CHAPTER - VI

MANPOWER AND SAFETY

6.1 Manpower-

6.2.1 Existing-

Underground-

A) Longwall Project at amalgamated Muraidih Colliery-

At present, no surface as well as underground mining activities are going on within the proposed sites. Hence, no manpower of Contractor exists at the site. Since, inclines, shafts and sheds exist, BCCL manpower is being used for safety and security purpose.

B) Continuous Miner/SDL Project at Phularitand Colliery-

The total existing departmental manpower in Phularitand Colliery is 821 as on 31-11-2018. Out of the total manpower, surface manpower is 124 nos. and underground manpower is 697 nos.

The details of manpower break-up is given below-

Sl. No.	Parameter (Category wise)	BCCL		Total
		Surface	Underground	
1	Officer	02	23	25
2	Supervisory staff	30	38	68
3	Workers (T/R)	92	634	726
4	Workers (P/R)		2	2
	TOTAL	**124**	**697**	**821**

Opencast-

Departmental OC manpower at amalgamated Muraidih Colliery-

Sl. No.	Parameter (Category wise)	BCCL			Total
		Surface	Opencast	Underground	
1	Officer	4	43	Nil	**47**
2	Supervisory staff				**0**
3	Workers (T/R)	300	595		**895**
4	Workers (P/R)		154		**154**
	TOTAL	**304**	**792**		**1096**

ASHOK KUMAR
Project Officer,
Muraidih Colliery

Hired/Outsource Patch at Phularitand Colliery-

It has been stated earlier chapter that one opencast/ HEMM patch is in operation in Phularitand Colliery on hired/outsourced basis. As per the data submitted by mine authority, the total manpower engaged in this Hired Patch is 31. Details of manpower is not available with the mine Authority.

6.2.2 Proposed-

Longwall Project-

Details of Manpower proposed to be deployed by the Contractor in longwall project are not available.

Continuous Miner/SDL Project at Phularitand Colliery-

A tentative manpower for this part of workings is proposed as 720 for achieving of target production of 0.6 Mty. Out of this total manpower, underground manpower has been assessed as 495 and surface manpower as 225

Sl. No.	Parameter (Category wise)	BCCL		Total
		Surface	Underground	
1	Officer	18	8	26
2	Supervisory staff	61	64	125
3	Workers	416	153	569
	TOTAL	495	225	720

Opencast-

Proposed-

Presently opencast is being done departmentally in amalgamated Muraidih Colliery and on outsourced basis at Phularitand Colliery.

In amalgamated mining plan for Muraidih-Phularitand(part) Colliery, the opencast work is proposed to be done as a single mine considering the total area after amalgamating of above two separate quarries stated in earlier paragraph. The operation of this opencast may be carried out by outsourced method or by departmental method depending on BCCL. Hence, equipment as well as total manpower is not assessed and also not given in this mining plan.

ASHOK KUMAR
Project Officer
Muraidih Colliery

6.3 SAFETY:-

Mining operation is required to follow statutory mine safety rules administered by the DGMS. Planning, Design & Electrical installation will be taken into account and comply with the existing electricity rules. To create safety awareness and impart education on safe practices, safety weeks will be organised, code of practices will be enforced risk assessment and mitigation measures etc will be adopted.

6.3.1 Underground Safety Provisions-

As stated earlier that, the proposed project area of amalgamated Muraidih-Phularitand (part) Colliery has two separate mining sections /units with different mining methods. One is existing amalgamated Muraidih Colliery on the eastern part where opencast working is going on departmentally with floor of V/VI/VII seam as base. Below this area, a mechanised Longwall project is approved by BCCL Board for extraction of underlying Seam-III and Seam-I on turnkey basis by underground mining method. The area designated for longwall project is not covering the total amalgamated area of existing amalgamated Muraidih Colliery. Hence, rest of the area of existing amalgamated Muraidih Colliery is proposed to be annexed with the part of the property of existing Phularitand Colliery falling in Cluster-III. In this Colliery, Seams upto V/VI/VII combined are being extracted by opencast method on outsource basis and underlying Seam-III and Seam-I/II combined along with Seam-I (split section) is proposed to be extracted by underground mining method. At present, development of Seam-III in this Colliry is going on with SDL-haulage combination.

6.3.1.1 Gassiness of Seams and its workings-

The study for ascertaining of degree of gassiness for Seam-III and Seam-I in amalgamated Muraidih Colliery has not been carried where longwall project is proposed. However, these seams has been worked in adjacent Jogidih Colliery where these seams are categorized as Degree-I gassiness. Considering the same, the seams to be extracted by longwall method is also

ASHOK KUMAR
Project Officer
Muraidih Colliery

considered as Degree-I gassy seam. It has to be ascertained as soon as mine is developed in Seam-III as well as Seam-I and also at frequent interval.

In Phularitand Colliery, the seam-III is under development and it has been categorized as Degree-I gassy mine. For Seam-I/II combined & Seam-I, it has to be ascertained when it will be developed and such study should be carried out at regular interval with the progress of mine workings in both seams.

6.3.1.2 Precautionary Measures to prevent explosions due to firedamp-

- To avoid accumulation of firedamp adequate ventilation must be provided to keep the limit well below the lower limit of explosion.
- Avoid sources of ignition, to avert explosion of accumulated firedamp.
- In addition to the provision of proper and adequate ventilation, regular inspection of all places will be done so as to avoid any accumulation of firedamp.
- Prevention of accumulation of coal dust on all flameproof motors, switchgears and transformers present in development and longwall panels will be done and timely dissemination of the coal dust, if any, accumulated over these structures will be strictly implemented on regular basis.

6.3.1.3 Inundation-

Surface water source-

Longwall Project area-

The eastern and northern boundary of Muraidih Longwall underground Project is bounded by Khodo nala which is a seasonal one but during rainy season, huge water from catchment area of northern side flows through this nala. In the western side of the property there are local nala's which are feeding this khodo nala. The Muraidih project area of 4.76 Sq. Km. has an undulating topography with a gentle slope towards east to south. The original topography of the area has since been severely damaged due to large scale mining activities mainly by open cast and partially by UG method. Drainage of the surface area surrounding the OCP's is controlled by seasonal khodo river/nala. The nala flows from north to east in the

ASHOK KUMAR
Project Officer
Muraidih Colliery

northern part of the property and then changes it course towards south and limits the eastern boundary of the existing amalgamated Muraidih project.

On surface plan, it has been shown that the eastern side quarry edge of this project has been extended beyond Khodo nala i.e. quarry edge has crossed the khodo nala as per mine authority after extraction of coal, course of the nala has been restored and maintained by filling Over Burden, stone pitching, etc. This they have done to avoid inrush of water into the quarry especially during monsoon. This might a vulnerable source of danger towards inundation by surface water as such it will be necessary to keep round the clock vigil during monsoon especially when the water flows near the danger level. The Khodo nala has a past record of 197.43m as highest flood level as shown in surface plan. As per DGMS stipulation, substantial coal to be left as safety barrier if mining to be done below. In order to maximize the coal recovery & ensure higher safety, it has been planned to divert the Khodo nala beyond the Northern boundary. The coal whatever is available within the economic range of open cast mine are to be taken out before the last few panels of Seam III are extracted.

