
Director General of mines Safety

**Government of India**
भारत सरकार
**Ministry of Labour and Employment**
श्रम एवं रोजगार मंत्रालय
**Directorate General of Mines Safety**
खान सुरक्षा महानिदेशालय

No. DGMS (Legis.) Circular No. 01 of 2018 Dhanbad, Dated 22-03-2018

सेवा में,

**The Owner, Agent, Managers of all Oil Mines & the Manufacturers.**

**विषय: Standard for emergency escape device used in oil mines.**

Your attention is drawn to the provision of Regulation 38(1) of Oil Mines Regulations, 2017, which requires that the owner, agent and manager of a mine shall ensure that an escape device with escape line and slide of adequate strength, as per the standard specified for the purpose by the Chief Inspector of Mines by a general or special order, is installed and maintained on every monkey board in such a manner that persons may come down safely from the monkey board to ground level in an emergency.

In this regard, a committee was constituted in which experts from Government test house, Oil industry, manufacturers and officers of DGMS were participated. After detailed discussion and deliberations by the committee members in the meetings, the draft standard for emergency escape device specified for the purpose used in oil mines was framed and is given below.

**1.0 The Manufacturer shall:**

1.1 have adequate knowledge, facility for proper manufacturing and testing of every part of the unit and shall have good workmanship. The product shall be reliable and free from any defects.

1.2 use the material in the emergency escape device shall be of good construction, suitable material of adequate strength and free from visible defect and shall be properly maintained. An every emergency escape device or any part thereof fitted in the device shall not be made of alloy and material likely to give incendive frictional sparks. The components/material used in the device shall conform to relevant BIS/ISO/OISD/Internationally accepted standards wherever applicable.

1.3 be fully responsible for quality and reliability of the emergency escape device.

1.4 furnish all the design, calculations, detailed drawings, set of working tools ,test reports/certificates or any other information of pertinent to their product(s) to the user(s), along with each consignment.

## 2.0 Testing and Examination:

2.1 The emergency escape device shall be tested for its accuracy, safe working, and reliability conform to BIS/API/OISD/ISO when formulated or equivalent internationally accepted standards at any test house prescribed under Para 6.0 of Approval Policy, 2015 ( Second Revision ) of DGMS or its revised version.

2.2 Any component in which defect is noticed shall be marked defective and shall not be supplied to any mine.

2.3 Non destructive test shall be conducted for vital components used in the emergency escape device, for its material composition, grade and other mechanical properties conform to relevant BIS/API/ISO/OISD/Internationally accepted standards at any test house prescribed under Para 6.0 of Approval Policy, 2015 (Second Revision) of DGMS or its revised version.

## 3.0 Marking:

The manufacturer shall ensure that each emergency escape device legibly marked on the body mentioning the following:

(a) The manufacturer's name,

(b) Serial and Batch number,

(c) The month and year of manufacture,

(d) Any other marking required by the applicable Oil industrial safety standards.

## 4.0 General requirements:

4.1 On every monkey board in rig there shall be installed and maintained an escape line, escape device with a slide of adequate strength in such a manner that persons can come down safely from the monkey board to ground level in an emergency.

4.2 Escape line shall be securely fastened to the girt immediately above the monkey board and it shall be securely anchored to ground at a distance, from centre of cellar pit, not less than the height of the monkey board from the ground.

4.3 The track rope shall conform to IS 2266:2002or its revised version /API/ISO/OISD/any Internationally accepted standards with minimum size of 12mm diameter, construction of stranded 6x19, galvanized or ungalvanized, non-lubricated and fiber core or steel core.

4.4 The track rope of the emergency escape device shall have sufficient sag to avoid straining due to pre-tensioning. The track rope or any part thereof shall have no damage or kink.

4.5 The haulage rope shall conform to IS 3459:2009 or its revised version/API/ISO/OISD/any Internationally accepted standards with minimum size of 6mm diameter, construction of stranded 6x19, galvanized or un galvanized, non lubricated and fiber or steel core.

