



## **1.0 RISK ASSESSMENT**

### **1.1 Introduction**

A major emergency is one which has the potential to cause serious injury or loss of life. It may cause extensive damage to property and serious disruption in work inside and outside the premises. It would normally require the assistance of emergency services to handle it effectively.

It must be realized that any incident may develop into a major emergency even with the best safety measures and programmes in any industry. Hence an emergency preparedness should be planned properly and documented for ease of implementation at the time of need without losing time and avoiding chaos and confusion etc. at the hour of the need by assigning specific responsibilities to persons, who will render services in meeting emergency smoothly and effectively.

#### **Objective**

The objectives of DMP is to describe the emergency preparedness organization, the resource availability and response actions applicable to deal with various types of emergencies that could occur at the mines with organization structure being deployed in shortest time possible during the emergency.

Thus the overall objectives of the emergency plan are summarized as:

- (a) Rapid control and containment of Hazardous situation.
- (b) Minimizing the risk and impact of event/accident.
- (c) Effective prevention of damage to property.

In order to achieve effectively the objectives of emergency planning, the critical elements that form the backbone of Disaster Management Plan (DMP) are:

- Reliable and early detection of an emergency and immediate careful planning.
- The command, co-ordination and response organization structure along with availability of efficient trained personnel.
- The availability of resources for handling emergencies.
- Appropriate emergency response action.
- Effective notification and communication facilities.
- Regular review and updating of DMP.
- Protect training of the concerned personnel.

Minimizing the effects may include rescue, first aid, evacuation, rehabilitation and giving information promptly to people living nearby and scrutinized information's to media.

#### **Identification of Hazards**

The following types of Hazards are identified at Limestone Mines:

- Fire in HEMM, Electric Panels, Oil room, Diesel storage and near magazine.
- Accidents in the mine
- Failure of slope of benches giving rise to slide of material on bench.



This risk of slope failure is subject to stratigraphic disposition of various rock formation coupled with prevailing hydrological conditions & pit design.

The case of fire in equipment could be a possibility and for which emergency plan must be prepared and this be controlled to quench it immediately at the source itself and not to allow it to spread. The relief to the person who might be inside the machines or standing close by is also to be considered along with revival of machines & preventing fire to spread further.

However a team of trained persons must be kept in readiness all the time, who can deal not only with fire emergency but also other emergencies if arise inside mines or off site emergency of any sort. So to deal the above emergencies, emergency plan is prepared.

There are various factors, which can cause disaster in the mines. The mining activity has several disaster prone areas.

#### 1.1.1 Blasting

The blasting operations in the mine will be carried out by deep hole drilling and blasting using delay detonators, which are bound to reduce the ground vibrations. Further, the ground vibrations will be controlled by using modern shock tubes with delay non-electric detonators and sequential blasting machine.

#### 1.1.2 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.

#### 1.1.3 Fuel Storage

Most of the HEMM will operate on diesel. However, no major storage is envisaged at the ML area.

#### 1.1.4 Water Logging

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

- Position of water body should be correctly known;
- Water from the surface water bodies should not be allowed to enter in the mines;
- Draining of mine water by suitable capacity pumps; and
- Surface water bodies should be correctly marked together with their highest flood level on the mines.

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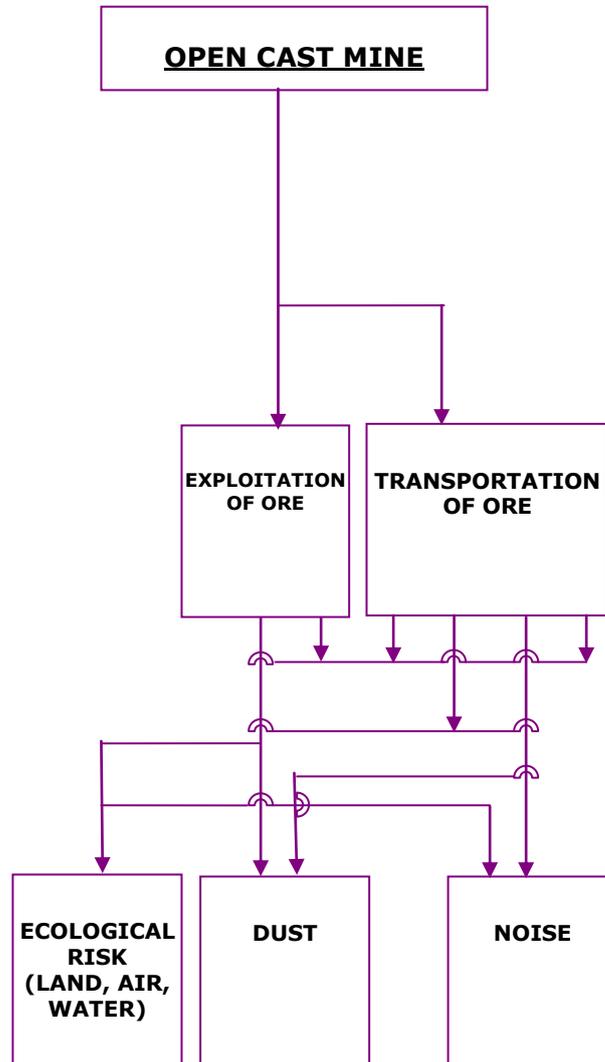
### 1.1.5 Safety Measures

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

- Mining will be done by shovel dumper system which requires proper benching not only for slope stability but also for movement of dumpers and other heavy machinery;
- The gradient of the haul road inside the pit, access trench and on the dumps will not be steeper than 1 in 16;
- The quarries will be protected by garland drains around the periphery for storm water drainage;
- 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 Regulation Act, 1961.

