

# RISK ASSESSMENT

## RISK ASSESSMENT AND DISASTER MANAGEMENT

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 for Cluster XVII mines of BCCL.

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.

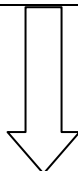
Safety Audit is an integrated component of Risk Assessment and Safety Management, which is required to be undertaken on regular basis by System Study and Safety Audit (SYSSA). Such System Study and Safety Audit (SYSSA) should be conducted at least once in every year, after every major accident or disaster 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.

### Disaster Management Plan

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| Duty of Persons | Any person who see/observe any emergency [smoke heating, fire, inundation/irruption of water, explosion, major roof fall etc.] which may cause disaster.<br><br>He will take immediate steps by shouting & calling to his fellow / co- workers to report to Mining Sardar (M/S),Over man(O/M), Asst. Manager, Supervisory official available in the mine. |
| Duty of mine    | M/S, O/M, Supervisory officials, Asst. Manager after                                                                                                                                                                                                                                                                                                      |

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| officials                                                 | <p>confirmation will withdraw all persons from other parts of mine also, to safe place in case of minor emergency.<br/>Give warning to other parts of mine by fastest possible means and withdraw all people to the surface keeping in view of type of emergency.</p> <p>Simultaneously send message to haulage operator by sounding 10(Ten) raps.</p> <p>Will warn on-setter by special messenger.</p>                                                                                                                                       |
| Duty of on-setter ,<br>underground<br>haulage<br>operator | <p>On-setter will telephone to surface banks- man without leaving the duty place.</p> <p>On-setter will give 10 raps on the shaft signals.</p> <p>Confirm through special messenger.</p> <p>U/G haulage operator will sound 10 raps to surface haulage operator in case of incline mines.</p> <p>Give warning to other parts of the mine (haulage operator, pump operator).</p> <p>On-setter will not leave his duty place at any time.</p>                                                                                                   |
| Duty of<br>Banksman /<br>Surface haulage<br>operator      | <p>Banksman without leaving his duty place give warning to attendance clerk / rescue team.</p> <p>Give warning to manager / Principal officials present if any &amp; Doctor.</p> <p>Person responsible for sounding colliery whistle. Inform to colliery engineer.</p> <p>Will not leave his duty place at any time.</p>                                                                                                                                                                                                                      |
| Duty of<br>Attendance<br>clerk                            | <p>Attendance clerk will sound siren of 10 blasts.</p> <p>Send message to colliery control room via wireless/phones or special messenger.</p> <p>Will inform to rescue team members, Doctors, Ambulance driver, PSC, WI of colliery.</p> <p>Send message to manager, agent &amp; other officials.</p> <p>Will inform to other units attendance clerk /wireless room of other units.</p> <p>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.</p> |
| Duty of control<br>room<br>attendant                      | <p>Will first inform to manager, agent or other officials.</p> <p>Inform to rescue team member, Doctor, Ambulance van, Colliery engineer, Survey officer.</p> <p>Attendance clerk of all the colliery. Area control room simultaneously.</p> <p>Store keeper, Finance officers, and other officers of colliery.</p>                                                                                                                                                                                                                           |

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|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                       | CGM,GM,ASO,AM(F),AM(X),AM(E&M),MM,DY.CPM,AMO<br>HQ, D(T) D&P, TU's leader, CCM, PSU,WI, Area GM/CGM, TU's leaders, CCM, PSE, WI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Conduct of Rescue & Recovery work                                     | <p>All the rescue &amp; recovery work will be conducted under the control, supervision &amp; direction of manager or the principal officials present there without delay.</p> <p>→ Manager or Principal official may take guidance during R &amp; R (Rescue &amp; Recovery)</p> <ul style="list-style-type: none"> <li>▪ From a group consisting officials.</li> <li>▪ Senior officials of B.C.C.L (Management).</li> <li>▪ D.G.M.S</li> <li>▪ RRRT – Sitarampur, ECL.</li> <li>▪ Rescue station - Sitarampur, ECL &amp; Dhansar.</li> <li>▪ TU's Leader</li> </ul> <p>→ Rescue trained person will not leave the place and will obey the manager or principal official.</p> |
| Duty of mine officials and competent persons at the time of emergency | <p>Haulage operator ,On-setter, Banksman , Winding engine operator, All supervisory officials, Attendance Clerk, Doctor, Para medical staffs, F.O, Storekeeper, Survey department , Civil department are required to be present at mine site.</p> <p>→ All above mentioned person will extend their full co-operation &amp; obey the manager or principal official during emergency period.</p> <p>→ They will not leave the place without arranging substitute.</p>                                                                                                                                                                                                         |



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| Resumption of work | Normal work shall not be resumed except with prior permission of the manager or principal official. |
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**Risk Reduction Programme (RRP)** is an ongoing process to achieve Zero Harm Status of Safety in any mine and should be incorporated in the Disaster Management Programme.

