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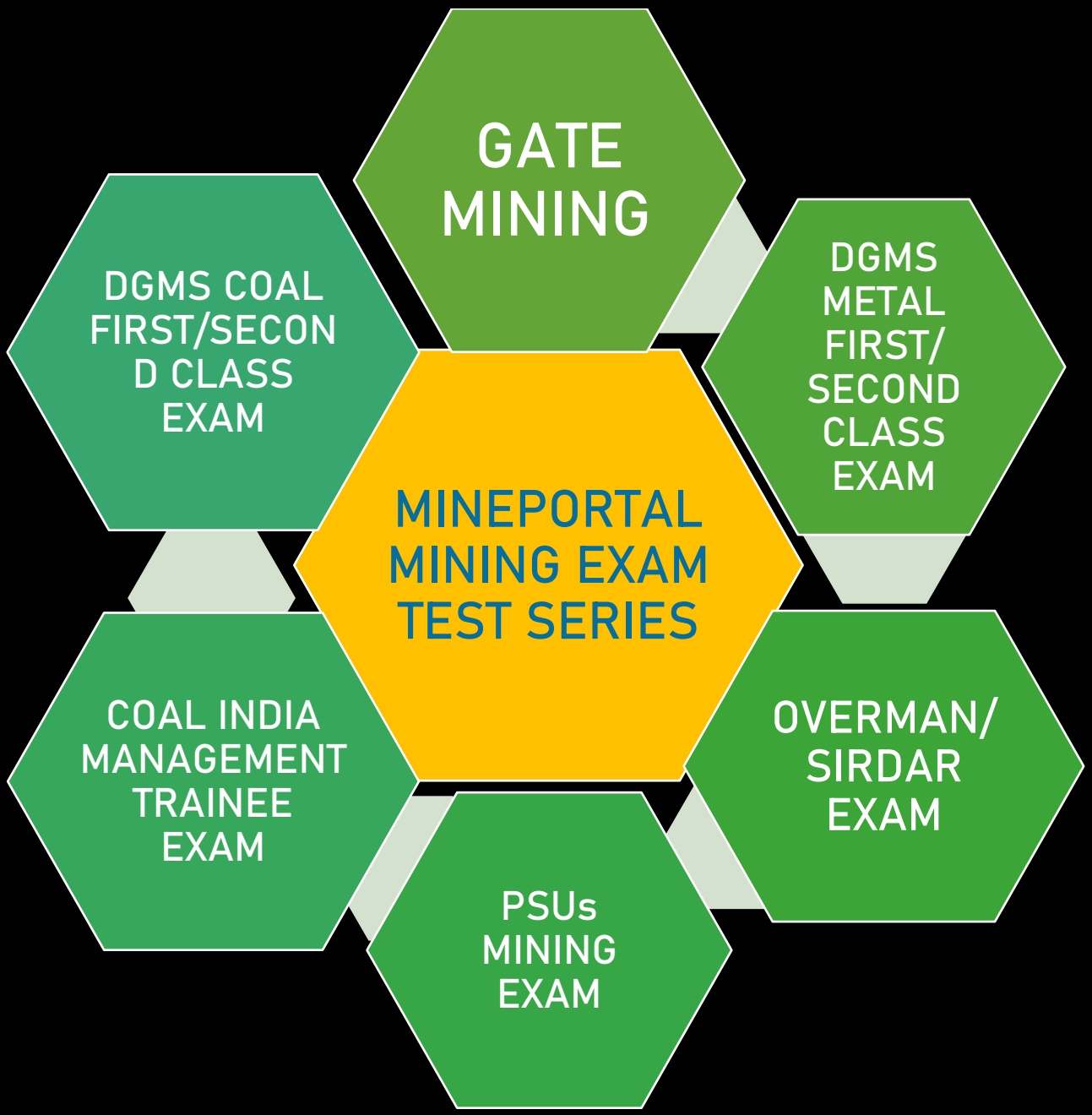

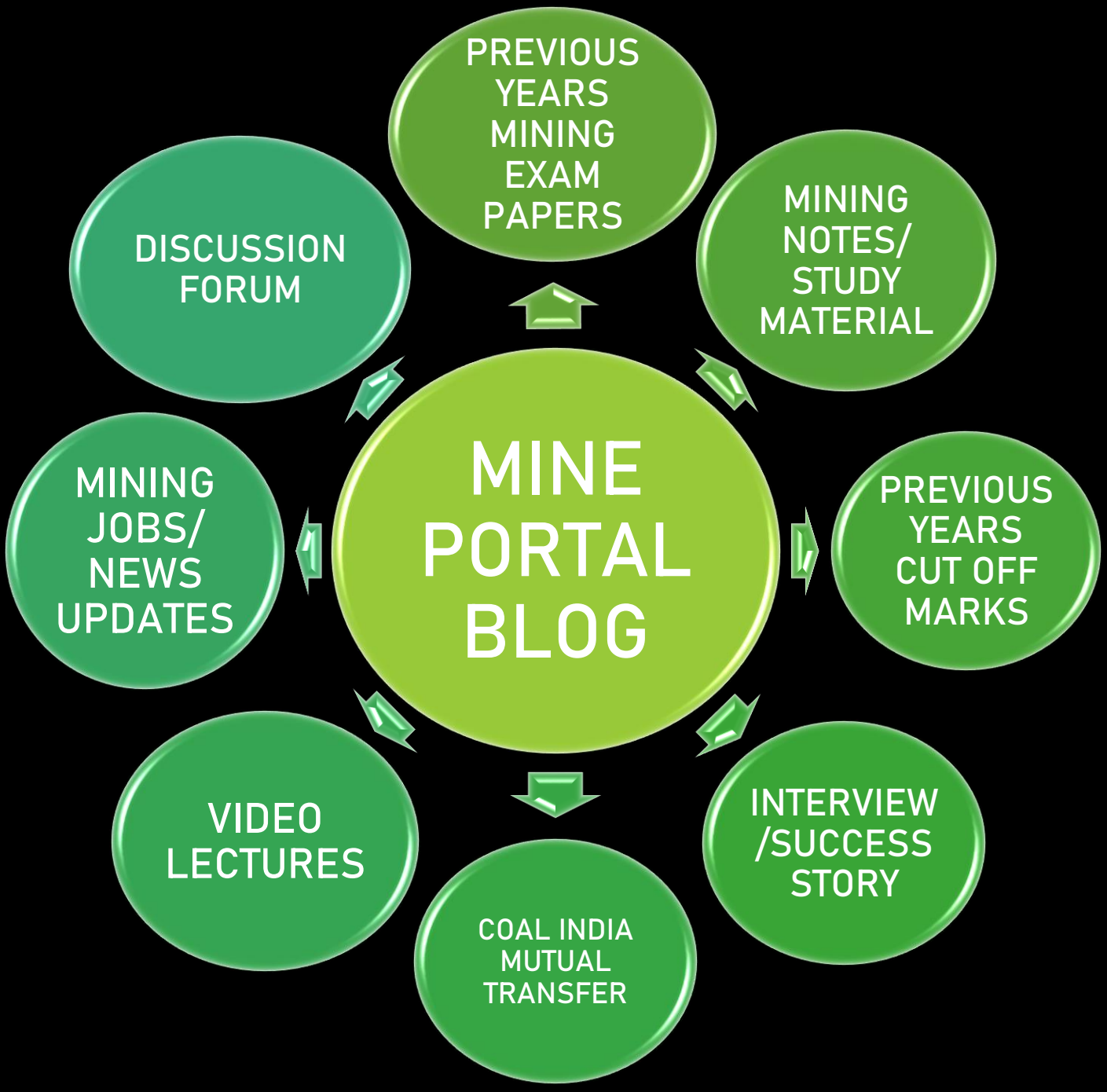

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DGMS CIRCULAR/GAZETTE OF INDIA
2018 FOR COAL MINE RGULATIONS
PREPARED BY-

Shri Animesh dutta & Pyare lal Patel

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USER NOTES

NOTIFICA TION

Dhanbad, the 1st October, 2018

G.S.R. 973(E).—In exercise of the powers conferred on me as Chief Inspector of Mines, under sub- regulation (3) of Regulation 64 of the Coal Mines Regulations 2017, I, Prasanta Kumar Sarkar, Chief Inspector of Mines, also designated as the Director General of Mines Safety, hereby, specify that all plans and sections prepared or submitted in accordance with the provisions of Coal Mines Regulations, 2017 shall be accurate within the limits of error as specified below:

SPECIFICATIONS OF LIMITS OF ERROR

1.0 Plans

1.1 Accuracy of Correlation with Survey of India National Grid

The positions of the surface reference stations and the centres of all mine shafts at the surface and reference points of underground surveys and also the boundaries of the mine and all surface features required to be shown shall be shown upon the key and Master plans in their correct positions relative to the Survey of India National Grid within the limits of error of survey and plotting as specified hereinafter.

1.2 Plotting Errors

All surface and underground surveys made and carried out in accordance with this Code shall be plotted on the plan of the mine so that, in the case of a plan on the scale of 1/2000, all points in the survey are correct by scale to their calculated co-ordinate position within a limit not exceeding 50 centimetres. In case of a plan prepared on the scale of 1/1000, the corresponding limit of error shall not exceed 25centimetres.

2.0 Surface surveys

2.1 Triangulation Station points

The position of every station point of triangulation with reference to the point of origin of the survey, calculated from an initial base line (or the Survey of India topo triangulation stations) shall agree with the position of that station point, calculated from a verification base line, within a limit of error not exceeding $1/5{,}000^{th}$ of the linear horizontal distance of the station point from the point of origin.

2.2 Traverses

Every traverse made between station points of a triangulation and / or for the determination of the boundaries of the mine or for the determination of other important surface details, shall be closed polygonally and shall be made within limits of error as follows:

- (i) The total angular error of the traverse shall not exceed $30\sqrt{n}$ seconds where 'n' is the number of observing stations (including the initial and closing stations).

- (ii) The error of closure (calculated by co-ordinates) after distribution of the total angular error shall not exceed 1/3,000th of the sum of the horizontal lengths of the drafts of the traverse.

3.0 Underground Surveys

3.1 Instrument for Main Road Traverses:

Every traverse made to determine or check the position of an underground survey station or the check the position of the main roadways of a mine shall be made with a theodolite the smallest reading of which does not exceed 20 seconds of arc and all measurements shall be made with a steel band or steel tape not less than 30 metres in length.

3.2 Angular Error of Closed Traverses

The total angular error of any underground traverse or check survey which has been closed polygonally shall not exceed $(20 + x)\sqrt{n}$ seconds, in which expression the value of 'x' is 10 seconds or the smallest reading in seconds of sub-division of the circle of the instrument employed (whichever is greater) and 'n' is the number of observing stations.

3.3 Co-ordinate Error of Closed Traverses

The error of closure of any underground traverse of check survey which has been closed polygonally (calculated by co-ordinates after distribution of the total angular error) shall not exceed 1/2500th of the sum of the horizontal lengths of the drafts of the traverse.

3.4 Co-ordinate Error of Open Traverses

Where an underground traverse has commenced from and closed upon surface reference points or upon survey stations of which the co-ordinates have previously been determined, but has not been closed polygonally, the error of closure (calculated by co-ordinates) shall not exceed 1/1,500th of sum of the horizontal lengths of the drafts of the traverse.

3.5 Subsidiary Surveys

Subsidiary surveys, to determine the position of any line of face or goaf and the positions of road junctions made between any two stations of check survey, shall have a permissible limit of error of closure by plotting not exceeding 1/500th of sum of the horizontal lengths of the drafts of the survey.

3.6 Checking Subsidiary Surveys

Where it is impracticable to maintain underground check survey stations, and/or where subsidiary surveys cannot be closed upon check survey stations, the difference in location of any point on the line of face or goaf as determined by any two or more such surveys shall not exceed 3 metres.

3.7 Errors of Correlation by wires

The correlations of surface and underground workings carried out by: (i) Single wire in each of two or more shafts.

or

(ii) Two or more wires in a single shaft

Shall be deemed to be within the required limit of error when the difference in value of azimuth of any reference line of the underground survey relative to the surface reference base line, as determined by two or more independent series of observations between wires, does not exceed two minutes of arc.

3.8 Errors of Magnetic Correlation

The Correlation of the surface and underground workings by precise magnetic observation (carried out by magnetic observations on the surface reference base line and by magnetic observations on not less than two underground observation lines, each tested independently for magnetic attraction and connected by a traverse survey carried out within the limit of error required by para 3.3 above) shall be deemed to be within the required limit of error when (after distribution of the permissible angular error in the traverse connecting the underground observation base lines) the difference of azimuth between those base lines so determined agrees with the difference of bearing between the base lines as determined by magnetic observation relative to the surface reference base line, within a limit of error not exceeding two minutes of arc.

Errors of correlation by Direct Connection

For the correlation of the surface and underground workings by direct connections through adits and inclines the traverse connection from, or between the points of reference to the surface shall be carried out within a limit of error required by para 3.3 of this Code, and the correlation shall be deemed to be within the required limit of error when (after distribution of the permissible angular error in the traverse) the values of the azimuth of any underground reference line relative to the surface reference base line, as determined by any two or more such independent surveys, agree within a limit of error not exceeding one minute of arc.

Levels

Errors of Surface Levels

The levelling to determine mine surface bench marks shall commence from a railway bench mark and close upon a second railway bench mark or shall commence from a Survey of India bench mark and close upon a second Survey of India bench mark, within a limit of error not exceeding 2 centimetres per kilometre. After Survey of India bench marks are available, the railway bench marks and Survey of India bench marks shall be linked by a levelling within a limit of error not exceeding 2 cm per km, and thereafter a note shall be made on the plan giving the correction relating to the surface bench mark value with the Survey of India levelling and National Datum lines.

Errors for Underground Bench Marks

The Levels of shaft inset bench marks shall be determined by shaft measurements and shall be deemed to be within the required limit of error when any two or more measurements from the surface bench mark to the mine inset bench mark agree within a limit of error not exceeding $1/5{,}000^{th}$.

Errors of Underground Levelling

All such underground levellings made to determine or cheek the levels of underground bench marks shall close within a limit of error not exceeding $1/2500^{th}$ of the inclined length of the route of the levelling.

Subsidiary Levels

In the case of subsidiary levelings made to determine the level of any point on a line of face or goaf or of any other part of the workings and which are not closed between underground bench marks, the difference in levels of any such point as determined by any two or more such levellings shall not exceed 50 cm.

SUMMARY OF LIMITS OF ERROR 1.0 Plans

1.0 plans

Plotting errors

Plans on 1/2,000 scale	50 cm
Plans on 1/1,000 scale	25 cm

2.0 Surface Surveys

(i) Triangulation

Position of stations of the triangulation As determined from initial and Verification bases	$1/5{,}000^{th}$ of the linear horizontal distance from the local point or origin.

(ii) Traverses

Total angular error	$30\sqrt{}$ n seconds
Error of closure	$1/3{,}000^{th}$ of horizontal length of the traverse.