Protective works-

- Mine entries including mouth of Air shaft & Fan drift have already been made considering provision as stipulated in CMR i.e 3m above the highest known flood level in the region to prevent rain water from entering into the mines through the entries.
- Before approaching a bore hole it will be ensured that it has been suitably and effectively cement grouted and does not connect to any UG/surface water body.

Precaution during Extraction-

- In order to avoid any accumulation of water on the floor of already excavated V/VI/VII combined Seam, BCCL will propose a comprehensive back filling Plan and overburden are properly dozed so that all the rain water takes its course to flow to the khodo nala. Earlier as well as at present, over burden is being dumped on the floor.

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Project Officer
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- it is most important to have a proper surface contour survey conducted prior to depillaring operation and the effect of subsidence on surface drainage are to be assessed. This would help to plan effective filling of surface cracks/subsidence trough which may occur due to caving operation.
- Garland drains are to be made prior to start of extraction of panel so that the flow of rain water is kept away from the proposed depillaring area to safe place
- The panels have been laid from rise to dip (i.e. towards trunk road ways) this will ensure self-drainage of the panels and no water would accumulate in goaved out areas.
- It has been proposed to depillar from top to bottom i.e. Seam III will be extracted first and then Seam I will be extracted later, so it is proposed that the panels which will be formed well before start of depillaring operation will be sealed off for better ventilation of the working panels.
- During reopening of sealed off developed panels the procedures stated in the CMR 2017 and DGMS circulars will be strictly followed.
- Overlying quarry will be dewatered. Study of Dump will be made in the context of Fire and sufficient quenching and blanketing will be made.

Underground Pumping-

Although CMPDIL had assessed the relative rate of percolation of water to be in the range of 100 Lps considering that there will be no accumulation of water from the floor of Seam V/VI/VII into underground. Most of the rain water will be suitably guided to take its course to Khodo Nala. Pumping capacity and no. of pumps required for this longwall project have been worked out so as to take care of heavy dewatering required during the monsoon period. Main sump has been proposed of adequate size at the dip most point of both the Seams and sufficient no. of standby pumps have also been envisaged.

Continuous Miner/SDL Project at Phularitand Colliery area-

Source of water from surface-

Within the proposed project area of amalgamated Muraidih-Phularitand (part) Colliery, there is no major source of surface water in western part i.e in Phularitand Colliery except few ponds lying on surface. In this part earlier

ASHOK KUMAR
Project Officer
Muraidih Colliery

excavated old quarries are filled with OB dumps. The running Hired HEMM quarry is maintaining a sump on the floor of V/VI/VII combined Seam and accumulated water is regularly pumped out from the quarry to the surface. The excavated area is backfilled with the progress of quarry face. Hence, threating of water for underground workings from quarry is less.

It is envisaged that garland drains shall be made on surface around the abandoned quarry so as to carry rain water and surface run off away from the mining area to the nearest drain / Jore. No surface water accumulation shall be allowed on surface/Quarry floor. Suitable monitoring arrangement shall be established and maintained to monitor the water in rainy season to prevent any sudden inrush of rain water from the adjoining area.

All precautionary steps viz. erection and maintenance of retaining wall along the incline mouth, regular de-silting of drain bed should be done to prevent inrush of rain water from the adjoining area to the combined seam abandoned quarry (P.B Section).

Underground source of Water-

Within the proposed area of exploitation, XIII seam is exhausted. XI/XII seam is mostly depillared and partly standing on pillar, mostly waterlogged. IX/X seam is mostly standing on pillars and partly depillared. VIIIC, VIIIB and VIIIA seams are partly worked on the rise side and virgin on the dip side. The developed workings in these seams are waterlogged on the dip side.

Below VIIIA seam, V/VI/VII seam has been worked in three sections by underground method and is partly depillared, partly standing on pillars and mostly virgin on the dip side. The dip side developed working of V/VI/VII seam is partly waterlogged. Though, some part of the old workings are being excavated by opencast working but towards western side of D B Road, B&P workings exist which are unapproachable, waterlogged and also inter connected at places between seams. The stone parting between V/VI/VII and III seam within the proposed area of exploitation varies from 53m to 58m and therefore attracts the provision of CMR 127 pertaining to development of the seam below waterlogged area. Therefore, for development below the

ASHOK KUMAR
Project Officer
Muraidih Colliery

waterlogged working of V/VI/VII seam where seam is not extracted, permission from the DGMS is required to be obtained.

Moreover, some exploratory boreholes exist within the property which are drilled from surface to Seam-I mostly on eastern side of the property and these boreholes are passing through the waterlogged workings of the upper seams Hence, under this circumstance, any inadvertent joining of these boreholes to the development galleries, during Bord & Pillar development of III Seam, may endanger the underground mining operation in III seam. It is, therefore, suggested to take necessary precaution while development is going on in III seam below the waterlogged workings of upper seams and suitably grouted by cement grout. The inclines of Phularitand Colliery are made from the quarry floor of V/VI/VII combined seam.The surface rain water over the catchment area enters into this abandoned quarry (P.B Section) during rainy season. The rainwater takes course to the underground working from this quarry through the inclines mouth. The overburden dumps on the floor of combined seam is not following any pattern. This may lead to formation of depression which may take shape of water body during rainy season. Hence, Garland drains will be made around the quarry so that rain water does not enter the quarry area. Proper care shall be taken so that rain water of the quarry area is accumulated at the dip side of the quarry and from there; it is pumped out to the nearest surface drain.

6.3.1.4 Dust Suppression Measures-

Underground workings-

Stress should be given to suppress the dust at the source of generation to control the air pollutants. All the cutting drum of the shearer & Bolter Miner will have adequate dust suppression.

Effective water spaying arrangement at the face, road ways & all transfer points will also be made, The velocity of air in belt conveyor has been kept not more than 4 m/sec and the belt speed not more than 2.5 m per sec with a view to prevent generation of air borne dust as far as practicable. Sufficient man power has been provided for cleaning of belt conveyors in

ASHOK KUMAR
Project Officer
Muraidih Colliery

Continuous Miner equipment, dust extractor is interlocked with water supply and spraying arrangement which are inbuilt so to reduce generation of the fine coal dust. All the precautions for suppression of dust as specified under CMR- 1957 will be taken.

In view of dust being airborne, gravimetric dust sampler is provided for determination of concentration of airborne dust in workings. Work persons shall be provided with dust masks and the exposure of persons to the dust is determined regularly at stipulated intervals with personal dust samplers.

