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**COAL INDIA LTD EMPLOYEES' SUBSIDIARY
MUTUAL TRANSFER FORUM**

Good Morning .

Welcome to the
Training session on
05-12-2021,

Organized by MEAI- B& H Chapter.



APPENDIX-II

SYLLABUS FOR THE EXAMINATION FOR

**MINE FOREMAN'S CERTIFICATE OF
COMPETENCY**

(RESTRICTED FOR MINES HAVING OPENCAST WORKINGS ONLY.)

**(Under the Metalliferous Mines
Regulations, 1961)**



a) General Safety and Legislation:

Duties and responsibilities of workmen, competent persons and officials ,

Discipline amongst workers, and control of staff.

Provisions of the Metalliferous Mines Regulations and Rules relating to mine workings,

Explosives and Shot firing,

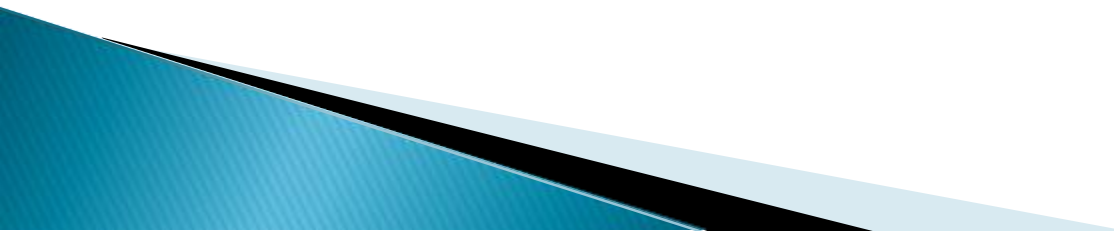
Haulage, General Knowledge of regulations and rules relating to precautions against danger from dust and water, and of other provisions, the enforcement of and compliance with which is and can be the responsibility of mine foremen .

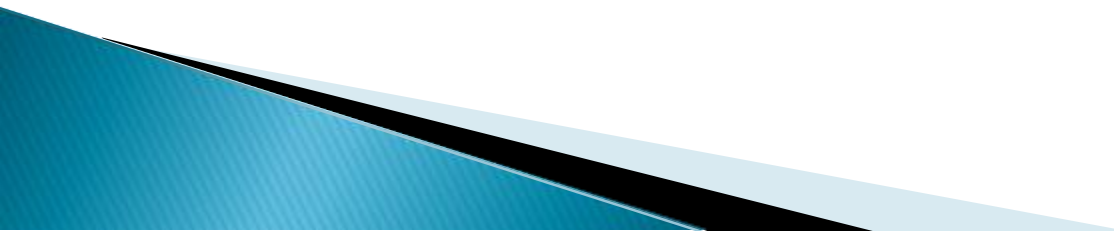
Writing of reports required to be made by mines foreman under the regulations .

Accidents. Their causes and prevention. Accident reports. Disturbing the place of accident. First-Aid.

Sanitation and health. Miners diseases, their main symptoms and prevention. Suppression of dust.

(b) Methods of workings

- Nature of occurrence of mineral deposits. Dangers and precautionary measures while approaching geological disturbances.
 - The purpose and utility of boreholes in proving deposits. Opencast methods of mining mechanized and hand cut working. Benching and other safety precautions
 - Gates and fencing, different kind of fences.
 - Inspection of opencast workings. General Safety and Legislation
 - Reading of statutory plans.
 - Use and safe handling of explosives. Heavy blasting. Storage, transports and use of explosives
 - Elements of Mining Machinery , Sources of danger from surface water. Precaution to prevent Inundation and irruption of water. Water dams Water danger plans.
- 

- Present examination is computer based (MCQ) Multiple Choice Questions type.
 - The system has been changed from subjective or descriptive to Objective, you need to adopt to the present method.
- 

MCQ on Drilling & Blasting .