3.0 Underground Surveys

(i) Traverse closed polygonally

Total angular error	$(20+x)\sqrt{n}$ seconds
Error of closure	1/2,500th of the horizontal length of the traverse

(ii) Traverse not closed polygonally but closed upon reference point

Error of closure	1/1,500th of the horizontal length of the traverse

(iii) Subsidiary Surveys

Error of closure by plotting	1/500th of the horizontal length of the traverse
Difference of two or more determinations of any subsidiary points	3 metres

4.0 Correlations

By shaft wires	2 minutes of arc
By magnetic observations	2 minutes of arc
By direct connection	1 minute of arc

5.0 Levels

Surface mine bench marks	2 cms per km
Inset bench marks should agree within 1/5,000.	Two or more shaft measurements to established inset bench mark
Inbye bench marks	1/2500th of the inclined length of the levelling
Subsidiary points	50 cm.

[F. No. Z-20045/01/2018/S&T(HQ)]

PRASANTA KUMAR SARKAR, Chief Inspector of Mines

Q. What should be the minimum permissible plotting error of a plan made in the scale of 2,000:1 :

(a) 50 cm

(b) 25 cm
(c) 15 cm
(d) 05 cm

Ans - a (Cir 20/1966)

Q. What is the maximum permissible plotting error of a plan made on the scale of 1,000:1 :

or

Q. According to DGMS circular what is the limit of plotting error is case of plan having scale 1:1,000 :

(a) 50 cm
(b) 25 cm
(c) 15 cm
(d) 06 cm

Ans - b (Cir 20/1966)

Q. What should be the total permissible angular error of a traverse where 'n' numbers of observing stations including initial and closing station :

(a) $30\sqrt{n}$ seconds
(b) 20/n seconds
(c) $20\sqrt{n}$ seconds
(d) 30/n seconds

Ans - a (Cir 20/1966)

Q. What should be the least count of instrument used to determine or check the position of an underground survey station (making traverse) :

(a) 01 min
(b) 10 sec
(c) 20 sec
(d) 30 sec

Ans - c (Cir 20/1966)

Q. What is the maximum permissible limit of error of all such underground levelling made in the inclined route of levelling :

(a) 1/5,000
(b) 1/2,500
(c) 1/2,000

(d) 1/1,000

Ans - b (Cir 20/1966)

Q. What is maximum permissible level error for an inset bench mark :

(a) 1/1,000
(b) 1/2,500
(c) 1/5,000
(d) 1/10,000

Ans - c (Cir 20/1966)

Q. What should be the maximum error of a traverse, closed polygonally, of its total horizontal length :

(a) 1/5,000
(b) 1/2,500
(c) 1/1,000
(d) 1/500

Ans - b (Cir 20/1966)

Q. What should be the maximum permissible error of the total horizontal length for traverse not closed polygonally but closed upon a reference point :

(a) 1/2,500
(b) 1/2,000
(c) 1/1,500
(d) 1/1,000

Ans - c (Cir 20/1966)

Q. What is maximum possible level error for surface bench mark of a mine :

(a) 01 cm/km
(b) 02 cm/km
(c) 10 cm/km
(d) 20 cm/km

Ans - b (Cir 20/1966)

Q. What should be the maximum plotting error of a plan made on the scale of 200:1 :

(a) 05 cm

(b) 10 cm
(c) 25 cm
(d) 50 mm

Ans - a (Cir 20/1966)

NOTIFICA TION
Dhanbad, the 1st October, 2018

G.S.R. 975(E).—In exercise of the powers conferred on me under clause (b) of sub-regulation (10) of Regulation 81 of the Coal Mines Regulations 2017, I, Prasanta Kumar Sarkar, Chief Inspector of Mines, also designated as the Director General of Mines Safety, hereby, specify the Maximum speed of man-winding in a shaft as follows:

Maximum man-winding speeds
(See Reg. 81(10) (b))

The maximum speed of man-winding in any shaft shall not exceed the values as given below:

Depth of shaft	Maximum rope speed during man-winding
Upto 100 metres (such shafts are not required to be fitted with an automatic contrivance)	2 m/sec.
101-300 m	4 m/sec.
301-500 m	5.5 m/sec.
501-700 m	7 m/sec.
701-1000 m	8 m/sec.
1,001-1,5000 m	10 m/sec.
above 1,500 m	12 m/sec.

In case of sinking shaft, the maximum man-winding rope speed shall not exceed 1.5 m/sec for depths up to 150 metres, 2.5 m/sec for depths from 151 metres to 500 metres and 3 m/sec for depths exceeding 500 metres.

Depth of sinking shaft	Maximum rope speed during man-winding
up to 150 m	1.5 m/sec.

151-500 m	2.5 m/sec
exceeding 500 m	3.0 m/sec

Note: The maximum speeds for man winding in coal mines recommended in view of shaft conditions and functioning of automatic contrivance, however the speed shall be fixed by the mines manager in consultation with engineer, but shall not exceed above mentioned maximum speeds to avoid over-winding/hard-landing.

Q. What should be the maximum rope speed during man winding when depth of shaft is 100 m :

(a) 2 m/s
(b) 4 m/s
(c) 7 m/s
(d) 8 m/s

Ans - a {G.S.R. 975(E)}

NOTIFICA TION

Dhanbad, the 1st October, 2018

G.S.R. 976(E).—In exercise of the powers conferred on me as Chief Inspector of Mines, under Regulation 101 of the Coal Mines Regulations 2017, I, Prasanta Kumar Sarkar, Chief Inspector of Mines, also designated as the Director General of Mines Safety, hereby, specify the standards and parameters of haul roads for trucks and dumpers as follows:

Conditions for Haul Roads
(See Regulation 101)

(1) All roads for trucks, tippers, dumpers or other mobile machinery shall be constructed to suit their load capacity and maintained in good condition. No vehicle other than HEMM shall be used on haul roads except between designated points and when permitted in writing by the manager.

(2) Design, construction, dimension and layout of haul roads shall be laid down at company level in respect of each opencast mine.

(3) All haul roads in opencast workings shall be arranged to provide one way traffic having width of the largest vehicle plying on that road plus 5m. Where this is not practicable, no road shall be of a width less than three (03) times width of the largest vehicle plying on that road plus five (05) m.

(4) All corners and bends on roads shall be made in such a way that the operators of vehicles have a clear view of distance of not less than 3 times the breaking distance as specified by the manufacturer in respect of the HEMM speeding at 40 Km/hour.

Where it is not possible to ensure a visibility for a distance as mentioned above, there shall be provided with two separate roads of width not less than 2 times plus 3m of largest vehicle plying on the road with a strong road divider at centre with adequate lighting and reflector along the divider.

(5) No road shall have a gradient steeper than 1 in 16. Ramps shall be used for crawler mounted machines only and not for tyre mounted machines. Gradient of ramps shall not be steeper than 1 in 10 and its length shall not be more that 50 m at one stretch..

(6) Where any road existing above level of surrounding area, it shall be provided with strong parapet wall / embankment of following dimensions:

(i) Width at top-not less than 1 m.
(ii) Width at bottom-not less than 2.5 m.
(iii) The height not less that the diameter of the largest tyre of the vehicles plying on the road.
Dumping of mud or overburden shall not be treated as strong parapet wall.

(7) Separate haul road shall be provided for light vehicles plying in the mine premises. Where it is not practicable, definite turnouts, crossing points and waiting points shall be designated for use of vehicles.

(8) Pedestrian or two wheelers shall not be allowed to travel on the haul road made for trucks, tippers, dumpers or other mobile machinery.

(9) Road signs with fluorescent paint shall be provided at every turning point for guidance of drivers especially at night times.

(10) At every curve, parapet walls or vertical posts with 'Zebra' line shall be provided to help the drivers to keep the transport vehicle on the track especially at night times.

(11) Suitable drainage system shall be provided and maintained on one side of the haul road.

Where special condition exists, the Regional inspector may permit the haul road to be maintained in variance of aforesaid conditions.

[F. No. Z-20045/01/2018/S&T(HQ)]
PRASANTA KUMAR SARKAR, Chief Inspector of Mines

[“Haul road” means any passage or road, which is maintained and used in connection with the working of opencast mines for plying of machinery within the precincts of a mine;

Dumper : The maximum speed of vehicles shall be restricted to 30 km/hours by blocking higher gear or any other automatic means.]

Q. No roads for trucks and dumpers shall have gradient more _ _ _ unless having permission of Chief Inspector :

(a) 1 in 10
(b) 1 in 14
(c) 1 in 15
(d) 1 in 16

Ans - d (Reg 101, G.S.R. 976-E -5)

Q. Gradient of haul road in opencast working shall not exceed :

A) 1 in 14
B) 1in 16
C) 1 in 1.5
D) None of the above

Ans - B (Reg 101, G.S.R. 976-E -5)

Q. What should be the minimum width of the haul road in an open cast mine where there is only one road for incoming and outgoing :

(a) 03 times width of the largest vehicle moving on the road +2 metre
(b) 03 times width of the largest vehicle moving on the road +5 metre
(c) 02 times width of the largest vehicle moving on the road +3 metre
(d) 02 times width of the largest vehicle moving on the road +2 metre

Ans - b (Cir Tech 3 0f 09/2008)

Q. All corners and bends in a haul road shall be made in a such a way that operator of the vehicle have clear view of at least a certain distance. What should be the such distance :

(a) not less than 02 times the breaking distance of largest HEMM working at 40km/hr
(b) not less than 03 times the breaking distance of largest HEMM working at 40km/hr
(c) not less than 30 m
(d) not less than 40 m

Ans - b (Cir Tech 04 0f 09/2008)

Q. Gradient of a ramp roads of small stretches shall be allowed up to 1in 10. The small stretches, should not be more than _ _ _ m of length at one stretch :

(a) 10
(b) 20
(c) 30
(d) 50

Ans - d (Cir Tech 05 of 9/2008)

Q. Where two separate haul roads, separated by a strong road divider are provided for outgoing and incoming vehicles, what should be the minimum width of the road :

(a) not less than 2 times width of the largest vehicle + 3 metre
(b) not less than 3 times width of the largest vehicle + 3 metre
(c) not less than 2 times width of the largest vehicle + 2 metre
(d) not less than 1.5 times width of the largest vehicle + 2 metre

Ans - a (Cir Tech 04 of 9/2008)

Q. What should be the minimum width of parapet walls / embankment provided where any haul road is above the surrounding ground :

(a) width at the top not less than 1.5 m and at bottom not less than 2.5 m
(b) width at the top not less than 1.0 m and at bottom not less than 2.5 m
(c) width at the top not less than 2.0 m and at bottom not less than 3.0 m
(d) not less than 1.5 m throughout

Ans - b (Cir Tech 06 of 9/2008)

Q. What should be the height of parapet walls / embankment along haul road where any haul road above the surrounding area :

(a) not less than half of the diameter of the tyre of the largest vehicle plying on the road
(b) not less than diameter of the tyre of the largest vehicle plying on the road
(c) not less than 1 m
(d) any of these

Ans - b (Cir Tech 6 of 9/2008)

Q. No roads for trucks and dumpers shall have gradient more _ _ _ unless having permission of Regional Inspector :

(a) 1 in 10
(b) 1 in 14
(c) 1 in 15
(d) 1 in 16

Ans - d (Reg 101, G.S.R. 976-E -5)

Q. Gradient of haul road in opencast working shall not exceed :

A) 1 in 14
B) 1in 16
C) 1 in 1.5
D) None of the above

Ans - B (Reg 101, G.S.R. 976-E -5)

Q. What should be the maximum gradient of roads for trucks and dumper in case of ramp over small stretches :

(a) 1 in 10
(b) 1 in 14
(c) 1 in 15
(d) 1 in 16

Ans - a (Cir Tech 9/2008)

Q. According to DGMS circular maximum speed of dumper shall be restricted to _ _ _ :

(a) 20 km/hr
(b) 25 km/hr
(c) 30 km/hr
(d) 40 km/hr

Ans - c

NOTIFICA TION

Dhanbad, the 1st October, 2018

G.S.R. 978(E).— In exercise of the powers conferred on me under sub-regulation (2) of Regulation 143 of the Coal Mines Regulations 2017, I, Prasanta Kumar Sarkar, Chief Inspector of Mines, also designated as the Director General of Mines Safety, hereby specify the Procedure for conducting air-borne respirable dust surveys in a coal mine as follows:

Procedure for conducting air-borne respirable dust surveys
(See regulation 143(2) of the Coal Mines Regulations 2017)

1.0 Instruments and Accessories

- 1.1 Sampling Instruments
  Air borne respirable dust sampling of air is to be done by dust sampler of a type approved by Chief Inspector of Mines.

- 1.2 Weighing Balance
  The balance to be used for measuring the weight of dust filters before and after sampling should be very sensitive and capable of weighting upto one hundredth of a milligram and it should be maintained properly.

- 1.3 Calibration
  The sampling instrument and the balance shall be calibrated as per manufacturer's instructions but on a date, which is not later than one year.
  Adequate number of approved type dust sampling instruments and accessories should be maintained in a mine or a group of mines so that the requirement of dust survey as required under Reg. 143 of CMR 2017 can be fulfilled.

2.0 Laboratory for determining dust content

As required under Reg. 143(7) of CMR 2017, respirable dust content or the quartz content shall be determined within 14 days of collection of the dust sample at an approved laboratory.
Determination of quartz content shall be made at-least once for each seam being worked in the mine and when there is substantial change in the coal property in the working section of the seam.

3.0 Air-borne Dust Survey In-charge

Air-borne dust survey in a mine shall be conducted by a suitable person, designated as Air-Borne dust Survey In-charge, in a manner specified in Reg. 143 of CMR 2017, and the provisions of these guidelines. Manager of every mine shall appoint an **Air Borne Dust Survey In-charge**, having minimum qualification and experience as mentioned below and trained as per the training schedule given below for the purpose of carrying out air-borne dust survey in the mine.

- 3.1 Minimum qualification : Holder of Overman's Certificate of Competency (Coal).

- 3.2 Experience : Minimum three (03) years as overman including minimum one (01) year in that mine.

- 3.3 Training of air-borne dust survey incharge :

3.3.1 Training Course: the course of the training of air-borne dust survey incharge should cover, among others, the following major subjects or areas:

- Detailed procedure for conducting air-borne dust survey in mines covering location and duration of sampling, types of sampling and instruments / accessories used for survey.
- Details about checking and operation of the instruments.
- Method of determination of air borne dust concentration including method of weighing filter papers, collection of dust.
- 'Permissible limit' and other statutory provisions regarding airborne dust survey in mines.
- Various dust control measures.

3.4 The Airborne dust survey In-charge shall be assisted by adequate number of trained dust survey assistants.

4.0 Sampling Procedure

- 4.1 Places to be sampled:
- 4.1.1 General : As required under Reg. 143(3) & (5) of CMR 2017, all the workplaces in a mine, where respirable dust is evolved, shall be sampled to ascertain the air borne dust concentration of that area and the dust exposure profile for different categories of work persons working in that area.