Measures to prevent Coal dust explosion -

- Reducing the formation of coal dust at the source i.e in the working faces, haulage roads etc.
- Preventing it to become airborne and its spread.
- Rendering the coal dust harmless by wetting it with water or mixing the same with inert stone dust.
- Making provision of stone dust barriers or water barriers.
- Water spraying at coal transfer points,
- Dust at the transfer points should be collected with use of dust extractors at vulnerable places.

6.3.1.4 Precautionary Measures against Fires and Spontaneous Heating/ combustion-

Sponteneous Heating-

Longwall Panel-

Adequate measure will be taken to seal off the old working and worked out areas. Capacity of the equipment is so selected that the depillaring operation to be completed to extract the coal within the incubation period. Moreover it has been proposed to extract coal full Seam in one lift so that no loose coal is left in the goaf. Proper cleaning of loose coal and stone dusting of the working will also be done regularly to prevent spontaneous heating. Since the parting between V/VI/VII combined seam and Seam-III is less, surface subsidence will reach to the floor of the seam and also at surfaces on the northern side of the property. Surface/ Floor cracks over goaved out areas will be filled properly so that breathing of air into underground workings does not take

ASHOK KUMAR
Project Officer
Muraidih Colliery

place. For this, leveling of overburden dump in the excavated is necessary and to be adopted to make the underground workings safe from spontaneous heating or fire transmission from the floor of excavated seam.

Continuous Miner Panel-

In addition to above precautions, care should be taken against spontaneous heating and outbreak of fire due to friction and operation of machines in underground. For this inbuilt spraying system with cutting head is provided in Continuous miner. Panel system of working has also been proposed. Each panel will be isolated by barrier around it with minimum number of openings required therein for ventilation and transport. The panel size has to be so selected that depillaring could be completed within the incubation period. Additional precaution shall be taken along the conveyor route to check the smooth rolling of idlers. The jammed and broken idlers shall be immediately replaced. Firefighting equipment shall be provided at suitable locations to meet any eventuality of outbreak of fire.

SDL Panel-

In this panel, coal will be extracted by solid blasting at face using permitted explosives. Hence all approved code of blasting practices should be strictly followed and all blasting operation will be carried out under the supervision of Shot Firer, Mining Sirdir and Overman. Explosive and detonators should be kept at deginated place before commencing of blasting operation. All exploder or blasting equipment should be tested at surface before taking into underground and always kept under the supervision of Shot Firer or Mining Sirdir.

Other precautionary measure to be taken as follows-

- Panels are to be worked within incubation period
- Monitoring of CO/CO2 ratio in main return air way of panels as well as the main return of the mine.
- Provision of escape route and marking the same on Plans from accident prone area are to be maintained properly.
- Inflammable materials will not be stored in UG except in permitted/authorized area, Due precaution will be taken in use of welding, repair of FLP electrical etc. of UG apparatus so that no fire does result.

ASHOK KUMAR
Project Officer
Muraidih Colliery

Therefore, precautionary measure as per circular will be observed fully on use of welding in Under Ground.

- Install the electrical cables and equipment with due cares and maintains them properly with regular inspections.
- Use of only approved safety lamps, which should be taken underground in locked condition.
- Sufficient quantity of fresh air should be circulated through the workings to dilute the inflammable and noxious gases within permissible limit to render them harmless. Competent persons with gas testing certificates should be authorized for operation of auxiliary fans in a district. Sufficient number of methanometer and gas detectors has been provided to supervisory officials for checking of gas during inspection of working faces.
- Stone dust barriers are to be provided at required places to guard against propagation of flame and shock front in the event of explosions.
- Provision is to be made for quick/speedy isolation of areas affected by spontaneous heating by using inflatable or other suitable type of stoppings.
- For Longwall panel operation in Muraidih Colliery, the Contarctor has conducted borehole gas emission test through scientific agency and as per the study report Muraidih mine has got gas emission rate as low as 0.36 m^3/t coal under category of degree-I, adequate ventilation has be provided to dilute accumulation of CH4 and action will also be taken, so that the ventilation standards as specified in CMR 2017
- Continuous monitoring of CO, CH4, O2 and other gases by tele-monitoring system which uses underground sensors at strategic locations and provides immediate analysis of the air is contemplated.
- Effective means of transmitting signal and other means of communication have also been envisaged. Intrinsically safe apparatus will be provided where ever needed.
- Sufficient illumination &Lighting at all the place where the persons have to work or pass through will be provided.
- Provision of training of the persons so that they do their work in a safe manner has been provided.
- Permission regarding method of work and use of machineries like Continuous Miner, Bolter Miner, PSLW equipment, etc, will also be taken from DGMS before commencement of work. Permission will also be taken to do blasting to induce caving if required from DGMS.

ASHOK KUMAR
Project Officer
Muraidih Colliery

6.3.1.4 Roof Control –

Trunk headings and road ways within panel have been proposed to be supported by quick setting resin bolts/full column cement grouted bolts, depending on the strata condition as per "rock mass rating" studies. In bad roof condition the above support system would be strengthened by steel channel or W- strap. Roof bolting with resin capsules is proposed as main method of roof support in trunk roads. Powered roof supports are proposed in face during Longwall working and hydraulic Open Circuit hudraulic props in Gate roads up to 30m or more from the retreating face depending on roof behavior. This will improve the safety of persons and equipment in caving district. Bolting density is to be increased at the junctions of interconnections and bad roof areas. In bad patches and near the fault plane, additional supporting with w-straps or rope stitching is proposed to reinforce the strata.
In gate roadways of Longwall panels, side bolting in chain pillars will be made if the pillar size are inadequate or there is any symptoms or indication of danger of crushing of chain pillars However, it is suggested to design and implement the support system after a thorough scientific investigations and study as the workings progress greater depth. Side bolting (like GRP / FRP) bolting may be installed in side of the pillars of board & pillar workings as well as gate roads because huge overburden dumps are being made on the floor of opencast workings. The parting between floor of V/VI/VII combined seam and Seam-III is less which may cause spalling / pre-mature crushing of standing on pillars in Bord & Pillar panel or in Chain pillars of gate roads.

The land use plan shows that majority of the land owned by BCCL and excavated but some portions of the land on the nort-western side within the demarcated Project area of Muraidih-Phularitand (part) Colliery are still to be acquired. On northern part of Phularitand Colliery i.e northern side of V/VI/VII combined seam incrop, acquiring of land is a mjor constraint and it has been decided in the meeting that no depillaring will be made in this area so that subsidence not reaches to surface. The depth of cover for Seam I & III ranges from around 48 m - 200 m approx. The thickness of the coal for Seam I & Seam III are in the working range of 2 to 3 m and 2.5 to 5.8 m respectively. It is evident that the surface subsidence will occur when the coal will be

ASHOK KUMAR
Project Officer
Muraidih Colliery

extracted by longwall mining method in the area of amalgamated Muraidih Colliery. It will therefore be necessary to acquire the surface land above the proposed longwall panels and it is presumed that BCCL will take appropriate actions to acquire those lands in time.