1. Core drilling is used to define ..

- (a) size of mineralization (b) Exact boundaries of mineralization, (c) Depth & angle of dip (d) degree & uniformity of mineralization (e) All the above (f) a, c & d

Answer : (e) All the above .

2. Full form of UNFC - (a) United Nations Frame Work Classification (b) Union Nations Final classification (c) a & b (d) Non

Answer : - (a) United Nations Frame Work Classification.



3 . Ore sampling method used in mine are.....

- (a) Chip sampling (b) groove or channel sampling
- (c) bore hole sampling (d) grab sampling
- (e) bulk sampling (f) All the above (g) a, b, & d.

Answer : (f) All the above.

4.. Important components shown in a mine plan or a section are

- (a) Title (b) Scale (c) True North or Magnetic north (d) Date of preparation
- (d) Signature of surveyor & counter signature of manager with date (e) All the above. (f) b, c, d & e.

Answer : (e) All the above.

5. Tabular or sheet like igneous body that is often oriented vertically or steeply inclined to the bedding of pre-existing intruded rocks is called

(a) dyke (b) sills (c) faults (d) folds

Answer : (a) dyke

6. Tabular or sheet like igneous body that is often oriented parallel to the bedding of the enclosing rocks are called

(a) Sills. (c) faults (d) folds (d) dyke.

Answer : (a) Sills.



7. A fault isfault in which the rocks above the fault plane, or hanging wall, move down relative to the rocks below the fault plane, or footwall.

(a) Normal (b) Reverse (c) Step (d) Non of the above

Answer : (a) Normal

8. A fault is **a fracture or zone of fractures between**
.....

(a) two blocks of rocks (b) more blocks of rock (c) a& b
(d) Non.

Answer : (a) two blocks of rocks



9. Anticlines , synclines and monoclines. are the types of

(a) folds (b) fault (c) sill (d) all the above.

Answer : (a) folds

10. Rock drill ability/ penetration rate depends on

(a) Mineral composition (b) Texture (c) Grain size
(d) Degree of weathering (e) All the above.

Answer : (e) All the above



Answer : (e) All the above

11. Drill bits contribute to the overall drilling performance ,such as

.....

- (a) Cost of drilling (b) life of drill bit (c) energy consumption (d) All the above

Answer : (d) All the above.

12. Drill bit selection depends on

- (a) Rock formation (b) Speed of rotation (c) Diameter (d) Depth of hole to be drilled (e) All the above (f) c & d.

Answer : All the above.



13. Advantages of Inclined drilling are -----

- (a) More useful in higher benches (b) Less over break (c) Face formed is smooth (d) ground vibration is less (e) All the above (f) a & d.

Answer : (e) All the above

14. Disadvantages of inclined drilling are

- (a) Difficult to drill (b) requires close supervision
(c) risk of deviation (d) difficult in removal of cuttings
(e) All the above (f) a, b & d

Answer : (e) All the above .



15. Drill Monitors are used to monitor

- (a) operational aspects (b) safety while drilling
- (c) Dust / environmental requirements (d) cracks, faults in rock mass
- (e) all the above.

Answer : (e) All the above.

16. DUST CONTROL - DGMS issued guide lines to adopt only wet drilling by Circular No.

- (a) 2 of 2017 (b) 2 of 2018 (c) 5 of 2010 (d) 2 of 2020

Answer : (a) 2 of 2017



17. Blast hole design parameters may be.....

(a) Hole size, (b) hole depth (c) burden (d) Spacing (e) Toe burden (f) Angle of drilling (g) All the above (h) a, b, d & f

Answer : (g) All the above .

18. Spacing is the distance between

.....

(a) distance between adjacent holes (b) distance between hole to free face (c) a & b (d) Non of the above .

Answer : (a) distance between adjacent holes .