  In view of the above, Manager of every mine shall identify such places in the mine. Mine air of that area shall be sampled by 'static sampling' method by a fixed type sampling instrument. Measuring the dust exposure of selected workers, whose exposure is deemed to be representative of their groups, by 'portal to portal personal monitoring' by using personal dust samplers shall also be done .
- 4.1.2 Fixed point or static sampling for underground workings

The following places shall be sampled by fixed type samplers or static samplers:

- (a) For B & P or R&P workings: The sampler shall be positioned on the return side of the point of dust generation (and within 1m of the normal working position of, but not behind the operator or worker) in the following places -

- Within 30m outbye of the first working face in the intake side of the district.
- 30m outbye of the last working face in the return side of the district
- Working faces
- Loading / Unloading / Transfer Points
- Bunkers / chutes

- (b) For Longwall working
  - 30m outbye of the face in the intake airway
  - 10m from the intake end at the face
  - 10m inbye of the return end of the face
  - At the centre of the face
  - 30m outbye of the face in the return airway
  - Loading / Unloading / Transfer Points
  - Bunkers / chutes
- (c) For Mechanised Long wall gate roads
  - 10m outbye of the face
  - 30m outbye of the face
  - Loading / Unloading / Transfer Points
  - Bunkers / chutes
- (d) In other working places, Manger shall fix the sampling points as nearer as possible to the source of dust generation.
- 4.1.3 Personal Dust sampling for underground workings

In addition to the static sampling as above, dust exposure of the following categories of persons shall be determined by **Personal dust sampler**:

- Loaders
- Shot firers and Helpers
- Drillers / Dressers
- Operators and helpers of loading machines (SDL, LHD, Shuttle cars, Gathering arm loaders or other mechanical loaders)
- Operators of Cutter loaders (shearer, plough, continuous miners, road headers, etc.)
- Long wall face crews
- Conveyor, bunker or chute operators
- Overman or other competent person

- 4.1.4 Fixed point or static sampling for opencast workings and other surface operations :
  For fixed-point or static sampling in opencast workings or other surface operations, direction of air current should be kept in mind and the Instrument should be placed on the return side of the point of dust generation. It is suggested that more than one fixed-point sampler shall be installed along the circumference of concentric circles of 5m & 10m radius around the point of equipment generating dust. The samplers shall be installed along the direction of wind or air current and the samplers may change their location during sampling with change of direction of air current.

- 4.1.5 Personal Dust Sampling for opencast workings and other surface operations :
  Dust exposure of the following categories of persons shall be determined by personal dust sampler:
  - Drillers /Dressers.
  - Operators of excavation / loader (Shovel, Back-hoe, Dragline, front-end loaders).
  - Dumper and Tipper operators and helpers.
  - Dozer/Grader operators and helpers.
  - CHP crews, crusher operators and helpers, wagon loaders.
  - Any other machine operators.

- Overman or other competent person.

- 4.2 Position of samplers (Static):
  Sampling should be carried out with air inlet of the Instrument facing the air current keeping the instrument in horizontal position, if the velocity of air is less than 4 metre per second and perpendicular to the air current, if the velocity of air is more than 4 meter per second. The instrument shall be placed at about breathing level with normal posture of the operator and located centrally, and away from the side, as far as practicable. Safety of the instrument and interference of the normal work shall be kept in mind for positioning the instrument.

- 4.3 Frequency of dust sampling:
  - (a) As required under Reg. 143(3) of CMR 2017, every place as mentioned above shall be sampled by static samplers or personal samplers, at-least once in every one month.

  - (b) Such measurement shall also be carried out immediately upon the commissioning of any plant, equipment or machinery or upon the introduction of any new work practice or upon any alteration therein that is likely to bring about any substantial change in the levels of airborne respirable dust.

- 4.4 Sampling by personal dust sampler shall also be carried on along with fixed point sampling.

- 4.5 Rejection of samples
  A sample shall be rejected in the following cases:

  - If the instrument was not working throughout the entire shift of 8 hours.

  - If duration of operation in that area, including operation of the machine, which generates dust, in that particular shift is less than 80% of normal duration of operation in a shift (average duration of operation of previous one month) of that area.

  - In case of 'portal to portal' sampling, if the person to whom the personal dust sampler is attached does not do his normal work in that shift.

- **5.0 Recording of results**
  All results of measurements of air borne respirable dust and all the relevant particulars shall be recorded in accordance with Reg. 143(8) of CMR 2017.

- 5.1 A plan in a suitable scale should be maintained showing clearly all the places where sampling of air born dust has been done. Date of last sampling should be indicated on the plan.

- 5.2 Results of air-borne dust survey shall be maintained in the format as per Annexure I & II.

- 5.3 Record of respirable dust content and the quartz content shall be maintained in the enclosed format and kept in a bound paged book.

- 5.4 Details of the weighing balance used shall be recorded along with sampling date.

6.0 Preservation of filter papers

The filter papers used for a particular sampling shall be preserved properly along with its serial number and date of sampling. These filter papers shall be preserved at least for a period of three (03) years and shall be readily available to the Inspector of Mines if so desired.

7.0 Report on Air Borne Dust Survey

After conducting the air borne dust survey as per the above guidelines a report shall be prepared giving the following details:

(i) Introduction

(ii) Methodology of dust sampling:

- (a) Sampling strategy for static sampling

- (b) Sampling strategy for personal sampling

- (c) Instrumentation

(iii) Observation:

- (a) Tables showing the results of air borne dust survey for static and personal sampling.

- (b) Maximum dust concentration and time weighted Average (TWA) for different locations and operation.

(iv) Conclusion

(v) Recommendations

[F. No. Z-20045/01/2018/S&T(HQ)]

PRASANTA KUMAR SARKAR, Chief Inspector of Mines

NOTIFICA TION

Dhanbad, the 1st October, 2018

G.S.R. 979(E).—In exercise of the powers conferred on me as Chief Inspector of Mines, under sub-regulation (2) of Regulation 146 of the Coal Mines Regulations 2017, I, Prasanta Kumar Sarkar, Chief Inspector of Mines, also designated as the Director General of Mines Safety, hereby, specify the type of stone dust barrier to be provided in a belowground coal mine as follows:

GENERAL:

1.1 Stone dust barriers shall be placed in the full path of the explosion and the shelves shall be so arranged that their collapse in the event of an explosion is not impeded.

1.2 Barriers shall be sited as low as convenient within the upper third of the roadway; and no part of any shelf and no stone dust on it shall be less than 10 cms. from the roof or sides of the roadway or any roadway support. In addition, the shelves shall be constructed and installed that, in the event of an explosion, they fly without obstruction along the roadway.

DESIGN OF BARRIERS:

2.1 The stone dust shall rest on boards which run longitudinally in the roadway and whose length equals the width of the shelves. These boards shall rest on a rigid frame, the two members of which shall be at least 15 cms. in depth and rest on their edge on two fixed rigid brackets.

2.2 Neither the boards nor the frame shall be fastened either to each other or to the fixed brackets.

2.3 Primary or first or light barriers which are intended to be installed nearest to be a possible point of ignition, when installed, shall consist of lightly loaded shelves (see below) not more than 35 cms. in width.

2.4 The distance between two shelves of a light barrier shall be not less than 0.9 m. and not more than 2.0 m.

2.5 The shelves of a light barrier shall be loaded with not more than 30 kg of dust per metre of shelf length and the total quantity of stone dust in the barrier shall be less than 110 kg. of stone dust per sq. metre cross-section.

2.6 Secondary or heavy type of barriers (see below) intended for use further outbye shall consist of one third (1/3) of its shelves lightly loaded and spaced (see below) as in case of primary barriers.

2.7 The loading for a heavy barrier shall be 390 kg of stone dust per sq metre of the cross-section. The shelves shall not exceed 50 cms. in width and their loading shall not exceed 60 kg per metre of shelf length.

2.8 The distance between heavily loaded shelves or between a heavily loaded shelf and a lightly loaded shelf shall not be less than 125 cms. and not more than 270 cms.

2.9 The lightly loaded shelves shall be adjacent to each other and placed at the in bye end of the barrier.

2.10 Where circumstances require intermediate barriers, such barriers shall be loaded with 195 kg. of dust per square metre of roadway, half the dust being placed on lightly loaded shelves and half of heavily loaded shelves. The lightly loaded shelves being arranged at the inbye end, as in the case of heavy barriers.

2.11 When calculating the quantity of stone dust in a barrier, cross sectional area shall mean the average cross sectional area determined by an offset survey of the roadway where the barrier is installed. The amount of stone dust in the lightly loaded shelves in a heavy barrier shall be calculated proportionately on the basis of average length of the shelf as determined from the offset survey plan.

2.12 For maximum dispersability the dust shall be piled loose on the shelves. The dust shall also be of a type that will not cake in use; in damp or wet condition water-proofed stone dust shall be used.

2.13 Where a roadway has to be enlarged to provide sufficient height to accommodate a barrier, the ripping shall extend over a distance on each side of the barrier equal to at least 20 times the difference between the height of the top of the stone dust on the barrier and the height of the unripped roadway.

2.14 When sitting a barrier, the distance as specified shall be measured from the shelf nearest to the face.

BOARD AND PILLAR WORKINGS:

3.1 The workings in the mine shall be divided into sections so that an explosion occurring in one section may not spread to another. The barriers may be sited in relation to group of adjacent headings.

3.2 In board and pillar working, only a heavy type barrier may be provided at a suitable site in relation to the groups of headings in a district intended to be served by the barrier.

Such a barrier shall be provided at a distance of not less than 135 metres from the nearest working face and not more than 365 metres from the farthest face.

3.3 Heavy barriers shall be provided in all the entries to the district. When in any entry a stopping is to be provided instead of a dust barrier, such stopping shall be explosion proof. If any dispute arises whether a stopping is explosion proof, it shall be referred to the Chief Inspector for decision so, however, that such stopping shall be of strong construction with brick in cement and not less than 1.8 metres in thickness and located at a position corresponding the inbye end of the barriers. The gallery outbye of such stoppings shall be kept cleared of coal dust heavily stone-dusted and adequately ventilated.

3.4 The barrier including the explosion proof stoppings, if any, shall be provided at fresh sites as the faces advance, in order to comply with the conditions mentioned under para 3.2 above.

3.5 The sites of stone dust barriers shall be predetermined at the time of planning the mine and the pillars at such sites shall be of adequate size so that the shelves of the barriers are included in about one pillar length. Where the shelves of a stone dust barrier extend through a junction of galleries, either the cross galleries shall be blocked off by stopping and such galleries kept adequately treated with stone dust and ventilated, or the shelves extended into the cross galleries for a length on either side which is not less than the length of barrier extending over the junction and outbye of it.

3.6 Where it is impracticable to site a barrier within the upper limit of 365 metres, the matter may be referred to the Chief Inspector.

3.7 When a new district is being developed, a barrier or barriers shall be sited in the adjacent transport road within the distance mentioned under para 3.2 to give protection in relation to the group of newly started headings.

4.0 SINGLE HEADINGS IN COAL:

4.1 When a single heading is driven from an existing main roadway, a barrier of heavy type shall be sited in the main road at a distance specified under para 3.2 measured from the face of the heading.

5.0 LONGW ALL WORKINGS:

5.1 A barrier of light type shall be installed in all longwall gate conveyor roads within the range of 45-110 metres from the nearest point of the face.

5.2 A second barrier of heavy type shall be installed in longwall gate conveyor roads at a distance of 180-320 metres from the face.

5.3 When a conveyor gate is being developed and the road is too short to accommodate barriers, a light and a heavy barrier shall be sited on the trunk conveyor road outbye of the transfer point at the respective distances mentioned under para 5.1 and 5.2.

5.4 Where the trunk conveyor road passes inbye of the transfer point to other districts, two more such barriers shall be provided in the corresponding positions, inbye of the transfer point.

5.5 For a newly developed face which does not have a separate ventilating split, a pair of barriers shall be sited on the trunk road at the distances specified above.

5.6 Where a number of longwall faces are being developed from a relatively short length of trunk road, protection shall be provided to prevent an explosion occurring at any face from spreading to other parts of the mine and also as far as practicable, so as to prevent an explosion from spreading to an adjacent face. Where practicable, this protection shall be provided by a system of light and heavy barriers.

6.0 SHAFT INSETS:

6.1 Where more than one seams are worked from the same shafts, heavy type of barriers shall be sited in the roads adjacent to the shaft landings in each seam at a distance of 90 m. to 150 m. from the landing. These barriers shall, as far as possible, be so arranged that they are in the middle of a straight stretch, at least 180 m. in length.

7.0 BARRIERS IN THIN SEAM:

7.1 In thin seam where the roof condition does not allow heightening of roadways to accommodate barrier shelves in the manner specified under paragraph 1.1 and 1.2, stone dust barriers may be provided in the following manner:-

(a) In the travelling roads and airways other than haulage roads, the stone dust barrier shelves may be provided of shorter length, leaving a clear space of at least 10 cms. on one side, and up to 90 cms. on the other side for passage of men, provided that the length of the shelves shall not be less than 180 cms. suitable type of fencing shall be provided between the travelling passage and the part of the roadway containing barrier shelves.

(b) In the haulage and tramming roads, the stone dust barrier shelves may be provided on either side of the track leaving a clear space of at least 10 cms. from the side of a tub and a shelf. Provided that the length of the shelf shall not be less than 90 cms. and where the roadway cannot be safely widened to accommodate such shelves, the shelves may be located on the side of the track.

(c) The total quantity of stone dust in the stone dust barrier shall be at least 1-1/2 times of that required in normal cases, the rate of loading of shelves remaining the

same.

(d) The part of the roadway containing the stone dust barriers shall be kept clean of coal dust and adequately treated with stone dust on roof, floor, and sides including cogs and other supports.

8.0 MAINTENANCE:

8.1 For proper discharge of his statutory duties, the Ventilation Officer shall ensure proper construction and maintenance of the barriers in the following manner :-

(a) He shall examine the stone dust barriers once at least in every week (07 days). As a part of this examination, dispersability of the dust shall be tested by taking some dust in hand and blowing on it. If this shows that the dust has tended to cake or consolidate, the dust in the barrier shall be removed and replaced by fresh dust.

(b) He shall arrange for repair of any damage to the shelves or other parts of the barrier.

(c) He shall supervise the erection of new barriers as required.

(d) He shall write a report on such inspection and on any action taken or required. The report shall be countersigned by the manager. In the book maintained for such reports, there shall also be recorded all data concerning position, quantity of stone dust, cross section of the road in which the dust barrier is situated, date of inspection and renewal of stone dust and any other relevant particulars.

(e) If at any time, the Ventilation Officer is not in a position to rectify any defect, or damage to a barrier, he shall report the matter to the manager who shall take immediate action to put the barrier in proper order.

8.2 If any defect in the stone dust barrier is not possible to be removed forthwith, shotfiring shall be stopped in the district or districts concerned, pending remedy of the defect as early as possible.

8.3 The barriers, as required, shall be moved at necessary intervals to ensure that they are maintained constantly within the recommended range of distance from the face.