Subsidence Management –

Considering the impact of subsidence on surface topography and surface feature, the following subsidence management aspects are required to be undertaken to overcome or to minimise adverse effects.

- Surface cracks likely to develop due to subsidence over the mining area need to be filled up properly and regularly by clay and stone chips (by dozing and compacting back filled dump areas), and thereafter with about 0.3 m high clay heap over the cracks. It will help in retaining the original /reorganised drainage pattern and run-off water over the mining area, improving the water retention capacity of the soil, minimising top soil erosion and chances of underground inundation and spontaneous heating/fire.
- A team is to be formed by the mine management which will be responsible for the proper and regular filling of surface cracks developed due to subsidence. The team will also maintain records of the development and filling of surface cracks. Adequate supply of filling materials should be arranged by mine management at the site.
- Subsidence may result in depressions on the surface with accumulation of water during the rains. Such accumulation of water may be beneficial for vegetation in the area. These water bodies may be retained wherever possible or drained out by cutting drains depending on safety of the underground workings.
- Surface drains should be made outside of the subsidence influence area to prevent the surface water of adjoining area from coming into active subsidence area.
- Proper precaution has to be undertaken while depillaring /extraction in the panels below and near surface features, e.g. sufficient coal barrier need to be left against surface feature considering the angle of draw of 30^0 to avoid any damage to the surface structure/feature.

ASHOK KUMAR
Project Officer
Muraidih Colliery

- Water bodies or ponds exist on surface and may fall within the subside area. Hence, these water bodies or pond over the mining area should be filled up and dried up before the commencement of depillaring operation below them and maintain.
- Provision has to be made for plantation over the reclaimed subsidence area. At present plantations are being done over the dumped area in large scale.
- It is recommended that while carrying actual depillaring/extraction in the panels, close subsidence monitoring is to be carried out over some initial panels for caving methods. On the basis of observed data, necessary correction can be made accordingly in subsidence estimation, if required.

6.3.1.5 Escapse route-

All galleries in underground should be clearly marked to use as escape route and also mark on the Emergency plan showing the escape route from underground workings to surface. The Plan should be made available in underground at strategic places and should be in knowledge of every underground worker. A mock rehearsal should be carried out at interval for this purpose.

6.3.2 Opencast Safety Provisions-

Safety-

Safety of men and machine deployed in the mining area should be properly taken care of irrespective of whether the mining activities are performed by departmental or by outsourcing option.

All the regulations & schedules of Coal Mines Regulations 2017 relating to opencast mining and other circulars issued time to time have to be adhered to and implemented in order to maintain day to day safety precautions as per stature. The following precautions should be taken during opencast mining operations.

Surface Features :-

i) Before starting any quarrying operation all structures / dwellings if any located with 100 m distance from the proposed area shall be vacated and rendered uninhabitable and no blasting shall be done within 100 m

ASHOK KUMAR
Project Officer
Muraidih Colliery

of both sides of any High tension line and its trestle, passing through the proposed area, if any.

ii) The management shall indemnify any person who may be affected and owner of any surface structure in case of damage or loss to any life or property arising out of aforesaid mining operation.

iii) Hot overburden excavated during mining operation or any hot material or ash shall not be deposited on any outcrop of coal or in opencast workings or in any ground broken by extraction of coal.

iv) Water pool shall be constructed above entire fire affected area after filling it with mutti / inflammable material and shall be maintained effectively.

v) After completion of operations, excavated area shall be filled with incombustible material and restored to the original ground level within the period not exceeding three months voids formed due to excavation in the quarry shall be back-filled simultaneously with coal extraction.

vi) An embankment 3.0 m above the HFL and 3.0 m wide at top with sides sloping at an angle of 45 degree pitched with slope shall be built along the river and Jore at places where the R.L. of the ground containing the edges of the quarry 3.0 m less than the HFL at the River or Jore.

Opencast Workings :

i) Before starting a mechanised opencast working, method of working, ultimate pit slope, dump slope and monitoring of slope stability, has to be planned, designed and worked as determined by a scientific study and the recommendations made in the report of scientific study should be complied.

ii) The height of the benches in overburden consisting of alluvial soil, morum, gravel, clay, debris or other similar ground shall not exceed 3 meters and the width thereof shall not be less than three times the height of the bench.

The height of benches in coal and overburden of rock formation other than that mentioned in above shall not be more than the digging height

ASHOK KUMAR
Project Officer
Muraidih Colliery

or reach of the excavation machine in use for digging, excavation or removal, and the width thereof shall not be less than -

(a) the width of the widest machine plying on the bench plus two meters; or

(b) if dumpers ply on the bench, three times the width of the dumper; or

(c) the height of the bench, whichever is more.

iii) Adequate precautions shall be taken to ensure dressing of the side. Special care shall be taken, when any slip or other plane of weakness or other geological disturbance exists, so as to prevent danger to the work-persons.

iv) No person shall be engaged to work or allowed to travel close to high sides / benches from which he is likely to fall vertically down, unless he is provided with and uses a safety belt or rope.

v) Final pit layout should be maintained keeping in mind the stability of OB dumps and highwalls

Fencing Around Opencast Workings :

i) The top edge of the opencast working shall be kept fenced with wire rope strands or barbed wire, supported by posts of timber, iron or concrete (movable). The gap between the adjacent rope strand or wires shall not be more than 0.30 m and bottom most rope, strand or wire shall not be more than 0.25 m and the topmost rope, strand or wire shall not be less than 1.0 m from ground level.

ii) At the finishing stage, opencast working shall be fenced with a masonry wall using lime mortar not less than 0.40 m thick and not less than 1.2 m high, with a parapet top.

Spoil Banks :

(1) While removing overburden, the top soil shall be stacked at a separate place, so that, the same is used to cover the reclaimed area.

(2) The slope of a spoil bank shall be determined by the natural angle of repose of the material being deposited but, in any case, shall not exceed 37.5 degrees from the horizontal:

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Project Officer
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(3) Loose overburden and other such materials from opencast workings or other rejects from washeries or from other sources shall be dumped in such a manner that there is no possibility of dumped material sliding.

(4) Any spoil bank exceeding 30 metre in height shall be benched so that no bench exceeds 30 metre in height and the overall slope shall not exceed 1 vertical to 1.5 horizontal.

(5) The toe of a spoil-bank shall not be extended to any point within 100m of a mine opening, railway or other public works, public road or building or other permanent structure not belonging to the owner.

(6) A suitable fence shall be erected between any railway or public works or road or building or structure not belonging to the owner and the toe of an active spoil bank so as to prevent unauthorised persons from approaching the spoil-bank.

