

RISK ASSESSMENT

GENERAL

Mining operations are associated with several potential hazards that affect adversely the human health and environment. It would normally require the assistance of emergency services to handle it effectively. The mining operation will be taken up under the supervision and control of qualified staff including Mine Manager.

Nevertheless, the following natural/industrial problems may be encountered during the mining operation.

1. Inundation due to excessive rains.
2. Accidents by heavy machinery.
3. Slope failures at the mine faces etc.

HAZARD IDENTIFICATION AND RISK ASSESSMENT METHODOLOGY

All types of industries face certain types of hazards which can disrupt normal activities abruptly. Similar mining also has risks which need to be addressed for which a disaster management plan has been formulated with an aim of taking precautionary steps to avert disasters and also take such action after disaster which limits the damage to minimum. In the sections below, the identification of various hazards, probable risks during the operational phase of the mining, maximum credible accident analysis and consequences analysis are addressed either qualitatively or quantitatively.

Risk assessments will help mine operators to identify high, medium and low risk levels. This is a requirement of the Occupational Health and Safety Act 2000. Risk assessments will help to priorities the risks and provide information on the need to safely control the risks. In this way, mine owners and operators will be able to implement safety improvements. The following natural/industrial problem may be encountered during the mining operation.

- Inundation: Filling of the mine pit due to excessive rains,
- Blasting- fly rocks and Boulders,
- Drilling- Noise and Vibration,
- Handling of overburden and heavy machinery,
- Storage of diesel,
- Slope failures at the mine faces or stacks.

As per proposal made under the mining plan the area will be developed by means of opencast mining method. Extraction of minerals is to be carried out by mechanized mining means. Water table will not be touched during the mining process. No high risk accidents like landslides, subsidence flood etc have been apprehended.

Risks due to Inundation

Mining will be done during the non-monsoon periods therefore problem of inundation is not likely to happen.

Risks due to Failure of Pit Slope

In order to allay dangers due to open cast slope failure, final pit, slope stability estimations will be made for the mines. Determining the factor of safety, the slopes should be monitored at regular intervals to check for any possible failure.

Risk due to Handling of Over burden and Heavy Machinery

During the mining, most of the activities are done by the vehicles and the heavy machinery for mining and handing of the mineral. There is no overburden or waste will be generated during the first five year of mining operation. Heavy machinery also causes for accidents due to mechanical failure.

Risks of Accidents due to Trucks and Dumpers

Identifying the hazards that come along with the presence of vehicles at the workplace (e.g. reversing operations, loading) can cause harm if not properly handled. Among some of the factors that may make vehicle accidents more likely are:

- Rough access roads
- Time pressure
- Inadequate brakes (Possibly from lack of maintenance)
- Carelessly parked vehicles (e.g. being parked on a slope without being adequately secured)
- Unsafe coupling and uncoupling of trailers, and
- Untrained drivers
- Overturning vehicles

To avoid such instances, we will talk to the workers and their representatives and will involve them in the risk assessment process and tell them what to do, to reduce risk. All transportation within the mine lease area should be carried out directly under the supervision and control of management.

- The vehicles will be maintained in good working condition and checked thoroughly at least once a month by the competent person authorized for the purpose by the management.
- Road signs will be provided at each and every turning point up to the main road (wherever required)
- To avoid danger while reversing the vehicles especially at working place/loading points, stopper should be posted to properly guide reversing/spotting operating.
- Only trained drivers will be hired.

By arranging the above hazards from highest to lowest, the hazards were re-arranged as per their risk levels. Ranking of hazards based on risk levels are provided below in the Table

Table Hazards faced in mining operations

S. No.	Activity	Hazard Description (Risk)	Score				Risk Level
			Consequences	Exposure	Probability	Risk Score	
1.	Site planning and layout	Travel in moving vehicle in uneven terrain	1	2	1	2	Level 3
2.	Bench Formation	Rock falls or slide due to lack of bench face stability (bodily injuries)	5	1.5	2	15	Level 1
3.	Crushing and sizing of ROM	Hit by Machineries – Electrical Equipment (bodily injuries)	1	3	3	9	Level 2
4.	Transportation of minerals	Vehicle Accident (bodily injuries)	5	5	2	50	Level 1
5.	Transportation of minerals	Accidental fire in vehicle (bodily injuries, exposure to heat radiation)	1	5	1	5	Level 3

Hazard Analysis

Broadly, the hazards cover slope and bench stability, mineral transport, mineral processing and force majeure conditions (rainfall and flooding). The mechanisms due to which hazards (coming under Risk Levels 1 and 2) may actually occur are covered in Table

