

Risk Assessment

The complete mining operation will be carried out under the management control and direction of a qualified mine manager holding a First Class Manager's Certificate of competency to manage a metalliferous mine granted by the DGMS, Dhanbad. The DGMS have been regularly issuing standing orders, model standing orders and circulars to be followed by the mine management in case of disaster, if any. Moreover, mining staff will be sent to refresher courses from time to time to keep them alert. However, following natural/industrial hazards may occur during normal operation.

Natural Hazards

- Land slides;
- Flash floods;
- Damage of life and property;
- Disruption of road & telecommunication facilities; and
- Lightening.

Industrial Hazards

- Accident due to explosives;
- Accident due to heavy mining equipment; and
- Sabotage in case of magazine.

In order to take care of above hazard/disasters, the following control measures will be adopted:

- All safety precautions and provisions of Mine Act, 1952, metalliferous Mines Regulation, 1961 and Mines Rules, 1955 will be strictly followed during all mining operations;
- Entry of unauthorized persons will be prohibited;
- Fire fighting and first-aid provisions in the mines office complex and mining area;
- Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use;
- Training and refresher courses for all the employees working in hazardous premises; Under Mines vocational training rules all employees of mines shall have to undergo the training at a regular interval;
- Working of mine, as per approved plans and regularly updating the mine plans;
- Cleaning of mine faces will be regularly done;
- Handling of explosives, charging and blasting will be carried out by competent persons only;
- Provision of magazine at a safe place with fencing and necessary security arrangement;
- Regular maintenance and testing of all mining equipment as per manufacturer's guidelines;
- Suppression of dust on the haulage roads;
- Adequate safety equipment will be provided at explosive magazine; and
- Increasing the awareness of safety and disaster through competitions, posters and other similar drives.

For any type of above disaster, a rescue team will be formed by training the mining staff with specialized training.

Possible Hazards in Open Cast Mine

There are various factors, which can cause disaster in the mines. The mining activity has several disaster prone areas. The identification of various hazards is shown in **Figure-1** and the hazards are discussed below:

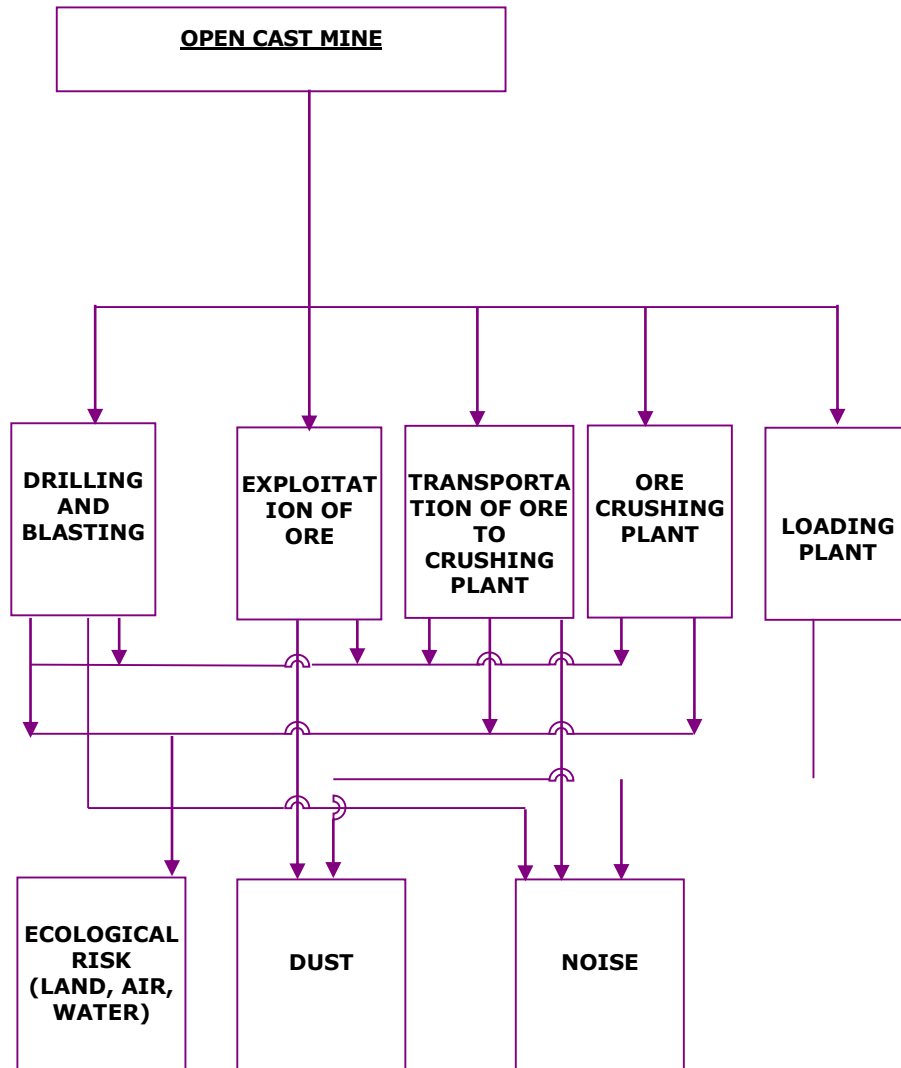


FIGURE-1
IDENTIFICATION OF HAZARDS IN OPEN CAST MINE

Blasting

Most of the accidents from blasting occur due to the projectiles, as they may some times go even beyond the danger zone, mainly due to overcharging of the shot-holes as a result of certain special features of the local ground. Flying rocks are encountered during initial and final blasting operations. Vibrations also lead to displacement of adjoining areas. Dust and noise are also problems commonly encountered during blasting operations.

Heavy Machinery

Most of the accidents during operation of dumpers, excavators and dozers and other heavy vehicles are often attributable to mechanical failures and human errors.

Storage of Explosives

The explosive magazines of adjoining ML area of the same company shall be used for the proposed working in the area.

The company already has established two Explosive Magazines of capacity 9 tones each storage facility which will cater to the proposed mining activities. For the purpose of transportation of explosives, explosive van is present. The main hazard associated with the storage, transport and handling of explosives is fire and explosion. The rules as per the Indian Explosive Act-1983 and Explosive Rules-2008 should be followed for handling of explosives, which includes transportation, storage and use of explosives.

Fuel Storage

Most of the HEMM will operate on diesel. However, no major storage is envisaged at the ML area. A diesel bouser is provided for the crawler mounted machines operating in the mine.

Water Logging

The rainwater would flow down the slope of the hills and also along the natural streams. Thus no water is likely to accumulate in the course of mining operations. Hence no pumping arrangements are envisaged.

Safety Measures

➤ **Safety Measures at the proposed Open Cast Mining Project**

- The opencast mines have been planned for working with shovel dumper system which requires proper benching not only for slope stability but also for movement of dumpers and other heavy machinery. The inclination of the quarry sides at the final stage i.e. at the dip most point will not exceed 60° to the horizontal. (This angle is measured between the line joining the toe of the bottom most bench to the crest of the top most bench and the horizontal line);
- Limestone benches, haul roads and ramps shall be developed and constructed mostly in hard strata and as such loose material slopes are not anticipated. The slopes, whether at faces/ benches or by the side of haul roads shall be in hard strata;
- The gradient of the haul road, access trench will not be steeper than 1 in 25;
- Slope stabilization measures such as diversion drains, retaining walls, crib structures trenches spurs and retards for seasonal streams shall be implemented on highest priority so as to prevent landslides in totality;
- Afforestation shall be given full thrust particularly in non-forest areas to rejuvenate the eco-system. The tree/shrub/grass species shall be selected as given in table earlier which is most adaptive to the climate and altitude of the area;

- The earthquake occurrences and tectonic activities are quite predominant. This area falls under category V in the seismic map of India. Due to this, all of the building and plant structures shall be designed so as to withstand expected severity of the earthquake. This will be necessary to prevent loss of life and damage to property; and
- All mining operations both within the quarry and outside will be conducted as per the conditions laid down by DGMS and under the strict supervision of competent persons appointed under Metaliferous Mines Regulation Act, 1961.

➤ ***Measures Suggested to Avoid Accidents due to Blasting***

- The blasting operation shall be supervised by a competent person appointed for the purpose;
- The blasting operation shall be strictly conducted as per the guideline given in metalliferous mines regulation, 1961;
- Demarcation of danger zone area falling within a radius of 500 m from the blast site;
- All employee and equipment shall be cleared from the blast area and located to a safe location prior to any scheduled blasting;
- To prevent unauthorized entry, guards shall be posted at all access points leading to the blast area;
- Audible signals such as sirens, whistles, etc. shall be used to warn employees, visitors and neighbours about the scheduled blasting event; and
- Sign boards showing "Blasting Time" to be exhibited at every entry to the mine.

➤ ***Measures to Prevent Accidents due to Trucks and Dumpers***

- All transportation within the main working area should be carried out under the direct supervision and control of the management;
- The vehicles must be maintained in good repairs and checked thoroughly at least once a week by a competent person authorized for this purpose by the management;
- Broad signs should be provided at each and every turning point specially for the guidance of the drivers at night;
- To avoid dangers while reversing the trackless vehicles, especially at the embankment and tripping points, all areas for reversing of lorries should, as far as possible, be made man free, and there should be a light and sound device to indicate reversing of trucks; and
- A statutory provision of the fence, constant education, training etc. will go a long way in reducing the incidence of such accidents.