(7) No person shall approach or be permitted to approach the toe of an active spoil bank where he may be endangered from material sliding or rolling down the face.

(8) Adequate precautions shall be taken to prevent failure of slopes of the spoil banks or dumps.

Haul Roads :

i) No road shall be of width less than three times the width of the largest vehicle plying on road plus 5.0 m.

ii) All corners and bends in roads shall be made in such a way that the operators of the vehicle shall have a clear view for a distance of not less than 3.0 times the breaking distance of largest vehicle playing at speed of 40.0 Km/Hour.

iii) Wherever it is not possible to ensure clear visibility of the operator for a distance as specified in Clause (b), there shall be provided two roads of width not less than 2 times the width of the largest vehicle plus 3.0 m with a strong road divider in between having adequate lighting and reflector along the divider.

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Project Officer
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iv) Where any road is existing above the level of surrounding area, it shall be provided with strong parapet walls / embankment of the following dimensions:

1. Width at top-not less that 1.0 m.
2. Width at Bottom-not less than 2.5 m.
3. The height not less than the diameter of tyre of largest vehicle playing on road.
4. It may be noted that just dumping of mud or overburden shall not treated a strong parapet wall.

v) No road shall have a gradient steeper than 1 in 16.

vi) Ramps with 1 in 10 gradients shall not be more than 50.0 m at one stretch. Ramps shall be used for crawler mounted machines only and not for tyre mounted machines.

vii) 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.

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

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

x) 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.

xi) 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

6.3.2.1 Safety Aspects For Of HEMM / Equipment-

Special precaution should be taken while deploying workers in the mine. Before employing any labour to the mine proper vocational training should be imparted. Some of the major aspects are as follows:-

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A) For persons:

i) No persons shall be deployed unless he is initially trained. Records of Vocational training Certificate and driving license of operators shall be kept by competent authority and shall be made readily available for inspection by management.

ii) No person shall be employed unless person holds VTC. A record of it shall be maintained.

iii) Adequate supervision shall be maintained by qualified competent persons only.

B) For Machineries as recommended by DGMS Cir. (Tech.) 1 of 1999:

i) All the machineries to be deployed in mines should be checked before deployment by competent authority.

ii) A proper record of repair and maintenance along with inspection done by competent authority and defect pointed out shall be maintained and signed by authorized person.

iii) All the equipment shall be provided with audio-visual alarms,

iv) When natural light is not sufficient, proper light for use at night

v) An audio-visual alarms for reversing on trucks shall be provided.

vi) Machine manufacturers should be asked to give risk analysis details in respective machines deployed

vii) Suitable type of the fire extinguishers shall be provided in every machine.

C) General:

i) No person/vehicle shall be deployed at any place other than authorized place.

ii) All workers should obey lawful instruction of mine management.

iii) Risk Management Plan of tipper/pay loader shall be made and implemented.

iv) All drivers shall obey systematic traffics rules prepared by management.

v) Before deploying workers they must be trained and briefed about safety aspects in opencast mine. However during course of execution

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of the work, if any accident occurs whether major or minor, the matter shall have to be immediately informed to mine management, i.e. Colliery Manager/Agent/GM of Area so that Notices of accidents in a accordance of (Reg.8 of CMR 2017) and Section 23 of The Mines Act 1952 may be given and other necessary steps may be taken in accordance with the Mines Act 1952.

viii) Mine authority shall operate transport system in such a way so as to minimize pollution in the mine.

6.3.2.2 Stability of Benches, Quarry Highwalls and Spoil Dumps:

Before starting a mechanized opencast working, the owner and agent of the mine shall ensure that the mine, including its method of working, ultimate pit slope, dump slope and monitoring of slope stability has been planned, designed and worked as determined by scientific study and copy of the report of such study has been kept available in the office of the mine.

Provided that in case of mines where such a study has not been made, it shall be the responsibility of the owner and agent to get the said study made within one year from the date of coming into force of these regulations

In opencast mines, slope failure takes place mainly due to:

i) Shearing effect on rocks
ii) Ground water pressure
iii) Geological disturbance etc.

Shearing effect occurs due to gravity loading, shock & seismic vibration. Shock & seismic vibration can be minimized by adopting control blasting techniques. Gravity loading can be minimized by controlling the kinetic load of dumpers by preventing over speeding while running on the benches.

Since the seams are developed, problem of ground water pressure is not likely to be faced in developed part of the project. Adequate pumping provision has been made which will reduce the ground water pressure.

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Bench parameters shall be adopted as mentioned in the report. However, during actual mining operation, the condition of benches & dumps should be closely observed at regular intervals and the dimension is to be modified as and when required. Working benches and spoil dumps shall be kept under constant vigil to mark any development of crack.

During quarry operations, it is necessary to adopt required mining parameters for the stability of benches, high walls and spoil dumps. It is also mandatory to examine systematically the fencing of mine workings, landslides and cracks between benches. It is required to maintain well-graded and wide roads on benches keeping the width of working areas sufficient for spreading of blasted rock and movement of the mining and transport equipment.

During actual mining operation, systematic observations of the condition of benches, high wall slopes and spoil dumps should be carried out and the dimensions be modified if necessary to suit the local conditions.

6.3.2.3 Measures to be taken for Fire Fighting and Fire Prevention:-

The excavation of fire area will be required during quarry operation. Therefore, method of work as discussed in fire dealing measures and other statutory provisions in this respect must be adhered to while working in the fire zone. However, the method may be improved / upgraded after suitable scientific field trials.

During implementation of the fire dealing measures and excavation & dumping of hot materials, monitoring of status of fire, its movement, temperature condition and efficiency of fire dealing measures, is to be done regularly. Even on dump sites, such a monitoring is required so that quenching can be done in time to avoid dump fire.

In addition to statutory provisions, the measures for fire-fighting and prevention of fires are as follows:

1) Organisation of special cell for systematic observations to examine and prevent fire.
2) Removal of spillage of coal on benches and cleaning of coal horizons to prevent cases of coal heating.

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3) Storage of lubricants and cotton waste in enclosed fireproof containers in working places.
4) Provision of fire extinguishers has to be made

6.3.2.4 Precautions against danger of Inundation from Surface Water.

1) A careful assessment is to be made against the danger from surface water before the onset of rainy season. The necessary precautions should be clearly laid down and implemented. A garland drain needs to be provided to drain away the surface rainwater from coming into the mine.
2) Inspections for any accumulation of rainwater, obstruction in normal drainage and weakening in embankment.
3) Standing order for withdrawal of working persons in case of apprehended danger.
4) During heavy rain inspection of vulnerable points is essential. In case of any danger persons are to be withdrawn to safer places.
5) Nallah or water inlets may be diverted or isolated by embankments if so required.
6) Every year, during the rains constant watch shall be kept on the flood levels on the surface of the mine and if at any time the levels cross the highest levels earlier recorded, such levels shall be marked by permanent posts along the edges of water and the new highest levels thus observed shall be recorded with the date as the highest flood level on the plans by an actual survey.