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 provision of Coal Mines Regulations 2017 and orders made thereunder as well as the periodic circulars issued by DGMS, relating to opencast mining have to be complied with in order to maintain day to day safety as per stature.

## **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

### **SAFETY**

Elaborate safety measures have been laid out as per statute concerning safety in mines. In addition to existing provisions, reference has been made here to some special precautionary measures which have been considered important and require special attention for the safety of men and mine.

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 provisions and precautionary measures as stipulated in CMR 2017 and orders made there under shall be strictly complied with. The important safety aspects have been deliberated subsequently.

In addition to those relevant clauses as stipulated in Act & Regulation, all clauses and sub clauses as mentioned in the permission granted by DGMS, Min. of Labor and Employment, GOI for working of Kalyaneshwari OCP shall be followed strictly.

### **SLOPE FAILURE IN MINE**

As per regulation 106 (2) of CMR 2017 :

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

It is proposed to conduct the aforementioned study before opening the mine through competent agency/consultant.

a) In opencast mines, slope failure takes place chiefly due to

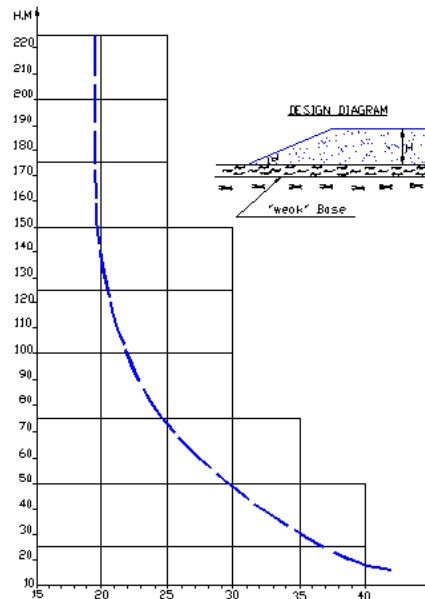
- i) Shearing effect on rocks and
- ii) Ground water pressure.

Shearing effect occurs due to gravity loading, shocks and seismic vibration. Shock and vibration shall be minimised by adopting controlled blasting

technique. Since the base seam is developed, problem of ground water pressure is not likely to be faced in this project.

b) Quarry workings shall be adequately fenced by proper fencing as specified in the Coal Mines Regulations and DGMS circulars. There shall be provision of interception ditches, garland drains around the quarry wherever necessary.

The graph illustrating dependence of stable slope angle ( $\alpha$ ) and height (H) of ex-site dumps formed on weak base is shown below:



The tentative parameters which will be followed during excavation of coal & OB to prevent risk of slope failure are as follows :

#### For Coal Seams

- Max. bench height - 14.1m
- Min. bench width - 30m
- Max. bench slope -  $70^{\circ}$
- Max. pit slope -  $45^{\circ}$

#### For OB Partings

- Max. bench height - 14.1m
- Min. bench width - 30m
- Max. bench slope -  $70^{\circ}$

#### For OB Dumps

- Max dump height - 120m
- Max. tier slope -  $37^{\circ}$
- Max overall slope -  $22^{\circ}$  to  $28^{\circ}$

Bench parameters shall be adopted as mentioned in the report. However, during actual mining operation, the conditions of benches should be closely observed at regular intervals and the dimensions be modified as and when required. Working benches shall be kept under constant vigil to mark any development of cracks etc.

The general measures to deal with slope stability problem are.

- i) Vulnerable area may be identified and marked on quarry plan. Periodic reviews may be done by strata control experts during operation life of the mine.
- ii) Observation of actual alignment of fault, its throw, joints, etc. may be recorded during the process of exploitation.
- iii) Water drainage system may be properly implemented to prevent accumulation of water in cracks. Also dumps shall be leveled to prevent accumulation of water over it. Proper drainage in dumps shall be also provided to prevent erosion of toe of dump.
- iv) Regular monitoring of tension cracks, horizontal and vertical movement of strata in critical area may be done.
- v) Rise side slope to be reinforced if required because it has to stand throughout quarry life. No dumps/surface structures to be located within 15m of quarry edge as it will act as surcharge there by destabilizing the slope.
- vi) No undercutting of slopes to be done.
- vii) Proper hydrogeological studies to be done if water table is at level of slope it should be brought down by using submersible pumps to prevent hydrostatic pressure.
- viii) Proper selection of site for dumping to be done before dumping place shall be made free from loose material. Dumping shall not be done at an angle more than angle of repose of material being dumped.
- ix) After completion of dumping operations dumps to be stabilized by

growing vegetation.