9.0 CHECK BOARDS :

9.1 A board shall be provided near each barrier on which the following information shall be recorded.

(a) Cross-section of the roadway.

(b) Total dust loading on the barrier.

(c) Number and loading of shelves.

(d) Date of last removal of stone dust.

(e) Reference number of the barrier.

(f) Date of last inspection by the Ventilation Officer.

(g) Signature of the Ventilation Officer.

9.2 The following particulars in respect of stone dust barrier shall be shown on the rescue and stone dusting plans :-

(a) Position, type of barriers, and date of their construction.

(b) Projection for next position of the barriers, and the likely date of their installation.

These Plans shall be brought up-to-date not less than once in three months and copies of the stone dusting plan shall be provided to the officials and competent persons responsible for examining and maintaining the barriers.

[F. No. Z-20045/01/2018/S&T(HQ)]
PRASANTA KUMAR SARKAR, Chief Inspector of Mines

Q. What should be the minimum gap between stone dust loaded on the shelves of stone dust barrier and roof of the gallery :

(a) 20 cm
(b) 15 cm
(c) 10 cm
(d) 05 cm

Ans - c (Cir Leg 1.2 0f 06/1975)

Q. What is the distance between two adjacent shelves of light type stone dust barrier :

(a) not less than 1.25 m and not more than 2.7 m
(b) not less than 0.9 m and not more than 2.0 m
(c) not less than 0.9 m and not more than 2.5 m
(d) not less than 1.25 m and not more than 2.0 m

Ans - b (Cir Leg 2.4 0f 06/1975)

Q. How much quantity of stone dust shall be loaded on per metre of length shelf in a light type barrier :

(a) 20 kg
(b) 30 kg
(c) 40 kg
(d) 60 kg

Ans - b (Cir Leg 2.5 of 06/1975)

Q. What will be the total quantity of stone dust loaded on the light type of barrier per square metre cross section of gallery in which barrier is sited :

(a) 390 kg
(b) 195 kg
(c) 110 kg
(d) 60 kg

Ans - c (Cir Leg 2.5 of 06/1975)

Q. What is ratio between numbers of lightly loaded shelves and heavy loaded shelves in a heavy type of stone dust barrier :

(a) 1:1
(b) 1:2
(c) 1:3
(d) 1:4

Ans - b (Cir Leg 2.10 of 06/1975)

Q. Which type of stone dust barrier shall be provided in the board and pillar working method :

(a) heavy
(b) light
(c) both
(d) none of these

Ans - a (Cir Leg 3.2 of 06/1975)

Q. In a bord and pillar working heavy type stone dust barrier shall be provided at distance of not less than 135 m from the nearest face and not more than _ _ _ meters from the farthest face :

(a) 420 m
(b) 365 m
(c) 320 m
(d) 180 m

Ans - b (Cir Leg 3.2 of 06/1975)

Q. A light type stone dust barrier shall be provided in a long wall gate roadways within which range from nearest point of the face :

(a) 45 to 110 m
(b) 135 to 365 m
(c) 180 to 220 m
(d) 133 to 320 m

Ans - a (Cir Leg 5.1 of 06/1975)

Q. What type of barriers shall be installed in a long wall gate roads :

(a) heavy type
(b) light type
(c) not required
(d) both types of barriers

Ans - d (Cir Leg 5.1 & 5.2 0f 06/1975)

Q. A heavy type stone dust barrier as second barrier shall be provided in a long wall gate roadway within a range of _ _ _ metre from the face :

(a) 45-110
(b) 180-320
(c) 135-365
(d) none of these

Ans - b (Cir Leg 5.2 of 06/1975)

Q. At what distance from a shaft landing, stone dust barrier shall be sited where more than one seam are working from same shaft in the roads adjacent to the shaft landing in each seam :

(a) 45-110 m

(b) 135-365 m
(c) 90-150 m
(d) 180-320 m

Ans - c (Cir Leg 6.1 of 06/1975)

Q. What will be the ratio between numbers of shelves lightly loaded and heavily loaded in an intermediate types of barrier :

(a) 1:1
(b) 1:2
(c) 1:3
(d) 1:4

Ans - a (Cir Leg 06/1975)

Q. Which type of barrier shall be provided near a shaft landing where more than one seams are working through same shaft :

(a) light type barrier
(b) heavy type barrier
(c) both type barrier
(d) intermediate type barrier

Ans - b (Cir Leg 06/1975)

Q. How many total quantity of stone dust shall be loaded per square meter of cross section of gallery on the shelves of an intermediate type of barrier :

(a) 390 kg
(b) 195 kg
(c) 110 kg
(d) 45 kg

Ans - b (Cir Leg 08/1975)

NOTIFICA TION

Dhanbad, the 1st October, 2018

G.S.R. 980(E).—In exercise of the powers conferred on me under sub-regulation (4) of Regulation 161 of the Coal Mines Regulations 2017, I, Prasanta Kumar Sarkar,

Chief Inspector of Mines, also designated as the Director General of Mines Safety, hereby, specify the Conditions for installation of two or more auxiliary fans in the same ventilating district or split in a belowground coal mine as follows:

Conditions for installation of two or more auxiliary fans in the same ventilating district or split
(See Regulation 161 (4) of CMR, 2017)

1.0 Selection of type and capacity of auxiliary fans and their location of installation shall be based on the scientific study.

2.0 Installation of auxiliary fans shall comply with all the relevant provisions under the Coal Mines Regulations and the Central Electricity Authority Regulations, 2010 as applicable to such installation, particularly that of Regulation 161 of the Coal Mines Regulations, 2017 and regulation 110 of CEAR, 2010.

3.0 (a) Before any auxiliary fan is installed and also, at least once every week thereafter, the quantity of air flowing in the airway at the point of its installation shall be measured by the Ventilation Officer. The fan shall not be installed or continued to be operated unless the measurement shows that sufficient quantity of air is available so however that :

- (i) not more than 50% of total air passing in the roadway is taken by the auxiliary fan; and
- (ii) ventilation of the inbye faces, when the fans are running, is adequate.

(b) Particulars of the quantities measured as at Clause 2.0 (a) shall be duly recorded in a bound paged book kept for the purpose.

(c) There shall be also kept at the mine an accurate plan showing the general system of ventilation in the district and the quantity of air current therein.

4.0 (a) The auxiliary fans shall be installed, as forcing fan, on the intake side of the place to be ventilated by it.

(b) No auxiliary fan shall be installed at a point within or less than 4.5 m from the nearer side of the entrance to the place to be ventilated by it.

5.0 (a) Air entering any of the auxiliary fans in the district shall not contain:

- (i) more than 0.3% CH_4; and
- (ii) excessive quantity of dust.

(b) The percentage of CH_4 in the return air in any heading ventilated by an auxiliary fan shall not exceed 0.5%.

(c) The auxiliary fans in the district shall be electrically interlocked by a sequence control which ensures that unless the first fan is running the second fan cannot be started and so on.

6.0 (a) No person shall start an auxiliary fan on any occasion unless the overman or a competent person authorised in this behalf considers that it is safe for the fan to be so started.

(b) An auxiliary fan on the return side shall not be started or re-started after stoppage of the auxiliary fan on its intake side due to power failure or otherwise, unless an overman or a competent person specially authorised by the Manager for the purpose, has also satisfied himself that the conditions at Clause 4.0 above was fulfilled.

7.0 (a) No workman shall enter or be allowed to enter in any heading ventilated by an auxiliary fan unless the overman or competent person has inspected the place and fount it safe and the requirements at Clause 4.0 above are also satisfied.

(b) In case of any interruption in the ventilation arrangements for working places, all persons shall be withdrawn from the area affected, with the exception of those required to rectify the situation.

(c) Particulars of every stoppage of auxiliary fan(s) and their re-starting shall be recorded by the overman or competent persons in a bound paged book kept for the purpose.

8.0 (a) No person other than an official of the mine, Ventilation Officer or a person authorised by the Manager for do so, shall regulate the quantity of air passing through or delivered by an auxiliary fan.

(b) If it is necessary to regulate an auxiliary fan, it shall be done in such a way as to prevent authorised or inadvertent alteration.

(c) Fans delivering air to flexible ducting shall not be regulated by constricting the ducting.

(d) Fans with rigid ducting shall not be regulated by placing loosed obstruction such as brick or stone in the ducting.

9.0 (a) The supply of electricity to the working place shall only be effected when the auxiliary fans are running satisfactorily and;

(b) On restarting the fan after a prolonged shutdown, sufficient time shall be allowed to elapse to clear any accumulation of gas or foul air before re-establishing the supply of electricity to the working place.

[F. No. Z-20045/01/2018/S&T(HQ)]
PRASANTA KUMAR SARKAR, Chief Inspector of Mines

Q. Who will give prior permission for installing two or more auxiliary fan in the same ventilating district in gases seam of second degree :

(a) Chief Inspector
(b) Regional Inspector
(c) Inspector of the concerned mine
(d) none of them

Ans - a {Reg G.S.R. 980(E)}
Note : in CMR 1957 the permission was given by Regional Inspector

Q. What should be the minimum percentage of CH4 in the air entering the auxiliary fan :

(a) 0.3
(b) 0.5
(c) 0.75
(d) 1.25

Ans - a {Reg G.S.R. 980(E)}

Q. What should be the percentage of inflammable gas in the return air in any heading ventilated by an auxiliary fan :

(a) 0.3
(b) 0.5
(c) 0.75
(d) 1.25

Ans - b {Reg G.S.R. 980(E)}

NOTIFICA TION
Dhanbad, the 1st October, 2018

G.S.R. 981(E).—In exercise of the powers conferred on me as Chief Inspector of Mines, under clause (b) of sub-regulation (2) of Regulation 178 of the Coal Mines

Regulations 2017, I, Prasanta Kumar Sarkar, Chief Inspector of Mines, also designated as the Director General of Mines Safety, hereby, in supersession of Notification No. GSR-617(E), dated 28th April 2017, published in the Gazette of India Part II, Section 3(i) on 21st June, 2017, hereby specify that the standards of lighting to be provided during working hours at different places or areas, where natural light is insufficient in opencast coal mines shall be in the manner as specified in the following table and in conformity with the general guidelines for illumination mentioned thereunder:

Standards of illumination in opencast coal mines
Abbreviations- V: Vertical; H: Horizontal

S. No.	Place/Area to be illuminated	Minimum standards of illumination to be provided (in lux)
1	Work place of Heavy Machinery	15H, 25 V (so as to cover depth and height through which the machine operates.)
2	Drilling operations	
	(i)Area where drilling rig works	25 V (so as to illuminate full height of the drilling rig)
	(ii)Area where drill holes exists	15 H
3	Places where manual work is done	15 H, 25V
4	Places where loading, unloading or transfer, loading of dumpers, trucks or train is carried on (including OB Dump and Coal Stack Yard)	15 H, 15V
5	Operators cabins of machines or mechanisms	50 H at all places of operation
6	Haul roads for Trucks and Dumpers	10 H
7	Rail haulage track in the pit	10 H
8	Roadways and footpaths from bench to bench	10 H

9	Permanent paths for use of persons employed etc.	10 H
10	In-pit Crusher/Feeder Breaker	40 H
11	Hand Picking Points	50 H
12	Conveyers	
	(a) Transfer points and drive/tail end area	40 H
	(b) Along conveyor	20 H
13	Coal Handling Plant	
	(a) Places of crushing, screening, segregation and loading/unloading	40 H
	(b) Operation points	50 H
	(c) Other places in general	20 H
14	Pumping Station	40 H
15	(i) Electrical Sub-station	100 H, 50 V
	(ii) Other places of operation of electrical apparatus/equipment	20 H, 20 V
16	First Aid station	50 H
17	Rest shelter	30 H
18	Workshop	100 H, 50 V
19	Parking Yard	50 H
20	General working areas as determined by the Manager in writing	10 H at the level of surface to be illuminated

Guidelines for mine illumination

1.The mine lighting should be designed and installed with proper lamps and fixtures in regard to height, orientation, spacing and reflectors or other accessories, so as to secure a uniform distribution of light on the work area for visual comfort and avoiding objectionable shadows, sharp contrasts of intensity, glare, light clutter (excessive groupings of light) and light pollution to prevent strain on the eyes of the workmen, work

fatigue and medically defined stress.

2.Portable lighting shall be provided at places, where the permanent/fixed lighting is not possible.

3.At strategic locations like electric substation, and any other places as determined by the Manager, emergency lighting arrangement by separate source shall also be provided.

4.In case of haul roads, orientation of light fittings should be kept so adjusted as to have emittance of light across the road and not along the road. Where the width of haul roads is more, the lighting arrangements shall be provided either by rows of lights erected on both sides of the road or by a centrally erected row over the divider, so as to maintain illumination as per standard.

5.Lighting arrangement at working places of heavy machineries, dump/stack yard and other loading/unloading areas shall be such that the formation of dark zone is avoided.

6.Considering high mobility of hydraulic excavators, the faces/benches worked by such machineries shall, as far as practicable, be illuminated by light source of matching mobility so as to avoid chances of lag for want of shifting.

7.Dump/stack yards shall be illuminated by suitable numbers of high mast towers/light source. It shall also be ensured that adequate light reaches up to edges of the active dump.

8.For better implementation of these standards, the manager of every mine shall formulate a detailed written “Illumination Scheme”, which may include an “Illumination Plan” and duties and responsibilities of Key officials for the purpose.

9.In respect of any particular place or operation in a mine, where due to existence of some special conditions the manager is of the opinion that compliance as per stipulated minimum standard is not reasonably practicable, he may provide illumination in variance thereof, if he has indicated the modified minimum illumination to be provided for such place or operation, as the case may be, in the “Illumination Scheme” with proper justification for the same and submitted a copy thereof to the Regional Inspector.

10.**Illumination Survey:**

(i) The manager of every mine shall arrange to conduct Lighting Survey once at least in every month to ensure adequacy of illumination.

(ii) While making such survey, the measurement of lighting shall also be taken at the point farthest from the source of light lying within the limit of the work place or in haul road or travelling or haulage roadway, as the case may be.

(iii) A record of every such survey shall be maintained and signed by the competent person making the survey and countersigned and dated by the manager.

11. Illumination Plan:

- (i) The manager of every mine shall ensure that an Illumination Plan, indicating the location of places, type of illuminating devices, fixtures, lamps, supports, any other devices for illumination and showing required as well as measured value of light at various places to be illuminated, is maintained. Where any area of the mine is not in use or not needed to be lighted, the same shall be clearly marked and demarcated on the plan with reasons to be recorded. The plan shall be kept signed and dated by the surveyor and the official authorized for maintaining the lighting standard and countersigned and dated by the manager.

- (ii) The Illumination Plan shall be brought up to date in every month based on the monthly illumination survey and considering the current status of workings.