6.3.2.4 Protection of Equipment deployed at Bottom Horizons from flooding:

During the heavy monsoon period, the mining operation in the lower-most bench may have to be stopped. Therefore, it is proposed to drown the lower-most bench, which would work as a sump. The water will be pumped out and discharged into the nearby khodo River flowing on eastern side.

For ensuring safety of the equipment while working out bottom horizons with no access to surface profile, the following measures should be taken:

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1) Drivage of initial trenches if any and coal cutting on bottom benches should be done during the dry period of the year.

2) Ramps should be made for quick shifting of equipment from bottom horizons, liable to be flooded during monsoon period, to the top horizons.

6.3.2.5 Prevention of Electric Shocks:

During mining operations, all the statutory provisions of the CEA Regulation 2010 (Measures relating to Safety and Electric Supply) and Indian Standards for installation and maintenance of electrical equipment etc. should be observed.

1) For protection from electric shocks to persons, all electrical equipment with voltage up to 1000V should be provided with Earth Leakage Relay, which will automatically disconnect electrical circuits.
2) Closed mobile substations and switchgears should be mechanically interlocked which exclude the possibility of opening the door when oil switch and air circuit breakers are in operation.
3) All metal parts of electrical equipment should be properly earthed to avoid failure of insulation.
4) All H.T lines and cables located within the blasting zones should be disconnected during charging & blasting operations.

6.3.2.6 Dust Suppression & Dilution of exhaust fumes :

The following measures should be adopted for dust suppression at all quarry working places, dumps, haul roads, CHP and near other auxiliary mining operations.

1) Spraying with water on all working faces & haul roads, by special spraying machines or water-sprinkler.
2) While drilling holes, it is necessary to use dust extraction devices.
3) Installation of local dust suppression in cabins of excavators and drilling rigs may be considered.
4) Leveling of spoil dump surface.
5) Separate dust suppression arrangement should be provided for CHP.

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To prevent collection of harmful mixtures in the atmosphere, from the different sections of quarry workings, it is recommended:-

To spread out the sources of dust formation and omission of harmful gases throughout the working area of the quarry-

1) Drilling & blasting operations should be timed for periods of maximum wind activity during the day.
2) Dumpers may be provided with purifiers for exhaust gases.

6.3.2.7 Measures to be taken while Drilling & Blasting:

Precautions while drilling:

1. The holes shall be drilled in the pattern proposed by the Manager on beginning of that day, in such a way that length of the face shall be more than three times the width of the face having three rows of holes, with spacing and burden as recommended for specific diameter of hole.
2. i) No drilling shall be commenced in an area where shots have been fired, until the shot fire has made a thorough examination at all places, including remaining butts of old deep holes, for unexploded charges that the drill may strike.
   (ii) The position of every deep hole to be drilled shall be distinctly marked by the blasting Overman so as to be readily seen by the drillers.
   (iii) No drill or bore rod or pick shall be inserted in butts of old deep holes even if an examination under Clause (i) has failed to reveal presence of explosives.
3. (i) Drilling operations shall not be carried out simultaneously on two benches at places directly one above the other.
   (ii) Drilling and charging of deep holes shall not be carried out in the same area at the same time.

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Precautions while Transport of Explosives:

i) Where explosives are transported in bulk for deep hole blasting the precautions laid down under Regulation 188 of CMR 2017 by general order from Chief Inspector of Mines, shall be strictly complied with.

(ii) All conditions specified by the Chief Inspector of Mines in the documents, if any granting permission to carry a larger quantity of explosives in a single case or canister or for the use at one time in one place of more than one such case or canister, in relaxation of Regulation 186 of the Coal Mines Regulations, 2017, shall be strictly complied with.

(iii) Not withstanding anything contained in the Coal Mines Regulations, 2017, the transportation of explosives, preparation of charges and the charging and stemming of holes shall be carried out under the personal supervision of a competent person who shall himself fire the shots in deep holes.

Precautions while Charging of Holes:

i) Where there is any doubt and particularly where there are cracks and crevices reported in the hole at the time of drilling the bottom 2.0 m length of the hole shall be filled with sand / water ampoule. In crushed / broken ground charging of the hole shall not be done.

ii) Explosives shall be delivered first to the hole farthest from the 'Priming Station' so as to avoid persons walking among piles of explosives.

iii) Not more than one hole shall be in the process of being charged at any one face at any one time.

iv) All charging, stemming and connecting up shall be done while standing on the solid, that is to say, on the side of holes remote from the quarry face.

v) The safe explosives charge for a limiting peak particle velocity shall not exceed the limits recommended at Para 7.2 of D.G.M.S. Circular No. 7 of 1997. The Peak Particle Velocity(PPV) shall be measured once in every quarter and the records of the same shall be maintained in a

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bound paged book and a copy of the same shall be submitted to this Directorate.

vi) The cartridges of explosive shall be lowered carefully. After inserting cartridges the length of the remaining hole shall be measured to ascertain that the cartridges are in close contact and there is no air space.

Precautions while Firing of the Shots :

i) A safe code of blasting practice shall be framed by the manager and shall be circulated to all concerned for its strict compliance.

(ii) The Manager shall fix the blasting time and shall circulate it to all concerned and display it on the Notice Board.

(iii) Clear and distinct warning shall be given before commencing charging of hole as well as before firing the shots. Subsequent to blast, after 15.0 minutes all clear signal shall be given. Presently hooters shall be installed for this purpose.

(iv) Adequate number of guards shall be posted to prevent inadvertent entry of any persons in the danger zone during firing of the shots.

(v) Shots shall not be fired except during the hours of day light or until adequate artificial light is provided. All holes charged on any one day shall be fired on the same day. Sleeping of holes shall not be permitted till the time specific permission in this regard is obtained.

(vi) Shots if fired beyond day light hours should be muffled so that; flying fragments from blasting can not project beyond a distance of 10.0 m from the place of firing in this connection, attention is drawn to D.G.(Tech.) Circular No. 8 of 1976 for compliance.

(vii) As far as practicable the shot firing shall be carried out either between shifts or during the rest interval or at the end of work for the day.

(ix) Precautions with regards to taking shelter, etc., as laid down in Regulation 196 of the Coal Mines Regulations, 2017 shall be complied with.

(x) No person other than blasting in-charge and his assistants, if any, shall be permitted to remain within a radius of 20.0m or within 60.0 m

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on the same bench where charging of holes with explosives is being carried out.

(xi) A proper record of every blast showing the pattern of shot-holes and particulars of charge and observation regarding fly rock and ground vibration shall be maintained by the blasting in-charge (First class Assistant Manager) and shall be countersigned by the Manager on every entry.

