

## **Risk Assessment**

The complete mining operation will be carried out under the management control and direction of a qualified mine manager. 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.

- Accident due to explosives;
- Accident due to operation of 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 Regulations 1961 and Mines Rules 1955 will be strictly followed during all mining operations;
- Entry of unauthorized persons in the mining area 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 boots, helmets, goggles etc. will be made available to the employees free of cost for their use;
- Training programmes 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 and loading & unloading points ;
- Adequate safety equipment will be provided at explosive magazine; and

- Increasing the awareness of safety and disaster through competitions, posters and other similar drives.

#### *7.4.1 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 or 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.

#### *7.4.2 Overburden*

The overburden dumps may cause landslides. High overburden dumps created at the quarry edge may cause sliding of the overburden dump or may cause failure of the pit slope due to excessive loading, thereby causing loss of life and property. Siltation of surface water may also cause run-off from overburden dumps.

To prevent this, height of overburden dumps will be restricted. Further, no stone or loose rock or loose tree will be allowed to remain within 3 metres of the edge of the quarry. To prevent siltation of surface water, retaining wall will be constructed on the down side of each OB dump.

#### *7.4.3 Heavy Machinery*

Most of the accidents during transportation by tippers/ trucks. Operation of poclains and ripper dozers and other heavy vehicles are often attributable to mechanical failures and human errors.

This can be prevented by regular training of all vehicle/machinery drivers/operators, regular maintenance of equipment and ensuring safe operations.

#### *7.4.4 Storage and use of explosives*

- Proper and safe storage of explosives in approved and Licensed Magazine.
- Proper, safe and careful handling and use of explosives by competent Blasters having Blaster's Certificate of Competency issued by DGMS.

- Proper security system to prevent theft/ pilferage, unauthorized entry into Magazine area and checking authorized persons to prevent carrying of match box, lights, mobile phones, cigarette or Biri etc.
- Conventional explosives shall be used in their original cartridge packing and such cartridge shall not be cut to remove explosive for making cartridge of different size.
- Explosives shall be conveyed in special containers.
- The holes which have been charged with explosives will not be left unattended till blasting is completed.
- Before starting charging, clear audible warning signals by Sirens will be given so that people nearby can take shelter.

#### *Fuel Storage*

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

#### *Water Logging*

Water logging in the mine site can be avoided by adopting following measures:

- Due care will be taken to provide retaining wall around the pits.
- Proper drainage will be maintained to eliminate inundation of working pits during rains from run-off water. Suitable garland drain will be provided around pit along with sedimentation pits on each side.
- There is no danger of flood or inundation as the ground level is well below the plateau top, where mining of bauxite will be carried out.
- Mining operations will be carried out to a depth of 9 to 10 m at the plateau top. The plateau top is 400 to 500 m above the surrounding ground and ground water table is some 30m below the ground level. Hence, there will be no disturbance to ground water quality due to mining activity.

#### **Natural resource conservation**

- A green belt will be developed so that minimum soil erosion takes place.
- The excavated soil will be spread over the backfilled mined out area in order to minimize the impact on environment.

- In any case the natural habitats of the existing flora and fauna will not be disturbed.
- Use of traditional knowledge in all aspects of conservation shall be utilized.
- Water conservation techniques will be employed.
- Time to time analysis of the soil, water resources etc will be done in order to analyze the negative impacts of mining activities on the environment.
- To prepare management plans for village landscapes, villages to be seen as landscapes of diverse elements such as forests, scrub, grassland, streams/river, ponds etc. The dynamics of the village as an ecosystem to be assessed, corridors to be devised between major natural landscape elements, so as to facilitate movement of species.

### *Safety Measures*

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

- The opencast mines have been planned for working with shovel tipper system which requires proper benching not only for slope stability but also for movement of tippers and other heavy machinery. The inclination of the quarry sides at the final stage i.e. at the dip most point will not exceed 40° 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);
- The gradient of the haul road inside the pit, access trench and on the dumps will not be steeper than 1 in 16;
- The slope of the sides of the OB dump to the horizontal will not exceed 30°, and the height of the OB dumps has been restricted to a max of 3 m;
- The quarries will be protected by garland drains around the periphery for storm water drainage;
- A minimum safe distance of 100-m will be kept between the surface edge of the quarry and the nearest public building, roads etc. When the surface edge of the quarry approaches within a limit of 300 m from any road, public building special permission from DGMS will be taken to conduct controlled blasting to prevent damage/injury to public life and property;
- 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 Metalliferous Mines Regulations, 1961.

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

- Blasting will be done during the lunch interval, i.e. from 1.00 to 2.00 pm.
- Holes will be drilled in square/scattered pattern.
- Shot firing will be usually done with the help of safety fuse & ordinary detonator/ electric shotfiring with delay detonators as per requirement.
- Adequate shelters or other protective structures shall be provided to the workers at all times;
- The shot fired shall give sufficient warning by effective signal over the entire area falling within a radius of 500 m;
- Blasting time is generally fixed after consultation with neighbouring mines after the working shift-taking all required precautions, like marking the danger zone of 500m with red flags, use of warning signals & providing blasting shelters etc.

➤ ***Measures to Prevent the Danger of Overburden***

- To prevent the failure of overburden slopes, especially during the rainy season, proper garland drain & bund are constructed around the dump.

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

- 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 of vehicles.
- 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.

**Disaster Management Plan**

### Objectives of Disaster Management Plan

The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation and restoration of production. For effective implementation of the Disaster Management Plan, it should be widely circulated and personnel training should be given.

The objective of the Disaster Management Plan is to make use of the combined resources of the mine and the outside services to achieve the following:

- Effect the rescue and medical treatment of casualties;
- Safeguard other people;
- Minimize damage to property and the environment;
- Initially contain and ultimately bring the incident under control;
- Secure the safe rehabilitation of affected area; and
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency.

In effect, it is to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy.

### ***Fire Fighting Facilities***

Sufficient fire extinguishers will be installed at selected locations such as mine office, garage, stores etc. Besides, sufficient water hydrants with sufficient length of hosepipes will be made available on the surface for fire protection.

### ***Emergency Medical Facilities***

An ambulance with driver availability in all the shifts, emergency shift vehicle would be ensured and maintained to transport injured or affected persons. Number of persons would be trained in first aid so that, in every shift first aid personnel would be available.

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