19. Sub grade drill - shall be between.....

- (a) 0.3 and 0.5 of spacing (b) 10 % of depth of hole. (c) 20 % of depth of hole (d) Non of the above (e) a & b

Answer : a & b

20. Drilling hazards may be :

- (a) Fall of sides (b) Fall of Drill rig, drill rods ,tools etc on the body, (c) Health Hazard due to dust, Noise & Vibration,
(d) All the above (e) b & c

Answer : (d) All the above



21. Snake hole means

- (a) a hole drilled below the boulder to push the boulder (b) a hole drilled to the boulder (c) a fresh hole drilled near snake hole (d) Non of the above.

Answer : (a) a hole drilled below the boulder to push the boulder.

22. Screw jack provided on the Machine, is used to

- (a) level the machine (b) to know that both track chains are in contact with ground (c) a & b (d) Non.

Answer : (c) a & b



23. Drilling area must be inspected for any hazards before starting drilling work

- (a) Misfire, (b) Sockets (c) Loose ground
(d) any other hazards. (e) all the above

Answer : (e) all the above.

24. Controlled blast techniques are

- (a) line drilling (b) pre-splitting (c) cushion
blasting (d) smooth blasting (e) all the
above (f) a & b.

Answer : (e) all the above.

25. Deep hole drilling in opencast mining means , blast holes drilled more than Deep.

- (a) 3meters (b) 4.5meters (c) 5 meters (d) 6 meters

Answer : (a) 3meters.

26. Flank holes in all the directions are drilled to reach/approach

- (a) water logged area (b) old working not filled with water
(c) a & b (d) Non.

Answer : (a) water logged area .



BLASTING : (Blaster's Training Modules).

- Knowledge about explosives, detonators, D-Cord, NONEL, Boosters etc used in mines,
- Law related to explosives, storage, Transportation, handling & use,
- Holes charging ,stemming &Initiation system,
- Blast design (blast pattern),
- Returning the remaining un-used explosives , detonators etc,
- Warning and signaling / fencing before blast,

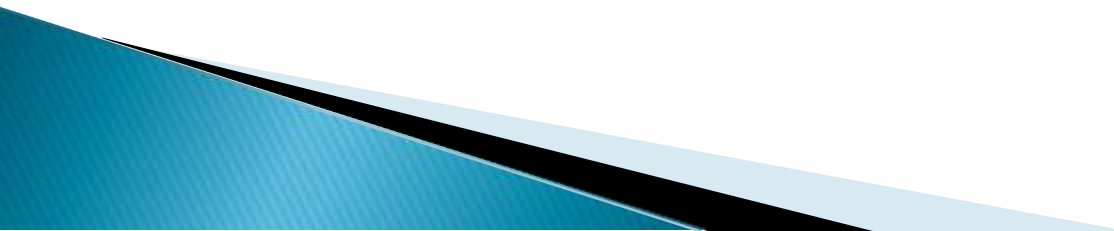
Contd...

- Taking shelter by co-workers(Men & Machinery) and blaster himself.
- **Blasting either by safety fuse or by electrically**,(waiting for 5/30 minutes respectively for fumes to clear),
- Inspection after the blast & declaring the place safe if there is no misfire.
- **If there is misfire** , dealing with misfire as per regulation **167 of IMMR 1961**, after relieving misfire , Once again examination of the blasted area declaring safe if every thing is ok.
- **SOP for blasting**

BLASTER TOOLS :

- Exploder :- Dynamo Condenser discharge type
- **Crimper: Made of Brass,**
- Pricker: Made of wood or non ferrous metal.
- **Knife if used safety fuse,**
- Stemming material (mixed with 70% fine sand + 30% clay),
- **Stemming rod Made up of strong wood/non metallic,**
- Scraper/ Crack detector of brass,
- **Torch (Not required for opencast mines) ,**
- **Measuring tape ,**
- **Shot firing cable ,**
- Circuit tester: Ohm meter approved type

BLASTING AIDS :

- Warning system – Siren,
 - Blast vibration monitoring instruments,
 - Communication system – Wireless to be used away from blasting area only,
 - Bore hole plugs.
- 

27. Explosives used in mines are classified as

- (a) Low explosives (b) Industrial explosives (c) High explosives (d) All the above.