(xii) All works related to drilling, charging and firing of deep holes shall be carried out under supervision of Blasting – Officer / blasting in-charge, who shall having First Class Mine Manager's Certificate of Competency. He shall be assisted by an Overman for all works.

Precautions when provision under regulation 196 (2a) & (2b) are attracted-

(i) No deep hole blasting shall be done within a distance of 100.0 m from any public road, land acquired for railway, any structure not belonging to the owner and those inhabited by any person unless vacated and demolished.

(ii) For carrying out blasting in the quarry when the permanent structures or buildings are located beyond 100 m but within 300 m of the site of blasting, safe charge of explosive that will cause ground vibrations less than the stipulated norms, as suggested by Proj No. Cons/2012/12-13 dated January 2013 studied by the Indian School of Mines, shall be used.

(iii) Efficient signals or other means is given over the entire area falling within a radius of 500 meters from the place of firing (danger zone) and also he has ensured that all persons within such area have taken proper shelter;

(iv) Not more than three rows shall be fired in a round of blast. The blasting patch shall be such that the length of the face is more than three times the width of the face.

(v) Face of the blasting patch shall not be oriented in the strike direction. The initiation of a round shall start from the incrop end.

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(vi) For day-to day blast, burden and spacing shall not be less than 2.5 m and 3.0 m respectively.

(vii) To reduce noise and air over-pressure levels, the surface detonating cord shall be covered with at least 15 cm thick sand.

(viii) Before conducting deep hole blasting in the OCP, persons employed in the belowground workings lying within 180 m of the point of blasting measured in any direction, in the same mine or in any adjoining mine, shall be withdrawn and no work-person shall be readmitted into the said underground workings until the same have been inspected by a competent person duly authorized for the purpose and found safe and free from loose roof and sides, any noxious gases and signs of fire etc.

(ix) A system of obtaining written confirmation from the Manager or authorized person of Colliery in a register, the respect to withdrawal of persons from underground shall be recorded and shall be countersigned by Manager of the mine. A code of practice in this regard, duly signed by the Manager of the colliery shall be adopted and submitted to this Directorate.

(x) Danger zone shall be kept marked in the field as well as on the plan maintained under Regulation 65(1)(a) of the Coal Mines Regulations, 2017.

(xi) Competent persons i.e. explosive carrier trained in controlled blasting techniques and duly authorized by manager shall be permitted for charging & firing the shots.

(xii) Blasting shall be conducted in such a way that the underground galleries are completely filled up, failing which no heavy machinery should be brought over those galleries.

(xii) Further dozing/filling shall be done in these galleries before bringing heavy machineries over these galleries:

(a) Where there is any doubt and particularly where there are cracks and crevices the bottom 2 m length of the hole shall be filled with sand.

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(b) No person including shot firer shall take shelter within 100 m of the site of blasting in the quarry unless such shelter shall be of approved design.

(xiii) The provisions of Regulation 196 of Coal Mines Regulations, 2017 shall be strictly complied with subject to the conditions as stipulated in the permission letter.

6.3.2.8 Precautions while extracting the Developed Pillars-

(i) No heavy machinery or vehicle except drilling machinery shall be deployed when the thickness of overburden above the underground galleries as proved by advance bore hole or other suitable means is reduced to 6.0 meters unless the underground galleries are completely filled in after blasting.

(ii) Where the workings are accessible the same shall be surveyed and cleaned of all the coal dust and thickly stone dusted before commencement of extraction of pillar.

(iii) The spacing of the holes in overburden bench lying immediately above the coal seam shall be so adjusted that the holes do not lie immediately above the galleries as for as possible in under to ensure that the holes do not directly fire into the underground workings.

(iv) Blasting shall be done in such manner so that the underground galleries are completely filled up. Otherwise mutti / overburden shall be dozed to fill up the galleries completely.

(v) No person shall be allowed at any place in opencast workings where thickness of overburden and / or coal over any gallery has been reduced to 1.5 m or less.

(vi) Each coal pillar shall be exposed completely by removing the overburden overlying the pillar and the adjoining galleries on all side.

(vii) The quarrying operations shall be done from rise to the dip.

(viii) Entrances to the wide underground galleries in an opencast shall be kept effectively fenced off.

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(ix) D.G.M.S.(Tech.) Circular No. 3 and Circular No. 4 of 1980 regarding precautions against the danger of coal dust explosion while extracting pillars by opencast method shall be complied with.

6.4 Disaster Management Plan-

Mining is a hazardous industry. There is risk to life and property associated with various mining and allied activities of the project. The project report has been drawn in conformity with the prevailing statutory provisions as per Mines Act, 1952 & CMR 2017 applicable for safety in mines. A detailed study has been carried out covering identification and assessment of risk, and recommendation of measures to prevent damage to life and property against such risks.

Safety Audit is an integrated component of Risk Assessment and Safety Management, which is required to be undertaken on regular basis by System Study and Safety Audit (SYSSA). Such System Study and Safety Audit (SYSSA) should be conducted at least once in every year, after every major accident or disaster or dangerous occurrence, before implementation of any new technology or use of any new system or machinery in the mine. Such Study may be subject wise as well as an integrated report of the mine incorporating all subjects such as mining, mechanical, , electrical, personal, occupational Health & Hygiene, and any other subject applicable to the mine and the system prevailing or to be used therein.

Risk Assessment & Management is prescribed to guard against and mitigate the consequences of major accidents. The essence of disaster management lies upon its prevention. A Disaster Management Plan (DMP) has been drawn up by BCCL for Shaft and Incline mine to meet the emergent situation:

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Duty of Persons	- Any person who see/observe any emergency like spontaneous heating, fire, inundation /irruption of water, explosion, major roof fall etc. which may cause disaster. He will take immediate steps by shouting & calling to his fellow /coworkers to report to M/S, O/M, Asst. Manager, Supervisory official available in the mine by fastest possible means.
Duty of mine Officials	- Mining Sirdar, Overman, Supervisory officials, Asst. Manager after confirmation will withdraw all persons from other parts of mine also, to be safe place in case of minor emergency. - Give warning to other parts of mine by fastest possible means and with draw all people to the surface keeping in view of type of emergency. Simultaneously send message to haulage operator by sounding 10 (Ten) raps. - Will warn on-setter by special messenger.
Duty of on-setter, U/G haulage operator	- On-setter will telephone to surface banks-man without leaving the duty place. - On-setter will give10 raps on the shaft signals. - Confirm through special messenger. - Underground haulage operator wills sound10 raps to surface haulage operator in case of incline mines. - Give warning to other parts of the mine (haulage operator, pump operator). - On-setter will not leave his duty place at any rate.
Duty of Banks man/ Surface haulage operator	- Banks man without leaving his duty place gives warning to attendance clerk /rescue team. - Give warning to Mine Manager/Principal official's present if any & Doctor. Person responsible for sounding colliery whistle. Inform to Colliery Engineer. - Will not leave his duty place at any rate.
Duty of Attendance clerk	- Attendance clerk will sound siren of 10 blasts. - Send message to colliery control room via wireless/ phones or special messenger. - Will inform to rescue team members, Doctors, Ambulance driver, PSC, WI of colliery. - Send message to manager, agent &other officials. - Will inform to other units attendance clerk/wireless room of other units. Will count and take attendance of all persons who have gone U/G and will report the same to the manager that every person has come out or not?