[F. No. Z-20045/01/2018/S&T(HQ)]
PRASANTA KUMAR SARKAR, Chief Inspector of Mines

Q. What should be the standard of lighting to be provided in dumper's haul road in opencast mine :

(a) 05 lux
(b) 10 lux
(c) 30 lux
(d) 50 lux

Ans - b (Cir S&T 06/2016)

Q. What should be the standard of lighting to be provided in work place of heavy machinery in horizontal direction :

(a) 10 lux
(b) 15 lux
(c) 25 lux
(d) 30 lux

Ans - b (Cir S&T 06/2016)

Standards of illumination in UG mines

Serial No.	Place/Area to be illuminated	Minimum standards of illumination to be provided (in lux)
1	every shaft landing and shaft bottom or siding which is in regular use	50 H
2	travelling roadway and haulage roadway including man-riding roadway and every incline in use	10 H, 10 V
3	haulage roadway (junction) at which tubs are coupled and uncoupled	30 H
4	places of loading and unloading	30 H, 20 V
5	every room and place containing any engine, motor or other apparatus in regular use	30 H
6	any working face and goaf edge of depillaring panels	20 H, 30 V
7	ladder way / man way	15 H
8	pumping station	30 H
9	area under filling / stowing	10 H
10	conveyors (a) transfer points and drive / tail end area (b) along conveyor	 40 H 20 H
11	hand picking points	50 H
12	loco charging station	50 H
13	UG garage / workshop	50 H
14	(a) electrical substation (b) other places of operation of electrical apparatus / equipment	100 H, 50 V 20 H, 20 V
15	every first-aid station	50 H
16	miners station / rest shelter	25 H

17	coal handling plant (a) place of crushing, screening, segregation and loading / unloading (b) operation points (c) other places (in general)	 40 H 50 H 20 H
18	workshop at surface	100 H, 50 V
19	General working area as determined by the manager in writing	10 H at the level of surface to be illuminated

NOTIFICA TION

Dhanbad, the 1st October, 2018

G.S.R. 982(E).—In exercise of the powers conferred on me under Regulation 188 of the Coal Mines Regulations 2017, I, Prasanta Kumar Sarkar, Chief Inspector of Mines, also designated as the Director General of Mines Safety, hereby, specify the conditions for transport of explosives in bulk in a coal mine, as follows:

CONDITIONS FOR TRANSPORT OF EXPLOSIVES IN BULK
(See Regulation 188 of the Coal Mines Regulations 2017)

1. The Owner, Agent or/and Manager of the mine where transportation of explosives in bulk is proposed to be practiced, shall ensure the following.

- (a) Only properly trained persons who are authorised in writing by the manager for the purpose are deployed.
- (b) Adequate personal protective equipments as required to be used by persons deployed in this connection are provided and also used.

2. The entire operations of transportation of explosives in bulk within an opencast mine shall be placed under the overall charge of a competent person holding at least an Overman's certificate of competency.

3. Transport of explosives in bulk to the priming station or the site of blasting shall be done only during day light hours.

4. The quantity of explosives to be transported in bulk at one time to the site of blasting shall not exceed the actual quantity required for use in one round of shots, and also not

before 30 minutes of the commencement of charging of holes.

5. Only a vehicle duly approved by the Competent Authority shall only be used for transport of explosives in bulk.

6. All conditions stipulated by the licensing authority in respect of the vehicle deployed for transportation and handling of explosives in bulk shall be strictly followed.

7.Such vehicle shall be in safe operating condition and should be driven by competent licensed drivers duly authorised by the Manager.

8. At least two fire extinguishers of suitable size and capable of fighting electrical and petroleum fires shall be provided in each vehicle in an easy accessible position and maintained in a state of readiness.

9. Before transporting explosives in bulk, the competent person authorised in this regard shall personally search every person engaged in the transport and use of explosives and shall satisfy himself that no person so engaged has in his possession any cigar, cigarette, biri, or other smoking material or any match or any other apparatus like mobile phone etc., of any kind capable of producing a light, flame or spark.

10. Additionally, the following precautions shall be strictly observed while transporting explosives in bulk.

- (a) The vehicle shall be properly earthed with chain links while loading.
- (b) The vehicle shall be well locked except during times of placement and removal of stocks of explosives.
- (c) The vehicle shall not be overloaded.
- (d) The vehicle shall not be driven at a speed exceeding 25 kilometers per hour.
- (e) The vehicle loaded with explosives shall not be left un-attended.
- (f) The vehicle shall be kept in isolated places while loaded.
- (g) The vehicle loaded with explosives shall not be taken into garage or repair shop and shall not be parked in a congested place.
- (h) The vehicle transporting explosives shall not be refuelled except in emergencies; even then its engine shall be stopped and other precautions taken to prevent accidents.

- (i) Wherever, drilling operations are being carried out, charging of already drilled deep holes shall not be carried out in the same area at the same time.

11. Every vehicle used for the transport of explosives in bulk shall be carefully inspected once in every 24 hours by a competent person, to ensure that:

- fire extinguishers are filled and are in place,
- the electric wiring is well insulated and firmly secured,
- the chassis, engine and body are clean and free from surplus oil and grease,
- the fuel tank and feed lines are not leaking and
- lights, brakes and steering mechanism are in good working order.

12. A report of every inspection made under sub-clause (a) shall be recorded in a bound paged book kept for the purpose and shall be signed and dated by the competent person making the inspection.

13. The mine manager shall frame a suitable code of practice for handling and transportation of explosives in bulk.

[F. No. Z-20045/01/2018/S&T(HQ)]
PRASANTA KUMAR SARKAR, Chief Inspector of Mines

Q. What should be the maximum speed of a vehicle transporting explosive :

(a) 25 km/hr
(b) 20 km/hr
(c) 15 km/hr
(d) 10 km/hr

Ans - a (Reg 188, G.S.R. 982-E, 10-d)

NOTIFICA TION
Dhanbad, the 1st October, 2018

G.S.R. 983(E).—In exercise of the powers conferred on me under Regulation 189 of the Coal Mines Regulations 2017, I, Prasanta Kumar Sarkar, Chief Inspector of Mines, also designated as the Director General of Mines Safety, hereby, specify the conditions for site selection for establishing a Reserve Station in a mine, as follows:

The conditions for site selection for establishing a Reserve Station under Regulation 189 of CMR, 2017.

The Reserve station shall be selected in such a way as to ensure that:

- (1) The place has no overhanging sides or prominent undercuts. The roof and sides are adequately supported and kept white-washed.
- (2) The place is kept clean, is free from loose debris and is adequately fenced.
- (3) The reserve station and all places lying within 18 m of the same are cleaned of coal dust, and the roof, floor and sides in the area are adequately treated with incombustible dust in a manner as prescribed in the Regulation 144 of Coal Mines Regulation, 2017. The floor of the workings in the 18 m zone shall be particularly treated with at least 2cm thick layer of incombustible dust.
- (4) No energised electric cables or any other source of energy having potential to ignite or explode explosives and/or initiation system, are allowed to pass within a distance of 90 m from the reserve station.
- (5) The place is adequately ventilated.
- (6) The place is not frequented by persons.

[F. No. Z-20045/01/2018/S&T(HQ)]
PRASANTA KUMAR SARKAR, Chief Inspector of Mines

Q. All places lying within _ _ _ of the reserve station shall be cleaned of coal dust :

(a) 90 m
(b) 50 m
(c) 20 m
(d) 18 m

Ans - d (Cir Tech 06/1980)

Q. The floor of the workings in the 18 m zone shall be particularly treated with at least _ _ _ thick layer of incombustible dust :

(a) 1 cm
(b) 2 cm
(c) 1 mm
(d) 2 mm

Ans - b (Cir Tech 06/1980)

Q. No energised electric cable be allowed to pass within _ _ _ from the reserve station :

(a) 90 m
(b) 50 m
(c) 20 m
(d) 18 m

Ans - a (Cir Tech 06/1980)

NOTIFICA TION
Dhanbad, the 1st October, 2018

G.S.R. 984(E).—In exercise of the powers conferred on me under Regulation 193 of the Coal Mines Regulations 2017, I, Prasanta Kumar Sarkar, Chief Inspector of Mines, also designated as the Director General of Mines Safety, hereby, specify the conditions for use of Ammonium Nitrate Fuel Oil (ANFO) in a coal mine, as follows:

CONDITIONS FOR USE OF AMMONIUM NITRATE FUEL OIL
(See Regulation 193 of the Coal Mines Regulations 2017)

Storage and Handling:

1. Ammonium nitrate should not be stored without obtaining licence from Chief Controller of explosives.

2. Storage of Ammonium nitrate shall be done as per the provisions of Ammonium nitrate Rule 2012.

3. Transportation of Ammonium nitrate shall be done as per the provision of Ammonium nitrate Rule 2012.

4. No person shall handle or caused to be handled the Ammonium nitrate in mine premises between the hours of sunset and sunrise.

5. No smoking, naked light or open flame should be allowed in the vicinity of ammonium nitrate at site.

6. Before being mixed on a blasting site, the ammonium nitrate should be stacked well clear of the diesel oil supply and there should be no fires within the working area.

7. As ammonium nitrate will pick up moisture from the atmosphere, care should be taken to prevent bags being torn. Under no circumstances should raked ammonium

nitrate in bags or bulk be loosened by blasting, With explosives.

8. Broken bags of ammonium nitrate should be cleaned up and properly disposed of immediately.

9. The unprocessed ammonium nitrate when transported in vehicle should be carried in a vehicle separate from explosives or combustible materials (including diesel oil).

10. Vehicles used for the transport of ammonium nitrate should be in a safe operating condition and should be driven by competent, licensed drivers.

11. Any tarpaulin or other material used to cover the load of ammonium nitrate should be fire-resistant.

12. (i) Semi-trailer or full trailer vans may be used for the on-site transportation of the ammonium nitrate fuel oil compositions, and for temporary storage of the same. Such vans should be kept in isolated locations while loaded.
(ii) The vans should be well ventilated and locked except during times of placement and removal of stocks of blasting agents.
(iii) No smoking and no open flames should be permitted in or near the vans containing blasting agents.
(iv) The area surrounding the vans (when used as temporary storage), not less than nine (09) metres in all directions should be kept free of rubbish, dry grass or other materials of combustible nature.
(v) Not more than one day's production of field mixed ammonium nitrate should be temporarily stored in the vans at any one time.

Mixing etc.

13. The mixing or impregnating of ammonium nitrate, or a non-explosive mixture of ammonium nitrate (with other substances), with diesel oil should be carried out at or close to the shot holes before immediate use only.

14. No liquid hydrocarbon fuels with higher volatile than No.2 diesel fuel should be used. The most sensitive mixture of ammonium nitrate/diesel oil contains 2% oil, while a 5-6% mixture gives the maximum power. Percentage of oil in excess of 10 tends to lower sensitiveness. Excess oil should be avoided.

15. No person should smoke when mixing, carrying, handling or using the ANFO explosive or when near any
person carrying on such work.

16. No person when mixing, charging or handling the explosive should allow any naked light or fire to be within 15 metres of the shot hole or the explosive.

17. The area surrounding the place of mixing for a distance of at least 15 metres should be kept free of rubbish, dry grass or other combustible materials.

18. All detonators, priming cartridge, and cordtex should be kept in secure receptacles at a safe distance from the explosives until actually required for use.

19. Not more than the quantity of mixture required for immediate use should be prepared.
If for unforeseen circumstances explosive in excess of that required for immediate use is mixed, it should be packed in inner and outer packages and stored in a magazine duly approved by the Licensing Authority under the Indian Explosive Act. The inner packages must prevent the escape of the explosive or oil. A suitable package is a thick polythene bag. The outer package can be of wood, soil fibre board or aluminium, but not of from or steel.

20. A suitable container in the form of portable wooden box should be used for pre-mixing near the shotholes to prevent accidental contamination by grit or other foreign matter as such a contamination may be dangerous. A suitable size for mixing upto 100 kg. At a time is 1.5 metres x 1.0 metre x 0.5 metre in depth. Shovels of similar material should only be used for the mixing, and no metallic shovel should be used. Preferably the mixing should be done by hand using rubber gloves. If necessary, a portable shelter may be used when mixing during inclement weather.

21. The mixing should not take place in the building where the bulk ammonium nitrate is stored.

22. When the mixture has been made, it should be kept in water proof bag until the time of use. The bags should be kept separately from all other materials, and no smoking, naked lights or open fires should be permitted within a distance of at least 15 metres there from.

23. When the mixing is done in a BULK MIXING DELIVERY SYSTEM, the following precautions shall be taken:

- (i) Bulk Mixing and Delivery shall be done in a vehicle duly licensed by Chief Controller of Explosives.

- (ii) The operations of mixing of AN and FO and its loading charging etc., shall be carried out under the guidance of the technical service engineer of the explosive manufacturer.

- (iii) All conditions stipulated by the Chief Controller of Explosives for granting license for use of BMD vehicle shall be complied with.
- (iv) The BMD vehicle shall be in a safe operating condition and shall be driven b a competent licensed driver.
- (v) The vehicle shall be kept in an isolated location while loaded.
- (vi) No smoking and no open flames shall be allowed within a radius of 60 m of the vehicle.
- (vii) The area surrounding the BMD vehicle, not less than 15 m in all directions shall be kept free of rubbish, dry grass or other materials of combustible nature.

24. The prepared mixture should be carried only in wooden or similar containers, and not in a metallic container.

25. Discarded empty ammonium nitrate bags should be disposed of daily in a safe manner such as by burning in an isolated area, burying and so forth.

26. Only the necessary minimum number of persons should be allowed to be present at or within 15 metres of the premises where the process of mixing is being done.

27. The cap sensitivity of the field-mixed ammonium nitrate/fuel oil mixture should be tested at regular intervals. (The test is as follows: Insert an electric detonator in the cartridge, sack or other package of mixed fuel/ammonium nitrate (or any other approved composition) placed on soft grount in an isolated area provided with an amply safe guarded spot for the shotfirer and others, and fire the detonator. A crater in the ground indicates a cap-sensitive mixture).

Charging and Firing:

28. As soon as is possible after the mixing of ammonium nitrate with diesel oil, the holes to be blasted should be charged and fired, and all normal practices of charging and firing of explosives as laid down in the Regulations should be observed.

29. The ammonium nitrate fuel oil (ANFO) mixture may either be poured free in dry conditions of use, or it may be packaged in polyethylene bags for use in wet holes.

30. When poured free, a suitable funnel of fibre board or wood may be inserted over the shot hole for charging the mixture, and a wooden stemmor may be used to aid

the flow.

31. Since the mixture is not as sensitive as conventional high explosive, detonating fuse can not be relied upon to initiate it. Primer cartridges of high explosive equal to 5 to 25% of the total charge should therefore be used. (A small diameter hole will require a high proportion by weight of the initiating charge). All initiating and booster charges should, as far as possible, be of the non-nitro-glycerine type.
In holes of 0.1 metre (4" dia) diameter or less only one line of detonating fuse should pass through the mixture.

32. Before entering a blast area, the Overman / Shotfirer and other personnel should make certain that it is completely free of visible reddish brown fumes, which is an indication of highly toxic concentrations of nitrogen dioxide gas.
Where fumes are observed after blasting, an adequate period of time should be allowed for them to disperse before returning to the blasting area.