Table Cause analysis for Level 1 and Level 2 hazards

S. No.	Hazard Description (Risk)	Risk Score	Risk Level	Cause Analysis
1.	Travel in moving vehicle in uneven terrain	2	Level 3	<ul style="list-style-type: none"> • Poor visibility • Incompetent driver • Poorly maintained vehicles
2.	Hit by fly rock (bodily injuries)	2	Level 3	<ul style="list-style-type: none"> • Poor access control of blast area

				<ul style="list-style-type: none"> • Poor blasting practices (leading to excessive fly rock)
3.	Rock falls or slide due to lack of bench face stability (bodily injuries)	15	Level 1	<ul style="list-style-type: none"> • Improper design of bench • Force Majeure (such as heavy floods or rainfall) • Improper blasting practices • Incompetent blasting personnel
4.	Hit by Machineries – Electrical Equipment (bodily injuries)	9	Level 2	<ul style="list-style-type: none"> • Improper design of equipment • Improper maintenance • Non usage of required PPE. • Incompetent Personnel
5.	Vehicle Accident (bodily injuries)	50	Level 1	<ul style="list-style-type: none"> • Head on collision between vehicle and another vehicle (due to poor visibility or incompetent drivers) • Poor vehicle maintenance
6.	Accidental fire in vehicle (bodily injuries, exposure to heat radiation)	5	Level 3	<ul style="list-style-type: none"> • Accident to vehicle carrying fuel, and subsequent ignition of spilt fuel • Improper storage of fuel, in MS drums, leading to spillage followed by ignition • Driving with loaded material on uneven terrain, and subsequent ignition of spilt fuel

Controls and Action Plans

To ensure that causes leading to the possible consequences are prevented from occurring, control and action plans are developed and suggested. It is required that these control and action plans be implemented and reviewed at least annually and also when there are changes to the work plan.

DISASTERS MANAGEMENT PLAN

The Disaster Management Plan (DMP) is a guide, giving general considerations, directions, and procedures for handling emergencies likely to arise from planned operations. The DMP has been prepared for the TCL on the basis of the Risk Assessment and related findings covered in the report.

Disaster Management Plan: Structure

The Disaster Management Plan (DMP) is supposed to be a dynamic, changing document focusing on continual advantage of doing this is to have a system that is in synchronicity with commonly used SHE systems such as ISO 14001 and OHSAS 18001.

Policy

The Safety Health and Environmental (SHE) policy is existing and accessible to all at site and to other stakeholders. The policy has been framed considering legislative compliance, stakeholder involvement, continual improvement, and management by objectives.

Planning

Identification and Prevention of Possible Emergency Situations

Possible emergency situations can broadly be classified into unintended explosions, vehicle collision, and inundation. Additional emergency situations can be developed on the basis of audit or other procedures prior to commencement of operations.

Emergency Prevention

Some of the ways of preventing emergencies are as follows:

- Preparation of a Preventive Maintenance Schedule Program and also covering maintenance schedules for all critical equipments and instruments as per recommendations of the manufacturers user manuals,
- Importantly, it is of great importance to collect and analyze information pertaining to minor incidents and accidents at the site, as well as for recording near-misses or emergencies that were averted. This information gives an indication of how likely or unlikely it is for the site to face actual emergency and what shall be further action to prevent them from occurring.
- Establishment of an ongoing training and evaluation program, incorporating the development of capabilities amongst employees about potential emergencies and ways and means of identifying and averting the same. Most emergencies do not occur without some incident or an abnormal situation. So there is always sometime of few seconds to few minutes to arrest an incident of abnormal situation from turning in to an emergency. This is the role of the shift in-charge who is the incident controller (IC) along with his shift team.

Emergency Plan Objectives

Specific objectives of the Emergency Response Plan are to be clearly listed with regards to the responses desired for successful management of the possible emergency situations. Suggested Objectives could include:

- To define and assess emergencies, including risk and environmental impact assessment.
- To control and contain incidents.
- To safeguard employees.
- To minimize damage to property or / and the environment.
- To inform employees, the general public and the authority on the hazards / risks assessed.
- Safeguard provided residual risk if any and the role to be played by them in the event of emergency.
- To inform authorities like Safety and Fire Dept and Mutual Aid Centers to come up for help.
- For effective rescue and treatment of casualties and to count the injured.
- To identify and list fatal accidents if any.
- To secure the safe rehabilitation of affected areas and to restore normally.
- To provide authoritative information to the news media.
- To preserve records, equipments etc. and to organize investigation into the cause of the emergency and preventive measures to stop its recurrence.
- To ensure safety of staff and patients and resume work.
- To work out a plan with all provisions to handle emergencies and to provide for emergency.
- Preparedness and the periodical rehearsal of the plan.