Answer : (d) All the above.

28. Detonators are called

- (a) high explosive (b) low explosive (c) initiators or primary (explosives) (d) All the above.

Answer : (c) initiators or primary (explosive).



29. Examples of blasting agents (i.e individual ingredients are non- explosive) are

- (a) ANFO (b) Emulsion (c) Slurry (d) TNT
(e) all the above (f) a, b & c .

Answer : (f) a, b & c .

30. Names of high explosives are

- (a) TNT (b) PETN (c) HMX (d) ANFO (e) all the above
(f) a, b & c

Answer : (e) a, b & c

31. ANFO is a mixture of Ammonium Nitrate prills & fuel oil by.....%

(a) 6% by weight (b) 6% by volume (c) 8 % by weight (d) 8 % by volume.

Answer : (a) 6% by weight .

32.ANFO is initiated during blasting at mine by a

(a) Plane detonator (b) Electric detonator (c) Booster (d) Non.

Answer : (c) booster.



32.Quantity of booster used in bulk loaded ANFO may be about

- (a) 15 – 20 % primer (b) 5 -10 % primer (c) 20-30 % primer
(d) Non.

Answer ; (a) 15 – 20 % (primer) .

33. Slurry explosives are

- a) Safe to use (b) good fume characteristic (c) Water resistant
(d) all the above (e) a & b

Answer : (d) all the above.



34. Advantages of Slurry explosives are.....

- (a) good detonation property (b) good storage life (c) less sensitive for shocks, impacts, friction etc (d) all the above.

Answer : (d) all the above.

35. VOD of slurry explosives is around

- (a) 5750m/s (b) 6000m/s (c) 6500m/s (d) 7000m/s .

Answer : (a) 5750m/s .



35. Write full form of AWS , ABS , RWS RBS,

Answer : AWS – Absolute weight strength (absolute amount of energy available in a gram of explosive)

ABS- Absolute bulk strength , absolute amount of energy available in a cubic centimeter of explosive)

RWS – Relative weight strength (amount of energy available in per weight of ANFO)

RBS – Relative bulk Strength . (is the measure energy available per volume of explosive as compared to equal volume of bulk ANFO at 0.81ge/cc density).

36.VOD of cast booster is around

(a) 7000m/s (b) 6500m/s (c) 6000m/s (d) 5000m/s

Answer ; (a) 7000m/s.



37.Boosters manufactured in our country are in the range of ----- grams (weight of booster).

(a) 100gm, (b)200gm, (c) 250gm (d) 300gm (f) a, b & c

Answer : (f) a, b & c .

38. Expand SMS & SME - Site Mixed slurry & Site mixed emulsion.

39.LOX explosives – Liquid Oxygen Explosives.

40.RBC – Rock Breaking Compound.



41. Blasting accessories are

(a) Safety fuse with plane detonator (b) Detonating cord/ fuse (c) Initiation by electric detonators
d) initiation by NONEL (e) electronic detonators
(f) Canisters (g) all the above.

Answer : (g) all the above.

42. VOD of detonating cord is (a) 6500m/s (b) 6000m/s (c) 5500m/s (d) 5000m/s

Answer : (a) 6500m/s.



43. PETN in the detonator is

(a) Base Charge (b) Priming charge (c) Main charge (d) all the above .

Answer : (a) Base Charge.

44. The distribution of PETN in the Core of detonating cord normally available is

(a) 15 gm/ m (b) 10gm/m (c) a & b (d) Non .

(a) Answer : (c) a & b

45. Types of detonators available are

(a) Plane detonator (b) Electric instantaneous (c) electric delay detonator
(d) electronic detonators (e) All the above.

Answer : (e) All the above



46. Half second detonator is also called.....detonator

(a) Short delay (b) Long delay (c) a & b (d) Non.

Answer : (b) Long delay

47. Standard detonators are manufactured instrength.

(a) No.6 strength (b) No.8 strength (c) No.10 strength (d) a & b

Answer : (d) a & b.