4.6 The minimum breaking load of wire rope shall conform to relevant BIS/API/OISD/any international accepted standards.

4.7 Care shall be taken to avoid any twisting or kinking of the wire rope while un-reeling of rope during installation.

4.8 The life of rope shall be fixed by the manager in consultation with competent person with following additional conditions:

a. Reduction in diameter of the rope is 10% of the original diameter when new, anywhere along the length of the rope.

b. Broken wires with in any one strand exceed 15% of the total numbers of wires in that strand.

4.9 A suitable speed control system shall be provided in the emergency escape device. In addition to the speed control system a suitable hand brake shall be provided in the chair unit which is easily approachable to the person sliding down.

4.10 The pulleys of braking unit of the emergency escape device shall be checked for free rotation prior to each installation and they shall be checked for any wear and make it free from slippage.

4.11 The chair(s) shall be ergonomically designed and provided with a cushioning seat and safety belt to give maximum comfort to the person throughout the travel period.

4.12 Ensure safe & easy access of the chair to the Topman at monkey board at all the time.

4.13 The swing of the chair unit while embarking and during riding shall be avoided. An additional lifeline may be provided under the chair unit to prevent hard landing with controlled speed.

4.14 An every landing shall be provided with suitable shock absorber of adequate strength for cushioning to prevent hard landing.

4.15 The landing area on the ground shall be provided with adequate amount of loose sand for smooth landing.

4.16 The speed of the chair shall be fixed by the manager in consultation with competent person/Installation manager and original equipment manufacturer and in any case it shall not exceed 2.2 m/s.

## 5.0 Responsibilities of Owner ,Agent and Manager(User):

5.1 The user(s) industry shall also be responsible to ensure correct quality and conformity to the prescribed specifications by the manufacturer and also take proper care during the installation of emergency escape device and also while in use. When emergency escape devices supplied to the mine, the mine shall ensure that the system has been adequately designed for the particular rig.

5.2 The user(s) shall visit the manufacturer's works to ensure the adequate manufacturing and testing facilities are available with the manufacture.

5.3 A competent person / installation manager, shall inspect the emergency escape device in accordance with regulation 38 of Oil Mines Regulation, 2017 for installation, testing and maintenance in accordance with clause 4.0 of this standard and its performance shall be recorded in a soft/hard copy with signature and counter signed by the manager or person authorized by the manager of the mine and kept available at the mine office. Any defects observed shall be rectified immediately.

5.4 The user shall ensure/observe the performance of emergency escape device for a period of three months for field trial of fresh consignment in consultation with the manufacturer and the results of joint field observations particularly in respect of malfunctioning of any unit/part and also point out any shortcoming in the installation likely to adversely affect the safety shall be rectified and recorded in a soft/hard copy and signed by an installation manager and counter signed by the manager or person authorized by the manager and kept available at the mine office.

5.5 The user shall also have the responsibility to get the valid test reports/certificates from the manufacturer while purchasing and using the emergency escape device in the Oil mines.

5.6 In-situ examination of emergency escape device & it's vital components and wire rope for non destructive test conform to relevant BIS/API/ISO/OISD/Internationally accepted standards shall be conducted once in a year by any test house prescribed under Para 6.0 of Approval Policy, 2015(Second Revision) of DGMS or its revised version.

**6.0 Miscellaneous**

6.1 The Chief Inspector of Mines or an Inspector of Mines may inspect, check and examine the manufacturing facilities at any time and get samples tested during the course of inspection or send such samples for testing at any prescribed test houses/ laboratories at the cost of the manufacturer.

6.2 The Chief Inspector of Mines or an Inspector of Mines may inspect, check and examine the emergency escape device at any time in the mine and get samples tested during the course of inspection or send such samples for testing at any prescribed test houses/ laboratories at the cost of the Owner, Agent and Manager of the mine.