Misfires:

33. Precautions for misfires should be taken in accordance with the provisions of the Regulations in this regard.

Fighting Fires Involving Explosives:

34. If high explosives are in the same premises where AN or ANFO fire is underway first attempt should be to remove high explosive from the danger area. If this is not possible, the entire area may be evacuated in anticipation of detonation and the fire should be allowed to burn.

Underground Applications:

35. ANFO should not be used in underground coal mines.

Hazard of Static Electricity:

36. In pneumatic loading of small dia. Holes, premature initiation of priming charge is quite possible. For this pneumatic loading equipment should be properly grounded. The hose connecting the loading machine to the charging hole should be semi-conductive, having a total resistance low enough to permit dissipation of static electricity and high enough to limit the flow of stray electric currents to safe level. Wire countered hose should not be used because of the potential hazard of stray electric currents. On the basis of available information it appears that semi-conductive hose having a resistance of not less than 5000 ohms per 0.3 m. with no more than 2 megohms for the total length is satisfactory.

Supervision:

37. The entire operations of mixing of ammonium nitrate and diesel oil on-site near the place of its use, and its charging and blasting in the shot holes should be placed under the overall charge of a competent person, holding a managers certificate or Foreman's/ Overman's Certificate and appointed in writing by the Manager for the purpose.

[F. No. Z-20045/01/2018/S&T(HQ)]
PRASANTA KUMAR SARKAR, Chief Inspector of Mines

NOTIFICA TION
Dhanbad, the 1st October, 2018

G.S.R. 985(E).—In exercise of the powers conferred on me under Regulation 194 of the Coal Mines Regulations 2017, I, Prasanta Kumar Sarkar, Chief Inspector of Mines, also designated as the Director General of Mines Safety, hereby, specify the conditions for deep-hole blasting in an opencast coal mine, as follows:—

Conditions For Deep-Hole Blasting In Opencast Coal Mine

(See Regulation 194 of the Coal Mines Regulations 2017)

GENERAL

1.0 The owner and agent of an opencast mine shall ensure that a prior scientific study is conducted in designing deep hole drilling and blasting system for the mine taking into consideration all mining parameters and machinery parameters which could have adverse impact on ground vibration in and around the mine and long-term stability of slope of opencast workings and dump yards.

2.0 The Owner and Agent of the mine where deep hole drilling and blasting is proposed shall indemnify the occupants / owners of houses / dwellings / buildings or other structures and the public authority concerned, if any, against danger to their property or injury to them or other persons, arising out of the operations conducted in respect of deep hole drilling and blasting.

3.0 The Owner, Agent or / and Manager of the mine where deep hole drilling and blasting is proposed shall ensure the following:—

(a) Only properly trained persons who are authorised in writing by the manager for the purpose are deployed.

(b) Adequate personal protective equipments as required to be used by persons deployed in this connection are provided and also used.

(c) Adequate scientific equipments for measurement of the health of machinery deployed, ground movements and various blasting parameters like ground vibrations, noise, etc., are provided.

4.0 The entire operations of conduct of safe deep-hole drilling and blasting operations in the mine including transport of the explosive to the site of its use, shall be placed under the overall charge of a competent person holding First class manager's certificate, hereinafter referred to as "Blasting Officer", duly appointed in writing by the manager for the purpose. He shall be assisted in operations connected therewith by adequate number of persons holding at least an Overman certificate of competency, who are duly authorized in writing by the Manager and are fully trained in deep hole drilling and blasting techniques.

DRILLING OF DEEP-HOLES

5.0 Before commencement, the position of every deep hole to be drilled shall be distinctly marked by an Overman working under the direct control of the Blasting Officer so as to be readily seen by the Driller.

6.0 No drilling shall be commenced in an area where shots have been fired, until the Shotfirer has made a thorough examination at all places, including remaining butts of old deep holes, for unexploded charges that a drill may strike.

7.0 No drill or bore rod or pick shall be inserted in butts of old deep holes even if an examination has failed to reveal presence of explosives.

8.0 Drilling operations shall not be carried on simultaneously on two benches, at places directly one above the other.

9.0 Wherever, drilling operations are being carried out, charging of already drilled deep holes shall not be carried out in the same area at the same time.

CHARGING AND STEMMING

10.0 During the approach and progress of an electric storm, no charging and blasting shall be done and precaution laid down in DG Technical Circular 1/1995 shall be followed.

11.0 No shot hole shall be charged in crushed, broken or fractured ground strata.

12.0 All detonators and primed cartridges shall be kept in secure receptacles at a safe distance from the detonating fuse and the explosive, until actually required for use.

13.0 Charging of explosives shall be such as to ensure continuity of the explosive column. Where deck charging is done, continuity shall be ensured for each deck of explosive charge.

14.0 Primer explosive cartridge shall not be slit or deformed.

15.0 Adequate amount of cap sensitive explosive shall be used with non cap-sensitive explosive charge to ensure complete detonation of the explosive charge.

16.0 In case, water is encountered in any shot-hole, either the shot hole shall be dewatered by blowing compressed air into the hole or the explosive column shall be gently pushed down by wooden rod and sufficient time given for the explosive column to sink to the desired depth before the round is fired. Decking in watery holes shall be avoided.

17.0 The charging of holes shall be carried out in day light hours only.

FIRING OF SHOTHOLES

18.0 Shots shall not be fired except during the hours of day light.

19.0 The manager shall fix the blasting time and shall circulate it to all concerned and display it prominently on the notice Board and at conspicuous places in and around the mine.

20.0 The danger zone shall be distinctly demarcated (by means of red flags properly arranged and supported) at least 30 minutes before firing of holes is done.

21.0 All holes charged on any one day shall be fired on the same day. However, in case of specific problems which may lead to the charged holes to sleep over night, the following conditions shall be strictly complied with.

- (i) Explosives charged shotholes in coal faces and the overburden bench immediately above coal seam SHALL NOT be kept sleeping and shall be blasted off on the day of charging.

- (ii) The total duration of sleeping of holes with explosives shall not exceed the hours as designated by the Manager in writing after consultations with the manufacturer of the explosive(s).

- (iii) Elaborate standing orders shall be formulated by the Manager on the various precautions to be taken during the sleeping of shotholes. The standing orders shall clearly spell out the responsibilities of various officials and supervisors including the Blasting Officer of the mine in maintaining the sleeping shotholes in safe condition.

- (iv) Before deciding to allow shotholes on sleeping at any place in the mine other than the coal benches and the immediate overburden bench over the coal seams, care shall be taken to ensure that there is no heating of strata anywhere along the depth of the shotholes. Details of bottom hole temperatures of all shotholes proposed to be charged with explosives and later kept sleeping shall be recorded. For regularly monitoring the bottom hole temperature for any increase, a few pilot holes shall be left uncharged. If the bottom hole temperature shows any sign of abnormal increase, then immediate steps shall be taken to blast all the shotholes at the earliest. The details of all such abnormal increase of temperature, shall be recorded in the register separately kept for the purpose and also signed and dated by the blasting officer and the Manager.

- (v) The area where the shot holes are kept sleeping with charged explosives shall be conspicuously marked by such an arrangement which could be clearly visible during any time of the day or the night.

- (vi) No person shall be allowed to be present anywhere within **100 m** of the shot holes sleeping with explosives. The entrance to such areas shall be effectively cordoned off to prevent any inadvertent and unauthorised entry.

- (vii) The fuse wire emanating out of the shot hole charged with explosives shall be covered with any incombustible material so as to prevent any accidental ignition due to the influence of static electricity form lighting etc.

- (viii) Adequate arrangement of water under high pressure shall be made available near the area of sleeping of shot holes for dealing with any exigencies, including flushing out of charged explosives from the shot holes and for de-sensitising the explosives in the charged shot holes.

22.0 The area of explosives charged shot holes shall be conspicuously marked by visible bright red flags.

23.0 Blasting shall be done preferably against a free face. Blasted material shall be cleared off before commencement of drilling operations for succeeding round.

24.0 All normal precautions for charging and firing, as laid down under Reg. 192 of the Coal Mines Regulations 2017, shall be strictly observed.

25.0 Guards shall be posted to ensure that no person inadvertently enters the danger zone and to ensure that all persons within the danger zone, have taken proper shelter.

26.0 Before shots are charged, stemmed and fired, sufficient warning by siren or other suitable means shall be given to warn persons in the danger zone, including to the habitants of structures and dwellings, not belonging to Owner.

27.0 In case of misfires, precautions as laid down in the Regulation 204 of the CMR-2017, shall be taken.

MISCELLANEOUS

28.0 Mobile phones shall not be used by any person connected with deep hole drilling and blasting operations. Only a two-way communication by wireless devices other than mobile phones shall be provided to the Assistant Manager, In-charge of blasting, shot-firers and to the assistant of the shot- firer.

29.0 A proper record of blast parameters like spacing & burden of holes, hole depth, number of holes fired in the round, charge/hole, charge/delay, charge/round, length of explosive column(s) & stemming column length(s), initiation pattern (with proper sketches wherever called for), results of ground vibration observed (ppv, frequency & air over pressure) and distance upto which flying fragments resulting out of blasting projected, shall also be kept maintained in a bound paged book for each round of deep-hole shots fired. The records shall be duly signed by the Blasting Officer and countersigned by the Manager of the mine.

30.0 The Manager of the mine, after thorough consultations with the OEM and explosives manufacturers, shall formulate suitable Codes of Practice in respect of drilling, charging, stemming, warning of persons, taking shelter, and firing of shots.

[F. No. Z-20045/01/2018/S&T(HQ)]
PRASANTA KUMAR SARKAR, Chief Inspector of Mines

NOTIFICA TION
Dhanbad, the 1st October, 2018

G.S.R. 986(E).—In exercise of the powers conferred on me under Regulation 202 of the Coal Mines Regulations 2017, I, Prasanta Kumar Sarkar, Chief Inspector of Mines, also designated as the Director General of Mines Safety, hereby, specify the Conditions for conducting blasting in fire Areas in an opencast coal mine, as follows:

Conditions for conducting blasting in fire areas in an opencast coal mine
(See Regulation 202 of the Coal Mines Regulations 2017)

(1) Blasting operations shall be carried out under direct supervision of an Assistant manager in charge of Blasting operations.

(2) Persons trained in the job of blasting in Fire area only shall be deputed for the said operation.

(3) No explosive other than slurry or emulsion explosives shall be used.

(4) Blasting shall be done with detonating fuse down the hole.

(5) Temperature inside the blast holes shall be measured (before filling with water) and if the temperature exceeds 80°C, in any hole, such hole shall not be charged. Records of measurement of temperature in each hole shall be maintained in a bound paged book and shall be signed by the Assistant manager incharge of Blasting operations and countersigned by manager.

(6) All blast holes shall be kept filled with water. When any hole is traversed by cracks or fissures, such hole shall not be charged unless it is lined with an asbestos pipe and the hole filled with water. In addition, bentonite or any other effective material shall be used for sealing any cracks at the bottom of the holes.

(7) Detonating fuse shall not be laid on hot ground without taking suitable precautions which will prevent it from coming in contact with hot strata.

(8) Hottest holes shall be loaded last. Uncharged holes shall be filled with water / sandy material.

(9) Carbonaceous material shall not be used for stemming.

(10) The charging and firing of the holes in any one round shall be completed expeditiously and in any case within 02 hours (120 minutes).

(11) Regular monitoring of Carbon Monoxide (CO) shall be done by a competent person authorised by the manager, during charging of the holes. If CO is more than 50 ppm, all persons from the area shall be withdrawn.

(12) Water spraying / quenching arrangements shall be kept available at the blasting site to deal in case of emergency.

(13) Precautions while drilling in Overburden or Coal over the underground workings in Opencast Mines.

A.Where the underground workings are accessible:
Before commencement of blasting operations in the quarry:

(1) Such workings shall be surveyed and cleaned of coal dust and thickly stone dusted. All persons shall be withdrawn from the underground in the same working seam or any other seam or section connected therewith and no work person shall be re-admitted into

the said underground workings unless the same have been inspected by a competent person duly authorised for the purpose by the manager and found free from any noxious gases and or signs of fire, etc.

(2) The underground workings to be quarried shall have sufficient thickness of horizontal barrier as stipulated in the Regulation 121(2) of the Coal Mines Regulations, 2017, otherwise shall be isolated by explosion proof stoppings such as to withstand the force of vibration of blasting, from any active working area either in the same or different seam or section or /mine as the case may be, so as to prevent transfer of danger of blasting to the said active underground workings.

B. Where the underground workings are not accessible:
Before commencement of blasting operations in the quarry:

Such workings shall be treated with incombustible dust ahead of the quarry face fed through surface boreholes and dispersed by compressed air. The following procedure is recommended for treating the inaccessible workings underground with stone dust:

- (a) Ahead of the bottom bench in overburden, holes shall be drilled 18 metre apart in grid pattern from top bench in overburden or surface to the underground galleries. The distance between the 1st row of holes and quarry face should be 06 metre or less.

- (b) After holing through of the galleries in coal, the drill rod shall be withdrawn and at least 02 tonne of stone dust fed through the borehole.

- (c) The drill rod shall then be lowered through the borehole again so that it is well in the heap of stone dust dropped on the floor of the underground galleries.

- (d) Compressed air shall then be blown at the rate of not less than 20 m^3/min under pressure of at least 3.5 kg/cm^2 for a minimum of 45 minutes. This time can be proportionately reduced if compressed air at higher pressure is available.

- (e) The steps (b), (c) and (d) shall be repeated with 02 tonne or more of stone dust dropped in each hole.

- (f) If perimeter of galleries exceeds 14 m, the quantity of stone dust dispersed shall be proportionately increased by repeating the whole process a second time.

- (g) For greater effectiveness, the holes shall be drilled in the junctions of the galleries.

- (h) For better dispersibility, it is desirable to use pure limestone dust or dolomite dust with least possibly silica content. The stone dust should preferably be water-proofed in humid and wet conditions.

- (i) It shall be possible to improve the efficiency of the operation by fabricating special equipment or device which would enable the stone dust to be airborne near about the mouth of the borehole instead of dumping the stone dust at the bottom of the hole and then attempting to disperse it with compressed air as outlined in the procedure given above.

Note: None of the holes put down for stone dusting the underground workings are to be utilised for any other purpose, except for determining the thickness of overburden, etc. and other monitoring purposes.

C. General Precautions:

(1) **Surveying:** Before commencement of the drilling of shothole over the underground workings in the opencast mine, surveying shall be done to legibly mark the galleries, pillars & staple pits in the blasting area.

(2) **Location of holes:** The holes drilled in the overburden bench lying immediately above the coal seam (referred to hereinafter as last overburden bench) shall not lie immediately above the galleries in order to ensure that the blast-holes do not directly fire into the underground workings.

(3) **Safe parting:** The depth of holes in the last overburden bench shall be such as to leave atleast 06m thick overburden above the coal seam, and to ensure compliance with this requirement, a pilot hole shall be put for each round of blasting to determine the total thickness of overburden over the coal seam.