The objectives are suggested in emergency preparedness plan of TCL. Responsibilities, resources and timeframes require to be allocated for implementing the objectives.

Setting up of Emergency Infrastructure

To enable the key persons to implement the DMP, the following infrastructure will require to be set up:

Assembly Points

In case of emergency the site needs to be evacuated immediately. On evacuation people will go to pre-assigned assembly points. The charge will be taken by shift in charge and in his absence person deployed by Commander will be in charge of respective assembly points and will supervise Assembly and Head Count. A Board indicating the Assembly Point having relevant information is placed at point for guidance.

Liaison with State Authorities

Government authorities, local hospital, police fire services, taluka mamlatdar, district collector will be kept informed about the occurrence and development of any incident by Commander and procure necessary help and guidance from these authorities.

Task Force of Essential Staff

A task force of essential trained staff is made available to get work done by the Commander.

Task Force personnel shall be trained to perform tasks as mentioned above.

Emergency Control Center

Manager-Quarry Office will act as Emergency Control Center and provided with required communication facilities. The Control Center is situated in an area of minimum risk and close to the road to allow for ready access by a vehicle if other systems fail or extra communication facilities are needed to be set up. The Emergency control center should consist of following items:

- External telephones
- Internal telephones
- E-Mail facilities
- Emergency plan
- Stationeries
- Torches and emergency lights.

Fire Fighting

Person noticing the fire shall immediately raise alarm and ask the nearest person to inform Matron and Manager-Quarry.

Portable Fire Extinguisher shall be used in an attempt to extinguish the fire, by the person at site.

Matron shall assess the severity of fire and if likely to be severe shall take following steps -

- Call fire tenders and mobile trailer pump from nearby fire department.
- Call for assembly of all persons at assembly points
- Manager-Quarry shall review the steps taken by Matron in his capacity as COMMANDER and establish a "Control Room" in his office.

Immediate Step in Case of Explosion:

At first the concerned security guard should inform about it to the shift-in-charge and Mgr.-Quarry.

They will take the precaution described in the Work Instruction.

Further Steps in Case of Fire Spreading

- Assembly of all persons at the assembly points.
- Arrival of fire tenders and / or Mobile Trailer Pump.
- Ensure evacuation in orderly fashion.
- Ensure that any vehicle parked near the Fire Site is taken away to safe area.
- Carry out responsibilities as detailed as above.

Emergency Preparedness for Electrical Shock / Accident

- Source of power should be put off immediately in case of any electrical shock.
- Injured person should be shifted to safe place.
- Persons engaged in rescuing operation should use all PPEs and take appropriate precaution while removing the injured persons.
- Trained persons are engaged to give first-aid treatment to injured persons.
- In case of major injury the injured is shifted to the Dispensary/Hospital.
- In case of electrical fire, only CO₂ type Fire Extinguisher is used.
- Accident report in prescribed form is sent to appropriate authority in case of reportable injury.
- All the persons engaged to carry out this operation should be equipped with appropriate PPEs (Personal Protective Equipments) like safety shoes, helmets, dust masks etc.

Cyclone and Flood

When warning of cyclone or heavy rains is received from Local Administration, the Commander shall alert Staff to be prepared.

- Matron shall withdraw the entire person from work place.
- All the equipment should be withdrawn from mine and kept in a higher site.
- The Quarry Manager may advise to leave the staff depending on security of situation.

Earthquake

- When earthquake hits, all persons shall be encouraged to run out in the open areas designated as Assembly Points.

- All the electrical supply should be disconnected by the electrical department.
- All key personnel shall reach Quarry immediately and carry out designated responsibilities.
- All the electrical supply should be disconnected by the electrical department.
- Steps detailed in Emergency preparedness are to be carried out.
- As soon as earthquake tremor stops - Site Incident Controller (Matron) shall :
- Check all areas to ensure that all fires are doused.
- Check all areas for persons trapped inside.
- Search and Rescue Operation shall be launched with help of Workers, if there is obvious damage to building.

First Aid

Adequate first Aid facility will be provided at mine site.

Treatment of affected persons

- i. Injured / Affected persons shall be provided suitable first-aid treatment and sent to Co.'s Doctor for further treatment depending on injury.
- ii. Patients requiring further treatment shall be sent in Ambulances to Hospitals.
- iii. Patients suffering from minor problems shall be discharged and sent home after preliminary treatment.