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Reduction Programme (RRP) is an ongoing process to achieve Zero **Risk** Harm Status of Safety in any mine and should be incorporated in the Disaster Management Programme.

6.5 Safety Management Plan-

Ensuring the safety of a mining operation is a complex task requiring the continued commitment of all personnel associated with the mine, as well as compliance with all safety legislation, guidelines and circulars.

The Safety Management System established by a mine must ensure all risks are identified and critical risks are controlled to ensure long-term health and safety. A Safety Management System should set the culture, framework and actions necessary to ensure that mining operations are carried out safely.

The owner, agent and manager of every mine shall prepare a document called "Safety Management Plan" and implement the SMP under Regulation 104 of the Coal Mines Regulations, 2017

(1) The owner, agent and manager of every mine shall-

(a) Identify the hazards to health and safety of the persons employed at the mine to which they may be exposed while at work;

(b) Assess the risks to health and safety to which employees may be exposed while they are at work;

(c) Record the significant hazards identified and risks assessed;

(d) Make those records available for inspection by the employees; and

(e) Follow an appropriate process for identification of the hazards and assessment of risks.

(2) The owner, agent and manager of every mine, after consulting the safety committee of the mine and Internal Safety Organisation, shall determine all measures necessary to-

(a) Eliminate any recorded risk;

(b) Control the risk at source;

(c) Minimise the risk; and

(d) In so far as the risk remains,

(i) Provide for personal protective equipment; and

(ii) Institute a program to monitor the risk to which employees may be exposed.

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(3) Based on the identified hazards and risks, the owner, agent and manager of every mine shall prepare an auditable document called "Safety Management Plan", that forms part of the overall management and includes organisational structure, planning, activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining a safety and health policy of a company.

(4) It shall be the duty of the owner, agent and manager to implement the measures determined necessary and contained in the Safety Management Plan for achieving the objectives set out in subregulation (2) in the order in which the measures are listed in the said sub-regulation.

(5) **The Safety Management Plan shall contain-**

(a) defined mine safety and health policy of the company;

(b) a plan to implement the policy;

(c) how the mine or mines intend to develop capabilities to achieve the policy;

(d) principal hazard management plans;

(e) standard operating procedures;

(f) ways to measure, monitor and evaluate performance of the safety management plan and to correct matters that do not conform with the safety management plan;

(g) a plan to regularly review and continually improve the safety management plan;

(h) a plan to review the safety management plan if significant changes occur; and

(i) details of involvement of mine workers in its development and application.

(6) The owner, agent and manager of every mine shall periodically review the hazards identified and risks assessed, to determine whether further elimination, control and minimisation of risk is possible and consult with the safety committee on review.

(7) The owner, agent or manager of every mine shall submit a copy of the Safety Management Plan to the Regional Inspector who may, at any time by

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an order in writing, require such modifications in the plan as he may specify therein.

(8) The owner, agent and manager of every mine shall be responsible for effective implementation of the Safety Management Plan.

6.6 Conservation-

For conservation of precious coal resource during mining operation, following measures are suggested :

i) OB dump should be so planned so that no extractable coal is buried below OB dumps which may result in sterilisation of coal reserves.

ii) No OB dumping should be done within the coal bearing area.

iii) Adequate precaution should be taken to eliminate loss of coal while mining the developed coal seams.

iv) Coal in "Coal+Jhama Zone" should be identified and mined selectively and separably from Jhama.

vi) While working in zone affected by fire, measures as suggested in 'Fire Dealing Measures' should be adhered to religiously to maximise recovery of coal in fire zone.

vii) Practice of selective mining of dirt bands must be adhered to by sub-benching whenever bench > 1.0 m thickness is encountered.

viii) Extractable local seams (> 0.50 m thickness) whenever encountered must be exploited by sub-benching.

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Project Officer
Muraidih Colliery

CHAPTER- VII

COAL HANDLING ARRANGEMENT

7.1 Surface Coal Handling Arrangement-

7.1.1 Existing

There are 5 nos. departmental feeder breaker of 400 TPH each and 1 no. Outsourced feeder breaker of 400 TPH is in operation within the proposed amalgamated Muraidih-Phularitand Colliery.

Phularitand Colliery-

At present there are two nos. of Feeder breaker is in operation at Phularitand Colliery near the inclines/drifts and these are being operated departmentally.

As per the mine authority, there is another Crusher/feeder breaker which is being operated by the Contractor for coal produced from Hired HEMM patch.

Transportation of Coal Produced from Opencast (Hired HEMM patch)-

- Coal from the face is transported to coal dump and then coal dump to Crusher/Feeder breaker to crush coal of (-) 100mm size. Then coal is send to KKC Railway Siding through truck transport system. From KKC Railway siding, coal is send to different Power Stations as per linkage.
- Certain amount of coal from the coal dump is also sent to private cookeries and Mithon Power Limited (MPL) by road from the KKC Railway Sidings.

Transportation of Coal Produced from Underground-

- Coal produced in underground is brought to surface through direct haulage. Coal tubs are unloaded by tippler into Tipper truck through chutes. From there it is send to coal dump and then as per linkage, coal is send to the Mithon Power Limited (MPL) by road.

Amalgamated Muraidih Opencast Colliery-

In this Colliery, an opencast is in operation departmentally. Three nos. of Feeder breaker (-100mm) each of 400 TPH is in operation departmentally at Muraidih Colliery.

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Coal produced from coal benches are send to coal dumps. From coal dumps, it is send to three numbers of departmental crusher to size coal into (-) 100mm. From Crusher, coal is send to KKC Railway Siding through truck transport system. From KKC Railway siding, coal is despatched to different Power Stations through railway wagons. Certain amount of coal from the coal dump is also sent to private cookeries and Mithon Power Limited (MPL) by road from the KKC Railway Sidings.

The above departmental feeder breakers will be utilized as on when required or may be transferred to other mines upto their life.

Proposed –

There are 6 nos. (4 working + 2 stand-by) feeder breaker of 400 TPH each have been proposed for crushing of 7.3 Mt per year ROM coal to (-) 100 mm. After crushing, coal will be transported to existing KKC link siding through contractual or departmental transport system as decided by BCCL Management.

ASHOK KUMAR
Project Officer
Muraidih Colliery