(4) **Compacting of the galleries:** After blasting the last overburden bench over developed galleries, loading operations shall not be started till the blasted area is fully compacted to prevent any chance of pot holing and declared free from any fire and safe by the blasting officer. Special care is to be taken to fill the shafts or staple pits whether vertical or inclined.

(5) **Workings developed in more than one section:** Where more than one section of the seam had been developed on pillars, the shot holes shall not be drilled to within 03 m of a lower section, and care shall be taken that the blast holes do not directly fire into any underground gallery.

(6) **Delay detonators not to be used:** Unless otherwise permitted by DGMS in writing and subject to such conditions as may be imposed, no delay action detonators shall be used in coal, and the manner of extraction of pillars shall be by drilling and blasting holes in coal pillars only from top downwards.

(7) **Use of water ampoules/moist sand:** All holes in the last overburden bench and/or in coal shall be charged with water ampoules or with moist sand of at least 0.6m in length at

the bottom of the hole.

(8) Where there is any doubt and particularly where there are cracks and crevices, the bottom 02m length of the hole shall be filled with sand.

(9) No person including shot-firer shall take shelter within 100 m of the quarry opening and such shelters shall be of stable and strong construction to provide safe shelter to the shotfirer and his helpers.

(10) Sleeping of holes shall not be permitted.

(11) No PETN/TNT based cast booster shall be used for initiating non-cap sensitive slurry/emulsion explosive in coal benches and overburden benches of a fiery coal seam.

(12) Overburden benches immediately above the coal seams and other fiery areas in the mine, the explosive charge shall be fired by detonator attached to the detonating cord at the surface and not within the shot hole.

(13) All explosives, cast boosters, detonators and detonating cord shall be subjected to proper testing in an approved laboratory in respect of temperature sensitivity, impact sensitivity for safe handling in mines. A certification to that effect shall be supplied for each batch.

[F. No. Z-20045/01/2018/S&T(HQ)]
PRASANTA KUMAR SARKAR, Chief Inspector of Mines

Q. A blast hole shall not be charged, if temperature inside it exceeds _ _ _ :

(a) 30°C
(b) 33°C
(c) 80°C
(d) 100°C

Ans - c (Cir

Q. In case of blasting in hot strata, charging and blasting of shot hole shall be completed within _ _ _ :

(a) 30 minutes
(b) 90 minutes
(c) 120 minutes
(d) 150 minutes

Ans - c (Cir

Q. In case of blasting in hot strata, if CO is _ _ _, all persons from the area shall be withdrawn :

(a) more than 30 ppm
(b) less than 30 ppm
(c) more than 50 ppm
(d) less than 50 ppm

Ans - c (Cir

Q. What should be the maximum gap of time between charging and firing of a blast hole in a fiery area :

(a) 4 hours
(b) 3 hours
(c) 2 hours
(d) 1.5 hours

Ans - c (Cir Tech 2/1985 & 2-1990)

Q. Temperature inside the blast hole of fire area shall be measured before charging of explosive in an opencast. Exceeding what temperature no blast hole shall be charged :

(a) 80°C
(b) 60°C
(c) 50°C
(d) 40°C

Ans - a (Cir Tech 2/1985 and 2/1990)

Q. No explosive other than the following explosive shall be used for blasting of deep holes in a fire area :

(a) LOX and ANFO
(b) slurry and emulsion
(c) heavy ANFO
(d) none of these

Ans - b (Cir Tech 2/1985 & 2/1990)

Q. To prevent coal dust explosion while extracting pillar by opencast methods bore holes should be drilled from surface to underground gallery in grid pattern 18 m apart. In such bore holes stone dust should fed twice. How much stone dust should be fed in each time :

(a) 1 te
(b) 2 te
(c) 3 te
(d) 4 te

Ans - b (Cir Tech 4/1983)

Q. To prevent coal dust explosion while extracting pillars by opencast methods, bore hole should be drilled from surface to underground gallery in grid pattern of flushing of stone dust. What is the maximum distance between two adjacent holes :

(a) 30 m
(b) 20 m
(c) 18 m
(d) 10 m

Ans - c (Cir Tech 4/1983)

Q. To prevent coal dust explosion while extracting pillar by opencast method bore holes should be drilled from surface to underground gallery and 02 te stone dust fed once. This stone dust should be blown by compressed air. What should be the minimum pressure and volume/m^3 the air should be blown :

(a) 3.5 kg/cm^2 and 20 m^3/min
(b) 3.5 kg/cm^2 and 50 m^3/min
(c) 3.5 $lb/inch^2$ and 20 m^3/min
(d) 30 Pa 30 m^3/min

Ans - a (Cir Tech 4/1983)

NOTIFICA TION

Dhanbad, the 1st October, 2018

G.S.R. 987(E).—In exercise of the powers conferred on me under sub-regulation (2) of Regulation 216 of the Coal Mines Regulations 2017, I, Prasanta Kumar Sarkar, Chief Inspector of Mines, also designated as the Director General of Mines Safety,

hereby, specify the Safety features and devices to be provided in Heavy Earth Moving Machinery (HEMM) including trucks and tippers used in a coal mine, as follows:

Safety features and devices to be provided in Heavy Earth Moving Machinery (HEMM) including trucks and tippers
(See Regulation 216(2) of Coal Mines Regulations 2017)

1.0 General Requirements:

The following Safety features and devices shall be provided in all Heavy Earth Moving Machinery (HEMM):

A. Access:

(i) Safe access to the Operator Station and to routine maintenance points of HEMM shall be provided. Proper placement of components of the access system shall permit and encourage a person to use three-point support while ascending, descending or moving about the access system, when more than 1m above the ground. Two-point support is acceptable for stairs, stairways, ramps, walkways and platforms. Three-point support should be used for all ladder systems. Track shoe and track pad surfaces are accepted as access steps if three-point support is provided when the HEMM is in 'OFF' condition.

(ii) On machines with articulated frames and in the fully articulated steering position, a minimum clearance of 150 mm shall be provided between firm structures and components with relative movement in the path of the access systems to the operator's station.

(iii) An alternative exit path shall be provided on a different location of the machine than the primary access path from the operator platform. If the alternative exit path is not obvious, it shall be identified. The alternative exit path is intended for emergency situations (e.g. machine tip-over) and therefore does not need to meet the primary access requirements.

B. Operator's Station (Cabin):

(i) The cabin shall protect the operator against foreseeable adverse climatic conditions, heat, dust, noise etc. Air-conditioning system shall be provided in the Operator's Station. A ventilation system, an adjustable heating system and a system for defrosting windows shall be provided wherever required.

(ii) Alternative opening (Emergency Exit): An alternative opening shall be provided on a side other than that of the primary opening. A window panel or another door is acceptable if they are easy to open or remove without the use of keys or tools. Latches may be used if they can be opened from the inside without the use of keys or tools. The breaking of a suitable size of glass pane is considered to represent a suitable alternative opening, provided that the necessary pane hammer, immediately accessible to the operator, is

provided and stored in the cab. When the window panel is used as an emergency exit, it shall bear an appropriate marking.

(iii) Doors and Windows: Doors, Windows and flaps shall be securely held in their intended operating positions. Doors shall be retained at their intended operating positions by a positive engagement device. The front window shall be fitted with motorized windscreen wipers and washers. The tank of the window washers shall be easily accessible.

(iv) Pipes and hoses that contain fluids at pressures exceeding 5 MPa or temperatures above 60 ℃ located inside the cab shall be suitably guarded.

C. Operator's protective Structures:

(i) All HEMM with a seated operator shall be equipped with a roll-over protective structure (ROPS). Th ROPS shall comply with ISO 3471. Further, it shall also be fitted with fall-over protective structure (FOPS), when they are intended for applications where there is a risk of falling objects. The fitted FOPS shall be in accordance with ISO 3449.

D. Seats:

(i) The Operator's Station shall be fitted with an ergonomically designed adjustable seat that supports the operator in a position that allows the operator to control the machine under the intended operating conditions. The seat and its suspension shall be so designed to reduce vibration transmitted to the operator to the lowest level that can be reasonably achieved.

(ii) If an additional seat for a trainer is installed in the Operator's Station, it shall be padded and shall provide adequate space for the trainer. The trainer shall also have available a conveniently placed handhold.

(iii) Seat Belt for Operator with reminder shall be provided.

E. Operator's Controls and Indicators:

(i) 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. 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.

(ii) Controls that can cause a hazard due to inadvertent activation shall be so arranged, deactivated or guarded as to minimise the risk - particularly while the operator is getting

into or out of the operator's station. The deactivation device shall either be self-acting or shall act by compulsory actuation of the relevant device.

(iii) A device/system shall be provided to release the residual pressure in each hydraulic and pneumatic circuits which can cause a risk.

F. Starting and Stopping System:

(i) All HEMM shall be equipped with a starting and stopping device (e.g. key). The starting system shall have a provision for protection against unauthorised use.

(ii) The starting and Stopping system shall be designed such that movement of the machine, working equipment and attachment, shall not be possible, while starting or stopping the engine, without activating the controls. (E.g. Transmission Neutral-Engine Start safety arrangement).

(iii) In case of Remote control operated equipment, the Starting and Stopping system shall conform to any National / Internationally accepted standard.

G. Steering System:

(i) The steering system shall be such that the movement of the steering control corresponds to the intended direction of steering.

(ii) Hydraulic Steering circuits shall, if used, incorporate the following features:

- (a) pressure control devices as required to avoid excessive pressures in the hydraulic circuit;
- (b) hydraulic hoses, fittings and tubing with test burst pressures at least four times the working circuit pressure control device(s) for normal and emergency steering systems;
- (c) plumbing arrangements which avoid excessively tight hose bends, torsion in the installed hoses, or scrubbing and chafing of hoses.

(iii) An emergency steering system shall be provided which also function with reverse machine movement if the maximum rated speed in reverse exceeds 20 km/h.

(iv) A warning device indicating a normal steering power source shall be provided. This warning device shall be audible or visual, and shall be activated by failure of the normal steering power source.

(v) 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

H. Brake System:

All HEMM shall be equipped with the following brake systems and all these systems shall be effective under all conditions of service, load, speed, terrain and slope, according to the intended use of the machine:

(i) Service brake - to be used as the primary braking system during normal operation of the equipment.

(ii) Emergency brake - to be applied by the operator in the event of a failure of the service brake.

(iii) 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) or any other means.

All HEMM shall have a brake system in accordance with ISO 3450 except for crawler machines with a travel speed less than 20 km/h, which shall have a brake system in accordance with ISO 10265.

I.Visibility:

(i) All HEMM shall be designed so that the operator has sufficient visibility from the operator's station in relation to the travel and work areas of the machine necessary for its intended use. The performance criteria shall be in accordance with ISO 5006.

(ii) Rear Vision Camera shall be provided in all HEMM.

(iii) Blind Spot Mirrors / Camera apart from rear side view mirror to enable operator to have clear visibility of blind spot shall be provided in all HEMM.

J. Stability:

(i) All HEMM with attachments, including optional equipment, shall be designed and constructed so that stability is provided under all intended operating conditions including maintenance, assembling, dismantling, and transportation, as specified by the manufacturer in the operation manual.

(ii) Devices (e.g. outriggers, oscillating axle locking) intended to increase the stability of HEMM in working mode shall be fitted with interlocking devices or check valves which keep them in position in case of hose failure or in case of oil leakage.

K. Noise:

The operator and persons near to the HEMM 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 the persons.

L. Warning devices and safety signs:

(i) All the HEMM shall be equipped with an audible warning device (horn) controlled from the operator's station.

(ii) Warning system for Operator's fatigue shall be provided in all HEMM.

(iii) Audio Visual Alarm (AVA) system for reversing shall be provided in all HEMM.

(iv) Safety signs and hazard pictorials shall be displayed at conspicuous places.

(v) Retro- Reflective Reflectors shall be provided on all sides of the HEMM at suitable positions.

M. Protective measures and devices:

(i) All dangerously exposed moving parts of the equipment shall be provided with suitable guards of substantial construction to prevent injury to person(s).

(ii) Guards or shields shall be provided in the vicinity of exhaust and turbocharger to prevent fuel or oil spraying on hot surfaces.

N. Electrical and Electronic Systems:

(i) Electrical components and conductors shall be installed in such a way as to avoid damage from exposure to environmental conditions (corresponding to the intended use of the machine) that cancause deterioration. Electrical component insulation shall have flame-retardant properties.

(ii) Degree of protection:

Depending on the location / installation of electrical and electronic components, the following degrees of protection are required:

- (a) All components installed exterior to the machine or directly exposed to the environment shall have a minimum degree of protection corresponding to according IEC 60529, IP 55;

- (b) All components installed in the operator's cab or protected against the environment, the protection shall be designed and executed to safeguard a correct function under expected and intended conditions.

(iii) Electronic controls, connectors in control circuits, multi-pin connectors and control switches external to the cab, shall have a minimum protection of IP 55.

(iv) All HEMM powered by electrical power source shall be provided with tripping device in Operator's Cabin to cut off Electric supply at Principal Switch Gear (PSG) end.

O. Fire Protection:

(i) All HEMM shall be equipped with suitable portable Fire Extinguisher(s) in addition to Automatically operated Fire Detection and Suppression device or System.

(ii) Hydraulic hoses, Electric Wires, sleeves and conduits (where cable/wire is passed) of fire resistant quality shall be provided in all HEMM

2.0 In addition to General requirement mentioned above, the following safety devices / features specific to machines shall be provided:

2.1 Dumper:

(a) Mechanical steering locking to prevent untoward movement of steering wheel and tyre during work persons working below the cabin while engine is running.

(b) Mechanical type device to protect operator in case of head to tail collision of dumpers.

(c) Limiting speed device to limit the speed as per working conditions.

(d) Propeller shaft guard.

(e) Proximity warning device.

(f) Dump body raised position indicator with Warning.

(g) Retarder System in addition to Service, Parking and Dump Brakes.

(h) Rock ejectors for tandem tyres.

(i) Body raised position mechanical locking arrangement

(j) Engine cut off arrangement / Battery Cut-off switch on front lower portion of the Dumper.

(k) Cabin Guard Extension / Canopy fully covering operator's cabin.

(1) Load Indicator.

(m) Auto dipping System.

2.2 Tippers / Trucks:

(a) Cabin Guard Extension / Canopy fully covering operator's cabin.

(b) Exhaust / Retard Brake.

(c) Propeller shaft guard

(d) Tail gate protection

(e) Limiting speed device

(f) Dump Body lifted position locking arrangement.

(g) Dump Body raised position indicator with Warning.

(h) Dumb body stabilisers.

(i) Proximity warning device

(j) Auto dipping System

(k) Load Indicator.

2.3 Excavator:

2.3.1 Hydraulic Excavators:

(a) All functions cut off switch

(b) Swing Motor Brake and Swing lock

(c) Parking Brake.

(d) Vent valve on top of hydraulic tank (should be able to be removed without any tool).

(e) Provision for Limiting of hydraulic cylinders-Stoppers.