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

- All transportation within the working area should be carried out under the direct supervision and control of the management;
- The vehicles must be maintained in good conditions 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.



**FIGURE-1**  
**IDENTIFICATION OF HAZARDS IN OPEN CAST MINE**

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## 1.2 Disaster Management Plan

### 1.2.1 Disaster Due to Surface Fire

The fire could be a surface fire. Such case has so far not been reported. Likewise, equipment sometimes catches fire which needs to be dealt.

#### **Code of Practice in Case of Fire at Mines**

##### **Objective:**

To deal with fire efficiently and quickly at different locations of mine.

##### **Source of Fire:**

- Electrical Sub Station
- Oil & Lubricant Room
- Mine machineries

##### **Line of Action:**

- i. Sufficient fire extinguishers will be installed at selected locations on site. Besides, number of water hydrants with sufficient length of hosepipes will be made available at the surface for fire protection.
- ii. Fire extinguisher will be provided all HEMM.
- iii. Any person notices any sign of fire shall immediately take steps to give warning by blowing the siren continuously and take steps to extinguish the fire by using appliances available near the site.
- iv. Duties of mine Official: - The Mine officials receiving the warning will forthwith inform at following places:
  - a) Firefighting station
  - b) Security main gate
  - c) Mines Manager
  - d) Mines Agent / Owner

After intimation he should reach the spot, remove Men & Machinery and take steps to tackle the fire in accordance with the firefighting instructions. Inform the security office to get an Ambulance if required.

- i. *Duties of Fire Fighting Team:* On receiving warning, the team shall reach the site of fire and depending on its nature, class and extent shall take steps to extinguish it and rescue persons who may be caught in fire.
- ii. *Duties of Mines Manager:*
  - a. On receipt of information about fire, the Manager will forthwith rush to the spot and assess the situation. He will oversee the overall rescue operation and make necessary arrangement for medical aid to the affected persons, if any.
  - b. Inform the management and statutory bodies.

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### **Code of Practice in case of Explosion & Accidents**

#### **Objective**

To deal with accidents efficiently and quickly

#### **Line of Action**

Any person, who notices any explosion or accident, should immediately take steps to give warning by suitable mean and at the same time take necessary action for withdrawal of men from the site. He shall also inform the mine's Manager and other officials without any delay.

#### **Duties of Mine's Manager**

- a. On receipt of information about explosion or accident, the manager shall forthwith rush to the spot and take necessary actions. He shall make the arrangements for withdrawal of affected persons, if any.
- b. Inform the hospital for Ambulance for affected persons, if any.
- c. Provide First aid to affected persons.
- d. Inform the senior officials and statutory bodies.

#### 1.2.2 Action in Emergency

If any emergency like fire arises in the mine one should immediately inform to Security Supervisor. Security will inform key personnel and act as detailed above and consequently inform to CCR for broad announcement by Public Address System and to blow the Alarm if CCR is not affected itself. The emergency alarm will be wailing sound for two minutes on hearing telephone or alarm; the key personnel will act as per responsibilities. The procedure for all emergency situations as mentioned above would be same.

#### 1.2.3 Site Restoration

The incident controller will check the areas thoroughly for possible hazards such as toxic fume or live wires after emergency and will inform site controller accordingly.

The key personnel will meet to evaluate their individuals and overall performance in responding to situation after the emergency is over. The review shall determine.

- Effectiveness of emergency response plan.
- Mine crew performance.
- Any need for updating or revision of the emergency response plan.
- Suitable arrangement for restart of the work.
- Evaluation and control of efficient arising out of mitigating measures like foam discharge & overflow of oil in water.
- Rehabilitate evacuated area.
- Adopt measures to prevent similar recurrence.

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#### 1.2.4 Precautions

To avoid all these disasters at working place and to minimize their effects following precautions shall be taken and arrangement shall be made at the working place.

- Preventive & periodical maintenance of mine machineries.
- The persons shall be trained properly to handle the situation.
- Detailed warning system, implementation procedure, emergency control centre, shall be maintained at the mine with names of trained persons.
- Details and availability of heavy machinery, fire-fighting equipment shall be available at the site.
- Proper arrangements shall be made for treatment of injured person, if any.
- All the safety equipment shall be available at the mine.