6.3 All user(s), manufacturers and test houses shall adhere to the above mentioned standard while testing, before supplying and using of an emergency escape device. If any deviation or defects found in the product supplied or used in the mine, shall be brought to the notice of this Directorate.

6.4 The above standard for an emergency escape device specified for the purpose by the Chief Inspector of Mines by a general order under regulation 38(1) of Oil Mines Regulations, 2017.

6.5 All circulars/ approvals issued by DGMS from time to time, relevant to the equipment shall be complied with.

6.6 The Chief Inspector of Mines may by an order in writing and subject to such condition as may be specified therein require any modifications or additional requirements to be included in this standard on merit of the case.

22.03.18

(Prasanta Kumar Sarkar)
Director General of Mines Safety

24/3/18

Government of India
भारत सरकार
Ministry of Labour and Employment
श्रम एवं रोजगार मंत्रालय
**Directorate General of Mines Safety**
खान सुरक्षा महानिदेशालय

No. DGMS (Legis.)/ Tech. Circular No 02 of Dhanbad, Dated 10-10-2018

सेवा में,

**The Owner, Agent, Manager of all Oil Mines & the Manufacturers.**

**विषय: Standard for Design, construction, installation and testing of lifting appliance, gear and rope used in Oil Mines.**

Design, construction and installation of lifting appliance, gear and rope used in Oil Mines shall be in accordance with the standard specified by the Chief Inspector of Mines by a General or Special Order in writing as required under Regulation 105(2)(a) of Oil Mines Regulations, 2017.

A committee of experts from Government test house, Oil industry, Manufacturers and DGMS was constituted and after detailed discussion and deliberations by the committee, standard for design, construction and installation of lifting appliance, gear and rope used in Oil Mines was framed. The standard is prescribed below:

## 1.0 General requirements:

### 1.1 Lifting appliances and gears: -

1.1.1 The design, construction and installation of lifting appliance and gear shall conform to relevant BIS / ISO / OISD / Internationally accepted standards like API 4F, API 9A, API 8C etc. wherever applicable.

1.1.2 Operation, maintenance & inspection of lifting appliances and gears shall conform to OISD – GDN -203 of 2003 or its revised version / BIS when formulated or equivalent internationally accepted standards.

### 1.2 Ropes:-

1.2.1 The minimum size of wire rope shall be of 12mm diameter and shall conform to IS 2266:2002 / IS 4521:2001 (or its revised versions) / OISD / API /any other equivalent internationally accepted standards.

1.2.2 The minimum breaking load of wire rope shall not be less than eight times the maximum lifting load on the rope.

1.2.3 Care shall be taken to avoid any twisting or kinking of the rope while un-reeling the rope during installation / Handling.

1.2.4 Rope life and discarding factors: The life of rope shall be fixed by Manager of the Mine in consultation with competent person and in no case it shall exceed the life specified by the Manufacturer and shall be discarded on following additional conditions:

a. When reduction in diameter of the rope is 10% of the original diameter when new, anywhere along the length of the rope.

b. When broken wires within any one strand exceed 15% of the total numbers of wires in that strand.

**2.0 Testing and Examination:**

2.1 The lifting appliances, gears and ropes shall be tested for its Quality, safe working and reliability conforming to OISD – GDN -203 of 2003 or its revised version /BIS when formulated or equivalent internationally accepted standards at any test house prescribed under Para 6.0 of Approval Policy, 2015 ( Second Revision ) of DGMS or its revised version.

2.2 Any component in which defect is noticed shall be marked defective and shall not be supplied to any mine.

**3.0 Marking:** The manufacturer shall ensure that each lifting appliance, gear and rope (Sling etc) are legibly and permanently marked on unwearable portion with the following:

(a) The manufacturer's name;
(b) Serial and Batch number;
(c) The month and year of manufacture;
(d) Safe Working Load;
(e) Identification mark bearing with certificates of Test and Examination; and
(e) Any other marking required by the applicable OISD.