Answer: (c) a & b

48. Advantages of using Millisecond delay detonators are:

(a) reduced blasting cost (b) increase in drilling factor i.e tonnage per meter drilled length (c) increased fragmentation (d) less over break (e) stable pit slope (f) all the above.

Answer: (f) all the above.

49. Initiation systems used in blasting

(a) Direct initiation (b) Indirect Initiation (c) a & b
(d) Non .

Answer: (c) a & b



49. Detonating Relays (MS connectors) - are used in opencast mines , because

(a) it is non electric initiation system (b) introduces millisecond interval between holes (c) a & b (d) Non.

Answer : (c) a & b.

50 Detonating relays are manufactured with delay interval

(a) 15, 17,25,35,45,50,60 & 100. (b) 0, 5, 10, 15, 20 ,25, 30 ,35.
(c) 10,15,25,35,45,50,60 & 100 . (d) a & c.

Answer : (a) 15, 17,25,35,45,50,60 & 100.



51. NONEL or Shock tube when initiated propagates at low energy signal at the rate

- 2000m/s (b) 1500m/s (c) 1000m/s (d) 500m/s

Answer : (a) 2000m/s

52. NONEL or Shock tubes are available from factory assembled with standard tube length of

- (a) 3,5,10,15,20 & 45 m (b) 3, 4, 5, 7,10,15,20 m
- (c) 3, 5, 15, 20 30m (d) Non.

Answer : (a) 3,5,10,15,20 & 45 m.



53. Environmental impacts of blasting are

- (a) Blast induced ground vibration (b) Fly rocks
(c) Air blast (d) Blasting fumes (e) All the above (f) a,b&d.

Answer : (e) All the above.

54. Resistance of electric detonator with 1.8 M long wire is

- (a) 2.5 to 4.1 ohms (b) 2.00 to 5ohms (c) 2.00 to 3.5ohms
(d) Nom

Answer : (a) 2.5 to 4.1 ohms .



55. Blasting cable of 30M length measure the resistance in ohms is about

(a) 05 ohms (b) 10 ohms (c) 15 ohms (d) 25 ohms.

Answer : (a) 05 ohms.

56. Resistance of circuit in electric blasting is measure by

(a) Galvanometer (b) Ohm meter (c) a & b (d) Exploder.

Answer : (b) Ohm meter



57. Blasting cable used to connect electric detonators main circuit and the exploder is checked for before energizing for the blast.

(a) Insulation test (b) Continuity test (c) a & b (d) Need not test.

Answer : (c) a & b.

58. Type of electric circuit to be used for blasting in mines as per Regulation 163.

(a) Series (b) Parallel (c) Series – Parallel (d) Parallel – series.

Answer : (a) Series circuit.



59. Electric Circuit resistance is more when detonators are connected in Connection.

(a) Series (b) Parallel (c) a & b (d) does not make difference.

Answer : (a) Series

60. Peak particle velocity (PPV) is measured in

(a) mm/s (b) m/s (c) cc /s (d) Non.

Answer : (a) mm/s



61. Safety fused for blasting in mines burns at the rate of

- (a) 2 feet/ Minute or one yard/ 100seconds (b) 3 feet / Minute
(c) 5 feet/ Minute (d) Non.

Answer : (a) 2 feet/ Minute or one yard/ 100seconds .

62. Various multi row firing (blasting) patterns are

- (a) V- Pattern , (b) Square grid pattern ,
(c) Staggered grid V – pattern, (d) All the above,

Answer : (d) All the above.



62. Peak particle Velocity (PPV) is the largest value of the Vector sum of thecomponents.

- (a) transverse (b) longitudinal (c) vertical (d) all the above
(e) Non.

Answer : (d) all the above.

63. Factors influencing the ground motion due to blasting are

- (a) charge per delay (b) stemming height (c) charge depth
(d) delay interval (e) all the above.

Answer : (e) all the above.