- x) Every person deployed by lessee of HEMM must be trained & briefed about aspects related to slope stability.

### **BLASTING & VIBRATIONS**

Controlled blasting techniques including muffled blasting will be adopted during blasting within 300 m zone but beyond 100m from villages, dwellings, surface structure, road etc. The blast design will be so regulated so that ground vibration which may affect the nearby surface structures, are kept within the stipulated limit. For proper blasting and minimizing the adverse side effects due to blasting, viz. noise, ground vibration, back-breaks, air blast, fly rocks, etc., the following precautions have been suggested to avoid dangerous situations:

- A safety zone for blasting has been provided around the quarry.
- Suitable drilling pattern.
- Before blasting is done, warning sound will be given so that people can move to safe places.
- Controlled blasting with site mixed slurry.
- Optimization of maximum quantity of explosive in a blast hole.
- Blasting will be done during daytime. Frequency of blasting shall be influenced by the availability of the land (tenancy in particular), DGMS permission for use of explosive geo-mining conditions, method of mining and prevailing meteorological conditions.
- No blasting will be done during low cloud cover.
- Blasting shall be carried out with closer control of blasting parameters including desired fragmentation, permitted vibration, etc.

### **EXPLOSIVE HANDLING**

The daily requirement of explosives during the life of the project has been calculated based on calendar programme of excavation & powder factor adopted as 3 m<sup>3</sup>/kg in OB & 6 Te/kg in coal. Controlled blasing with muffling and pre-split blasting thechniques would be adopted, while blasting is carried out within 300 m from any surface structure.

## **SAFETY RULES**

Mining operation is required to follow statutory mine safety rules administered by the DGMS. During planning of an opencast project, sufficient care has been taken to comply with these rules. Planning, Design & Electrical installation have taken into account the to comply with the existing electricity rules also.

To create safety awareness and impart education on safe practices, the following steps will be taken when the project becomes operational.

- Holding annual safety weeks.
- Imparting basic & refresher training to new & old employees respectively.
- BCCL has a separate department namely "Human Resource Development" headed by a General Manager. Time bound training programme for various types of workers, supervisory staff and executives should be prepared & executed regularly for improving the quality of manpower so that target & quality envisaged in the project report may be achieved.

## **SAFETY MEASURES FOR WORKING OVER DEVELOPED COAL SEAMS**

To guard against any eventuality, following steps will be taken :

- For deployment & movement of HEMM minimum solid parting of 3m must be ensured over developed workings which should be mined by Hydraulic Backhoes as far as possible.
- Accurate survey plan of development workings must be prepared for safe operation of the HEMM.
- Precautions laid down by DGMS to prevent coal dust explosion and subsequent fire in U/G due to blown through shots shall be adhered to.

## **SAFETY FROM INUNDATION**

Garland drains and storm water drains will be provided in near quarries and overburden dumps.

## **ROAD ACCIDENTS**

Sufficient arrangements for illumination of roads including haul roads have also been made. Road crossings have been properly planned & designed to

prevent vehicular accidents. Further, haul roads have been planned in such a way that the HEMM traffic will be away from the passenger traffic. There are likely to prevent road accidents. Incidentally all the dumpers are fitted with audio-visual devices warning while reversing. Operators of HEMM shall be given safety talks and training for avoiding accidents. Traffic Rules & Code of practices for safe operations shall be framed and displayed prominently.

#### **OTHER MISCELLANEOUS MEASURES**

- Provision of proper illumination in the quarry, OB dump area, workshop & other work places besides along roads as mentioned above.
- Provision of efficient communication system to allow communication link amongst various work centers to help in avoiding accidents.
- Provision of store for spare parts for quick maintenance.

#### **MEDICAL AID**

The Project has been provided with Regional Hospitals at Laikdih with adequate beds, qualified Doctors and Staff in addition to first aid at project level. They will attend to medical emergencies arising out of accidents. Besides this, a well equipped Central Hospital at Jagjiwan Nagar, Dhanbad has been established in this coalfield to offer proper medical facilities.

Initial Medical Examination (IME) & Periodic Medical Examination (PME) of all the employees, would be undertaken in accordance with the requirement of Mines Act, 1952 & the Mines Rules.