#### 1.2.5 Post Disaster Analysis and Evaluation

When the emergency is over, the team will carry out a detailed analysis of cause of accident/occurrence, evaluate the influence of various factors and find out the procedures to minimize them in future. At the same time adequacy of disaster management plan shall be evaluated and shortcomings shall be rectified to improve the plan.

#### 1.2.6 Off-Site Emergency Planning

The off-site emergency plan is an integral part of any hazard control system. It would be based on those accidents identified by the management, which could affect people and the environment outside the works. Thus, the off-site plan follows logically from the analysis that took place to provide the basis for the on-site plan and the two plans should therefore complement each other. The key feature of a good off-site emergency plan is flexibility in its application to emergencies other than those specifically included in the formation of the plan. The roles of the various parties that may be involved in the implementation of an off-site plan are described below. The responsibility for the off-site plan will rest either with the works management or with the local authority.

Either way, the plan must identify an emergency coordinating officer who would take overall command of the off-site activities. As with the on-site plan, an emergency control center will be required within which the emergency coordinating officer can operate. An early decision will be required in many cases on the advice to be given to people living “within range” of the accident – in particular whether they should be evacuated or told to go indoors. Consideration of evacuation may include the following factors:

- In the case of a major fire but without explosion risk (e.g. an oil storage tank), only houses close to the fire are likely to need evacuation, although a severe smoke hazard may require this to be reviewed periodically.
- But if the fire is escalating it might be necessary to evacuate people nearby, but only if there is time; if insufficient time exists, people would be advised to stay indoors and shield themselves from the fire.

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#### 1.2.6.1 Aspects to be included in an Off-Site Emergency Plan

Some of the aspects to be included in off-site emergency plan are as follows:

a) Organization

Details of command structure, warning systems, implementation procedures, emergency control centers, name and appointments of incident controller, site main controller, their deputies and other key personnel.

b) Communications

Identification of personnel involved, communication center, call signs, network, list of telephone numbers.

c) Special Emergency Equipment

Details of availability and location of heavy lifting gear, bulldozers, specified fire-fighting equipment, fireboats.

d) Voluntary Organizations

Details of organizers, telephone numbers, resources, etc.

e) Meteorological information

Arrangements for obtaining details of weather conditions prevailing at the time and weather forecasts will be made.

f) Humanitarian Arrangements

Transport, evacuation centers, emergency feeding, treatment of injured, first aid, ambulances, temporary mortuaries.

g) Public Information

Arrangements for:

- Dealing with the media-press office
- Informing relatives, etc.

h) Assessment

Arrangements for:

- Collecting information on the causes of the emergency
- Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

#### **Role of the Emergency Coordinating Officer**

The various emergency services will be coordinated by an Emergency Coordinating Officer (ECO) who is likely to be a senior police officer but, depending on the circumstances, could be a senior fire officer. The ECO will liaise closely with the site main controller. Again depending on local arrangements, for

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very severe incidents with major or prolonged off-site consequences, the external control may pass to a senior local authority administrator or even an administrator appointed by the Central or State Government.

### **Roles of Major Hazard Works Managements**

Where the local authority has the organization to formulate the plan, the role of works managements in off-site emergency planning will be to establish liaison with those preparing the plans and to provide information appropriate to such plans. This will include a description of possible on-site accidents with potential for off-site harm, together with their consequences and an indication of the relative likelihood of the accidents.

Advice should be provided by mine managements to all the outside organizations which may become involved in handling the emergency off-site and which will need previously to have familiarized themselves with some of the technical aspects of the mine activities, e.g. emergency services, medical departments, etc.

### **Role of the Local Authority**

In some places the duty to prepare the off-site plan lies with the local authorities. They may have appointed an emergency planning officer (EPO) to carry out all this duty as part of the EPO's roles in preparing for a whole range of different emergencies within the local authority area. The EPO will need to liaise with the mine to obtain the information to provide the basis for the plan.

Rehearsals for off-site plans are important for the same reasons as on-site plans and will need to be organized by the EPO.

### **Role of the Police**

The police normally assume the overall control of an emergency, with a senior officer designated as emergency coordinating officer.

Formal duties of the police during an emergency include protecting life and property and controlling traffic movements.

The functions include controlling bystanders, evacuating the public, identifying the dead and dealing with casualties and informing relatives of dead or injured.

### **Role of the Fire Authorities**

The control of a fire is normally the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer may also have a similar responsibility for other events. Fire authorities having major hazard works in their area should have familiarized themselves with the location on site of all stores of flammable materials, water and foam supply points and fire-fighting equipments.



### **Role of the Health Authorities**

Health authorities, including doctors, surgeons, hospitals, ambulances and so on, have a vital part to play following a major accident and they should form an integral part of any emergency plan.

For major fires, injuries will be the result of the effects of thermal radiation to a varying degree and the knowledge and experience to handle this in all, but extreme cases may be generally available in most hospitals.

### **Roles of The Government Safety Authority**

The Inspectors of Director General of Mines Safety would like to satisfy themselves that the organization responsible for safety & risk management including the off-site plan has made adequate arrangements for handling emergencies of all types including major emergencies.