64. Scaled Distance (SD) – is the accepted method of predicting

- (a) Peak particle velocity(PPV) (b) air blast
- (c) powder factor (d) all the above.

Answer : (a) Peak particle velocity(PPV) .

65. Predictor Equation - is used in the determination of

- (a) Peak particle velocity(PPV) (b) blast sequence
- (c) controlled blasting (d) all the above.

Answer : (a) Peak particle velocity(PPV) .



66. Instruments used to measure blast induced ground vibration is

- (a) Seismographs (b) A tri- axial geophone (c) (c) a & b
(d) Non.

Answer : (c) a & b.

67. Chamber blasting is generally practiced in the very high benches of

- (a) soft rock (b) medium hardness rock (c) hard rock
(d) weathered rock.

Answer : (a) soft rock .



68. Fly rock is more in Secondary blasting in one of the method practiced in mines is

(a) Pop shooting (b) Plaster shooting (c) a & b (d) Non.

Answer : (a) Pop shooting (pop hole blasting).

69. Controlled deep hole blasting methods used are.....

(a) Pre splitting (b) Cushion blasting (c) smooth wall blasting
(d) Line drilling (e) All the above (f) b, c & d.

Answer : (e) All the above



70. No drill shall be used for boring a shot hole unless it allows a clearance of at least _____ over the diameter of the cartridge of explosive which it is intended to use.

- a) 2 mm b) 2.5mm c) 4mm d) 3mm.

Answer : (d) 3MM

71. Height of Benches to be formed in the mines is as per

- (a) mine manager wish (b) Mines Rules (c) DGMS Permission under Regulation 106 (2) (d) Non.

Answer : (c) DGMS Permission under Regulation 106 (2) (b)



72 An improper drill pattern may lead to

- (a) Poor fragmentation (b) Fly rock (c) air blast (d) heavy ground vibration
(e) All the above (f) a, b, & e

Answer : (e) All the above.

73. To measure the performance of the blast which factor is calculated?

- a) Tonnage factor b) space factor c) stripping ratio
d) Powder factor

Answer : (d) Powder factor.



74 . Ore sampling method used in mine are.....

- (a) Chip sampling (b) groove or channel sampling (c) bore hole sampling (d) grab sampling (e) bulk sampling (f) All the above (g) a, b, & d.

Answer : (f) All the above.

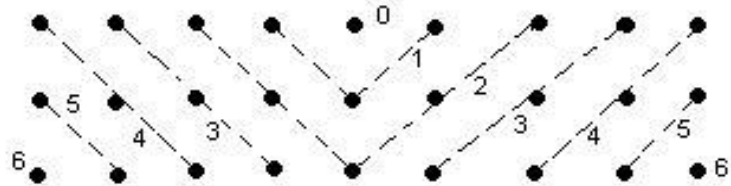
75. Important components shown in a mine plan or a section are

- (a) Title (b) Scale (c) True North or Magnetic north (d) Date of preparation (d) Signature of surveyor & counter (f) signature of manager with date (e) All the above. (f) b,c,d & e.

Answer : (e) All the above.

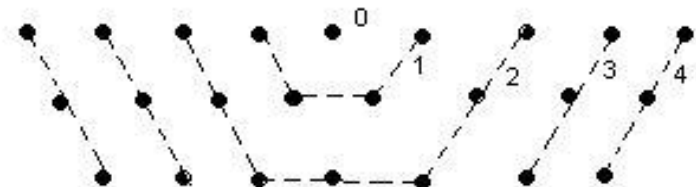


Face



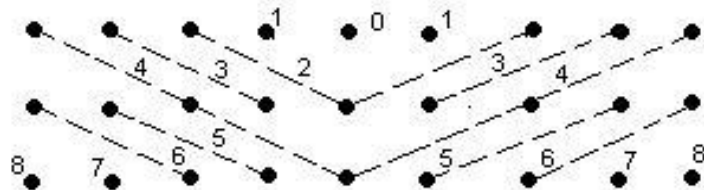
Square 'V'