**4.0 The Manufacturer shall-**

4.1 have adequate knowledge, facilities for proper manufacturing and testing of every part of the unit and shall have good workmanship. The product shall be reliable and free from any defects.

4.2 ensure that the materials used in the lifting appliances, gears and ropes are of good design, construction, suitable material of adequate strength and free from visible defects. Alloys or materials likely to give incendive frictional sparks shall not be part of lifting appliance, gears and ropes.

4.3 be fully responsible for design, quality and reliability of every lifting appliances, gears and ropes.

4.4 furnish design calculations, detailed drawings or any other information pertinent to their product(s) to the user(s), along with each consignment.

4.5 provide certificate of test and examination along with Operation and Maintenance Instruction manual to the User(s), along with each consignment.

**5.0 Responsibilities of Owner, Agent and Manager (User):**

5.1 The user(s) shall ensure that the lifting appliances, gears and ropes have been adequately designed for the particular rig and proper care is taken during installation and use of lifting appliances, gears and ropes.

5.2 The user(s) shall visit the manufacturer's facilities to ensure availability of adequate manufacturing and testing facilities.

5.3 In case of fresh consignment, the user shall observe the performance of lifting appliances, gears and ropes for a period of three months of field trial in consultation with the manufacturer. Malfunctioning of any unit / part and shortcoming(s) in the installation which are likely to have adverse effect on safety shall be immediately stopped and attended to and recorded in soft / hard copy with signature of competent person / Installation Manager and counter signed by the Manager or person authorized by the Manager of the mine. This record shall be kept available at the mine office.

5.4 Competent person / Installation Manager shall ensure that installation, testing and maintenance of the lifting appliances, gears and ropes are in accordance with clause 1.0 and 2.0 of this General Approval. Their performance shall be observed and recorded in a soft / hard copy, signed by competent person / Installation Manager and counter signed by the Manager or person authorized by the Manager of the mine. The record shall be kept available at the mine office. Any defects observed shall be rectified immediately.

5.5 The user shall also have the responsibility to obtain valid test reports / certificates, instruction manuals, etc, from the manufacturer during procurement.

5.6 In-situ Non Destructive testing of vital components of lifting appliances, gears and ropes shall be conducted once in a year conforming to relevant BIS / ISO / OISD / Internationally accepted standards by any test house prescribed under Para 6.0 of Approval Policy, 2015 ( Second Revision ) of DGMS or its revised version.

**6.0 Miscellaneous:**

6.1 The Chief Inspector of Mines or an Inspector of Mines may inspect, check and examine the manufacturing facilities at any time and get samples tested during the course of inspection or send such samples for testing at any prescribed test houses / laboratories at the cost of the manufacturer.

6.2 The Chief Inspector of Mines or an Inspector of Mines may inspect, check and examine the lifting appliances, gears and ropes at any time in the mine and get their samples tested during the course of inspection or send such samples for testing at any prescribed test houses/ laboratories at the cost of User(s).

6.3 All user(s), manufacturers and test houses shall adhere to above mentioned standards and parameters while testing and before supplying the lifting appliances, gears and rope. Any deviation or defects found in the product supplied or used in the mine, shall be brought to the notice of this Directorate.

6.4 The lifting appliances, gears and ropes confirming to the standards, parameters and testing as mentioned above, shall be considered as approved by the Chief Inspector of Mines by a General Order under Regulation 105(2)(a) of the Oil Mines Regulation, 2017.

6.5 All circulars/approvals issued by DGMS from time to time, relevant to the equipment shall be complied with.

6.6 The Chief Inspector of Mines by an order in writing and subject to such conditions as may be specified therein require any modifications or additional requirements to be included in this standard on merit of the case.

10.10.18

(Prasanta Kumar Sarkar)
Director General of Mines Safety