(f) Battery cut off switch outside cabin

(g) Two way communication system other than mobile phone in Operator's Cabin.

2.3.2 Rope Shovels & Draglines

(a) All functions, such as Crowd, Hoist, Swing, Propel and Drag shall be provided with 'ON' type brake so as to automatically apply the brake in case of Electrical power failure.

(b) Travel limit switches for crowd, hoist and Drag functions as applicable.

(c) Limit switch for boom movement.

(d) Two way communication system other than mobile phone in Operator's Cabin

(e) Boom crack monitoring system in Draglines.

2.4 DRILLS :

(a) Dust prevention or suppression system provided in the Drills shall confirm to DGMS circular no. DGMS(S&T)/ circular (Approval) No 1, dated 10.03.2017.

(b) Emergency 'Stop' push button in

- (i) Operator's cabin
- (ii) Main frame.
- (iii) Propeller pendent
- (iv) Rear end

(c) Over Temperature protection devices, in motor winding and other related parts.

(d) Explosive vent in transformer.

(e) Interlock between propel and drilling operations.

(f) High air discharge temperature trip switch

(g) Low lube oil pressure cut off switch (engine and compressor)

(h) Oil stop valve (electric solenoid valve in compressor lubrication line)

(i) No bump circuit

(j) Tower lock.

(k) Propel joystick-spring loaded type to return to neutral (dead man safety)

(1) Lock check valves for preventing creeping in drill

(m) Unloader valve

(n) Stabilizers

(o) Breakout wrench

3.0 All Heavy Earth Moving Machinery including dumpers and trucks shall be provided with Safety features and devices mentioned above before putting them into operation in a Mine.

[F. No. Z-20045/01/2018/S&T(HQ)]
PRASANTA KUMAR SARKAR, Chief Inspector of Mines

NOTIFICA TION
Dhanbad, the 1st October, 2018

G.S.R. 991(E).—In exercise of the powers conferred on me under Regulation 225 of the Coal Mines Regulations 2017, I, Prasanta Kumar Sarkar, Chief Inspector of Mines, also designated as the Director General of Mines Safety, hereby, specify the Conditions and other details for conduct of Drilling Operations in connection with methane exploration or extraction in belowground coal mine, as follows:

I. Every drilling system shall have Safe Operating Procedures covering all the operations, repair and preventive maintenance including safety checks as per OEM recommendations.

II. An emergency plan shall be prepared considering the risks of spontaneous combustion, and hazardous gases and shall be implemented in case of emergency.

III. The all drilling crew shall be imparted basic hazardous gas training and shall be aware of the recommended trigger levels. All on site personnel shall have appropriate PPE (Personal Protective Equipment) and RPE (Respiratory Protective Equipment).

IV. To prevent the incidence of frictional ignitions of methane there shall be a regular change-out schedule to replace worn bits, bits with a larger carbide tip to reduce wear shall be provided.

V. To reduce frictional ignitions bits shall be replaced regularly

VI. The power unit for the drill shall be kept in a fresh air entry.

VII. The drill machine shall be fitted with a gas monitor that alarmed at 1% methane and cut power to the rig when the sensor detected 1.25% methane. These monitors shall be periodically calibrated.

VIII. All boreholes drilled for degasification shall be accurately surveyed either during or after drilling is completed using commercially available borehole surveying tools. These boreholes shall be accurately plotted on mine plans to prevent any inadvertent mining through them.

IX. Exit routes from the confined space shall be well defined.

X. Suitable and sufficient material shall be available on site to seal boreholes in an case of emergency.

XI. Appropriate Personal Protective Equipment (PPE) shall be available at drilling site for workers.

XII. Appropriate Respiratory Protective Equipment (RPE) shall be available at drilling site for workers.

XIII. For Electrical safety : –

(a) The system shall have sufficient protection against electric shock during normal operations.

(b) All electrical equipment including electric motors, generators and panels shall be properly earthed.

(c) All electrical wires shall be properly secured, insulated and plugs shall be in good condition. Joints, if any, shall be placed in safe area and be located such that it does not pose hazard due to accidental contact.

(d) All lights shall be properly protected and adequate illumination shall be ensured.

(e) Locked out/tagged out with appropriate work permit shall be issued before taking up any electrical equipment repair job. The repair job shall be performed after taking electrical isolation from the power source. Electric shock treatment chart shall be displayed in generator/electrical control room.

(xv) Following precautions shall be taken at drilling machines:

a) Never make any adjustments while the machine is operating.
b) Never clean away chips with your hand. Use a brush.
c) Keep all loose clothing away from turning tools.
d) Make sure that the cutting tools are running straight before starting the operation.
e) Keep all guards in place while operating.
f) Always wear eye protection while operating any drilling machines

[F. No. Z-20045/01/2018/S&T(HQ)]
PRASANTA KUMAR SARKAR, Chief Inspector of Mines

Q. In connection with methane exploration or extraction activities in a belowground mine drill machine shall be fitted with a gas monitor that alarmed _ _ _ methane :

(a) 0.50 %
(b) 0.75 %
(c) 1.00 %
(d) 1.25 %

Ans - c {Reg 225, GSR 991 (E) 1/10/18}

Q. In connection with methane exploration or extraction activities in a belowground mine drill machine shall be fitted with a gas monitor that cut power to the rig when the sensor detected _ _ _ methane :

(a) 0.75 %
(b) 1.0 %
(c) 1.25 %
(d) 1.5 %

Ans - c {Reg 225, GSR 991 (E) 1/10/18}

NOTIFICATION
Dhanbad, the 1st October, 2018

G.S.R. 992(E).—In exercise of the powers conferred on me under Regulation 230 of the Coal Mines Regulations 2017, I, Prasanta Kumar Sarkar, Chief Inspector of Mines, also designated as the Director General of Mines Safety, hereby, specify the conditions and other details for methane gas transportation in belowground coal mine, as follows:

Conditions and other details for methane gas transportation in belowground

(see Regulation 230 of the Coal Mines Regulations 2017)

1.0 The pipelines shall be designed in a manner that ensures adequate safety under all conditions likely to be encountered during installation, testing, commissioning and operating conditions. All materials and equipment shall be selected to ensure safety and suitability for the condition of use**,** required flow rate to be transported and Operating pressures and temperatures.

2.0 All pipelines, valves, flingers, equipment or other material fittings that are meant to be used at the pipeline shall conform to API, ANSI, ASA & BIS (Pipe Fittings - as per ANSI B 16.5, Valves - as per API 6D Std. Ball Valves) and shall be of such type, standard and make as recognized or approved by the Chief Inspector of Mines.

3.0 The number of flanged or threaded joints for station piping shall be to the extent minimum. The threaded joints, after tightening, may be seal welded. Flanges shall conform to ANSI B 16.5 or ASME B 16.47 or MSS-SP 44 or equivalent.

4.0 The flange joint shall be provided with either spiral wound metallic gaskets or metallic ring type gaskets, depending upon the piping class. Plain asbestos sheet / reinforced gaskets shall not be used.

5.0 Materials for use in the pipeline system shall comply with the design and service requirements and shall be suitable for the intended fabrication and/or construction methods.

6.0 Adequate precautions shall be taken to protect the pipeline from washout, erosion, ground movement, falls, excessive load, impact, vibration or other likely hazards, which may cause serious movement or damage to the pipeline(s).

7.0 While laying a new pipe lines or making any alteration in existing pipe line in any mine, an underground Woking plan of the area where the pipe line is proposed to be laid showing the extent and route of the pipe line shall be prepared and kept in the mine.

8.0 When any pipeline has been commissioned, the owner , agent manager of the mine shall forthwith submit self-certification in support of complying with the requirement and communicate the actual date of commissioning to the Regional Inspector.

9.0 The pipeline shall be laid, operated and maintained in a safe manner so as not to cause any damage to life, person or property. There shall be adequate arrangements & safety devices for:

- a) Protecting the pipeline from pressure in excess of which it is designed.
- b) Prevention from internal corrosion

- c) Communication and procedures in respect of any emergency in the event of leakage, breakage, fire or other accident.

10.0 Pipeline, pipe fittings and valves shall be installed, supported and maintained in such a manner so as to safely withstand stresses imposed on them by internal and external loads, and by contraction, expansion and vibration.

11.0 All welding jobs shall be carried out as per API 1104 followed by 100% radiographic examination or other suitable technique.. Similarly 100% radiographic examination will be carried out in the tie-in joints. The result of examination shall be recorded in bound paged book kept for the purpose and shall be signed and dated by the person carrying out the examination and shall be countersigned by the manager.

12.0 The sectionalising valves shall be installed where require for operation and maintenance and control of emergencies. The sectionalisation valves shall be provided on the based on risk assessment survey to limit the hazard and damaged from accidental discharge from pipe line and facilitate repair and maintenance of the pipe line.

13.0 Non-return valve of proper rating and high pressure isolating valves shall be provided at suitable points in each flow line.

14.0 Adequate & suitable instruments shall be provided for recording pressure, flow level etc. at suitable points.

15.0 Pressure safety valves and other suitable device of sufficient capacity and sensitivity shall be installed to ensure the normal operating pressure in the pipe line network.

16.0 Following tests shall be conducted during construction and laying of pipeline:

- 16.1 Air & Bubble Test - each section of the line, after assembly and before coating the field joints and tying in shall be tested to an interval pressure of not less than 7kg/cm2 (100psi) for as long as it may be necessary to enable the engineer in-charge to inspect all pipes, joints, valves, etc. Leaks shall be checked by application of suitable foaming agent or alternatively, by radiographic test of welds. Electrical testing of protective coating/insulation shall be performed as per ANSI/ASME B-31.8- 1982, API 1104 standards.

- 16.2 The result of every such test shall be recorded in a bound paged book kept for the purpose and signed and dated by the person making such test and shall be countersigned by the Mine Manager.

- 16.3 Before the pipeline is put into operation, it shall be subjected to hydraulic test at a pressure of at least 1.25 times the internal designed pressure or maximum working pressure likely to be attained at any point along with the pipe line.

- 16.4 The test pressure shall be maintained for at least 24 hours except where specifically mentioned.

- 16.5 The result of every such test shall be recorded in a bound paged book kept for the purpose and signed and dated by the person making such test and shall be countersigned by the Mine Manager.

- 16.6 Similar test shall be made after every renewal or repair and in any case at intervals of not more than three (03) years or at such shorter intervals as may be required. The result of every such test shall be recorded in a bound paged book kept for the purpose and signed and dated by the person making such test and the same shall be countersigned by the Mine Manager.

17.0 Necessary surveillance shut down facilities, pressure levelling device, and isolating block walls shall be provided, wherever required.

18.0 Adequate inspection and patrolling of the pipeline routes shall be carried out as often as necessary to ensure complete safety of the pipelines along their entire routes and all the vulnerable sections of the pipeline. A record of observations made by the Patrolling Team shall be kept maintained.

19.0 The entire length of pipeline shall be inspected once every month for detection of leakage. The result of such inspection shall be recorded in a bound paged book kept for the purpose and shall be signed and dated by the person making the inspection.

20.0 Workers employed for the routine operation of the transportation of Methane shall be made familiar with the layout of all the pipelines in the area and function of various valves, so that not only during operation but also in case of an accident or any emergency, each can quickly and correctly operate the proper valves.

21.0 Adequate number of Automatic gas and leakage detectors fitted with audio visual alarms shall be provide at suitable locations to give warning in event of any leakage of inflammable gas or any other noxious gas from the pipe line in to the mine atmosphere. The detectors shall be inter-coupled with tripping device at permissible Limit.

22.0 Each pressure relieving devices installed on operating equipment shall be so maintained as to ensure proper functioning of the device at the designed pressure.

23.0 A detailed operation and maintenance procedure for control system and safety interlocks shall be developed for each pipeline section and station. Standard operating procedure shall be developed. The procedure shall include, system description, operation set points, activities like detecting , isolating and repairing a leak in the pipe line in safe and efficient manner normal operations, normal shut-down procedure, conditions under which emergency shut-down is required, etc.

24.0 Maintenance schedule, defining the duties and responsibilities of individuals in various working groups shall be formulated and implemented strictly, for ensuring timely action in detecting, isolating, and repairing a leak in the pipeline in a safe and efficient manner.

25.0 Such maintenance shall include testing, inspection and repair of the pressure, relieving device at such intervals as may be necessary.

26.0 Emergency procedure, shall be framed and submitted to the Directorate, specifying the action to be taken in the event of fire, uncontrolled escape of gas from the pipeline, bursting or damage to the pipeline.

27.0 Adequate number of self contained hand lamps of approved type shall be made and kept available for immediate use in case of emergency.

28.0 Pipeline system shall be monitored and controlled from SCADA to ensure effective and reliable control, management and supervision of the pipeline with an objective for:

- (a) Real Time monitoring of various pipeline parameters like Pressure, Temperature, Flow, Status of equipment.
- (b) Leak detection and leak location.
- (c) Remote control operations for Open / Close of valves during emergency shutdown.

29.0 Master Station (MS) should have the complete SCADA database and integrated alarm and event summary for overall operations management & control of the entire pipeline network.

30.0 Effective defect detecting systems like, pipeline patrolling / surveillance, visual / UT inspection, leak detection tests, internal audits, external audits etc. shall be put in place for detection of defects and damages of pipe work. Defective or Damaged pipelines shall be identified and restored to safe operating conditions by the use of appropriate repair methods as per this standard.

31.0 When a repair to a pipeline is made by cutting out a section of the pipe as a cylinder and replacing it with another section of pipe, the replacement section of pipe shall be pre tested to a pressure equal to 1.25 times the design pressure of the parent pipeline for minimum period of 4 hrs. prior to installation. Radiographic inspection shall be carried out on all tie-in-butt weld joints after the installation.

[F. No. Z-20045/01/2018/S&T(HQ)]
PRASANTA KUMAR SARKAR, Chief Inspector of Mines

NOTIFICATION

Dhanbad, the 1st October, 2018

G.S.R. 993(E).—In exercise of the powers conferred on me under clause((c) of sub-regulation (3) of Regulation 243 of the Coal Mines Regulations 2017, I, hereby specify the Course of training in the use of self -rescuer, as follows:

Course of training in the use of self –rescuer
(See Regulation 243(3)(c) of Coal Mines Regulations 2017)

Course of training:

1. Two (02) lectures including demonstrations of not less than one (01) hour duration each in every six (06) months.

2. The following topics shall be covered in the training classes:

- Brief about noxious gases which may present in the atmosphere of belowground coal mines.
- The circumstances which will necessitate the use of self-rescuer.
- Brief detail about the self rescuer.
- Checks to be performed before taking self-rescuer like, external damage, colour indicator, broken seal, etc.
- Correct wearing/donning procedure of self-rescuer.
- Do's and don'ts during use of self rescuer.
- Probable discomforts faced during the use of self-rescuer and remedy thereof.
- Escape routes, refuge chambers/change over stations.
- Practice with donning unit not less than 30 minutes.

[F. No. Z-20045/01/2018/S&T(HQ)]
PRASANTA KUMAR SARKAR, Chief Inspector of Mines