Face



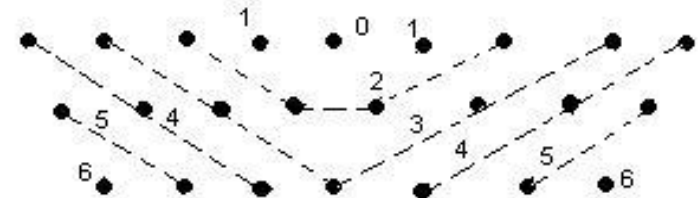
Staggered 'V'

Face



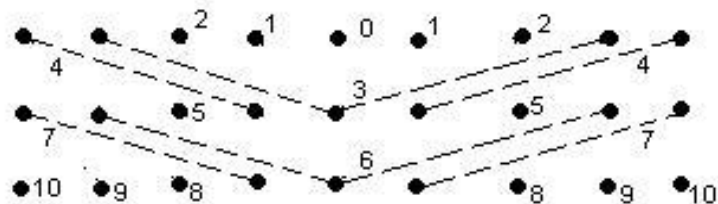
Square 'V1'

Face



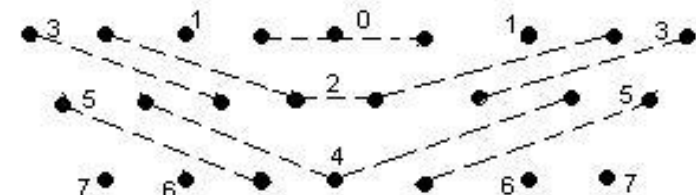
Staggered 'V1'

Face



Square 'V2'

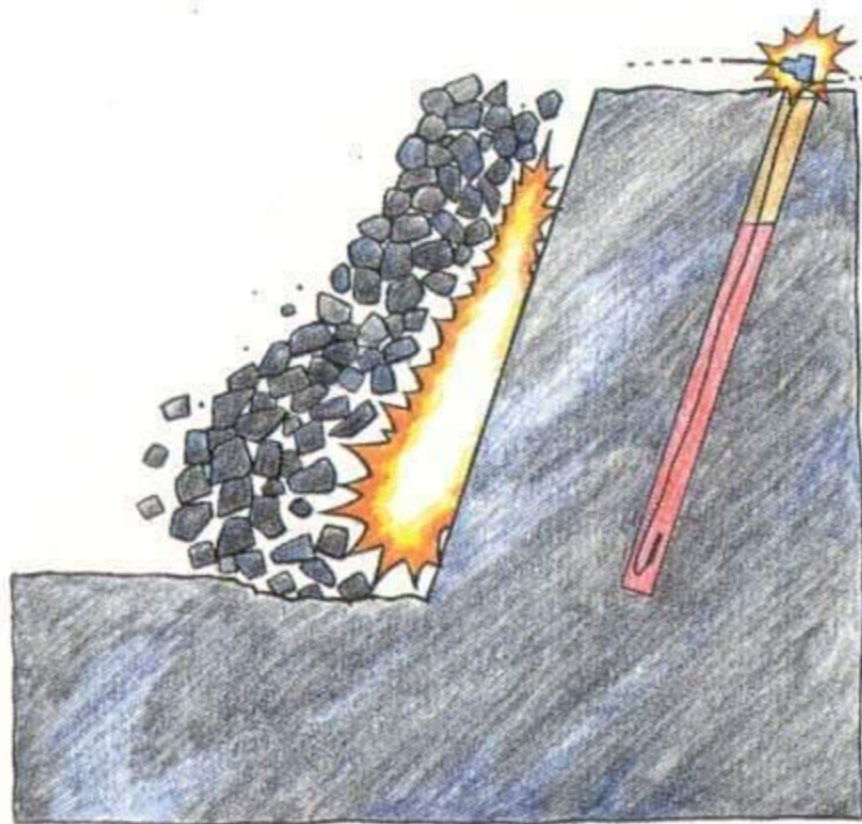
Face



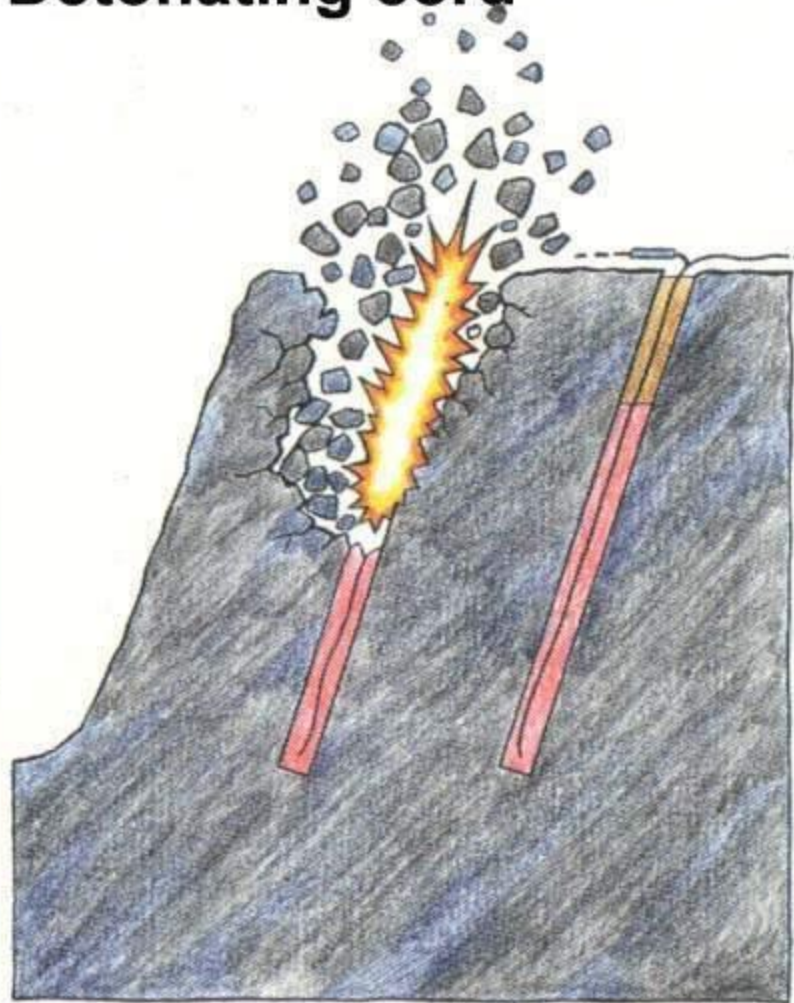
Staggered 'V2'

Blastholes / Initiation patterns for shot fired to an open face

NONEL

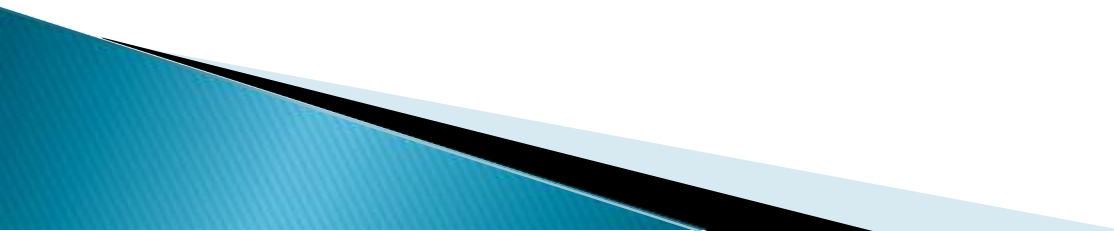


Detonating cord



Pilferage of explosives.

Avoid pilferage of explosives from the mine by checking at various stages .



*Thank
you*



*By Chandrashekhar H,
Dy Gen. Manager,
MGVTC, SANDUR .*