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 have 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 prioritise 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 rook 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 existing 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 Overburden and Heavy Machinery
During the mining, most of the activities are done by the vehicles and the heavy machinery for mining and handling of the mineral. There is no overburden or waste will be generated during the first five year of mining operation. Heavy machinery also cause 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/loading operations.
- Only trained drivers will be hired.

Storage and use of Explosive Materials

- Proper and safe storage of explosives in approved and Licensed Magazine.
- Proper, safe and careful handling and use of explosives by competent Blaster 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 Bidi 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.

The results of risk assessment are given in table below:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Activity</th>
<th>Hazard Description (Risk)</th>
<th>Score</th>
<th>Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Consequences</td>
<td>Exposure</td>
<td>Probability</td>
</tr>
<tr>
<td>1.</td>
<td>Site planning and layout</td>
<td>Travel in moving vehicle in uneven terrain</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>Storage of explosives</td>
<td>Unintended explosions (exposure to overpressure)</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>Charging of explosives</td>
<td>Unintended explosion or exposure (exposure to overpressure)</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Blasting</td>
<td>Hit by fly rock (bodily)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>S. No.</td>
<td>Activity</td>
<td>Hazard Description (Risk)</td>
<td>Score</td>
<td>Risk Level</td>
</tr>
<tr>
<td>-------</td>
<td>--------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>-------</td>
<td>------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consequences</td>
<td>Exposure</td>
<td>Probability</td>
</tr>
<tr>
<td>5.</td>
<td>Bench Formation</td>
<td>Rock falls or slide due to lack of bench face stability (bodily injuries)</td>
<td>5</td>
<td>1.5</td>
</tr>
<tr>
<td>6.</td>
<td>Crushing and sizing of ROM</td>
<td>Hit by Machineries – Electrical Equipment (bodily Injuries)</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>7.</td>
<td>Transportation of minerals</td>
<td>Vehicle Accident (bodily injuries)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>8.</td>
<td>Transportation of minerals</td>
<td>Accidental fire in vehicle (bodily injuries, exposure to heat radiation)</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

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 ranked by Risk level**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Activity</th>
<th>Hazard Description (Risk)</th>
<th>Risk Score</th>
<th>Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Site planning and layout</td>
<td>Travel in moving vehicle in uneven terrain</td>
<td>2</td>
<td>Level 3</td>
</tr>
<tr>
<td>2.</td>
<td>Storage of explosives</td>
<td>Unintended explosions (exposure to overpressure)</td>
<td>15</td>
<td>Level 1</td>
</tr>
<tr>
<td>3.</td>
<td>Charging of explosives</td>
<td>Unintended explosion or Exposure (exposure to overpressure)</td>
<td>3</td>
<td>Level 3</td>
</tr>
<tr>
<td>4.</td>
<td>Blasting</td>
<td>Hit by fly rock (bodily injuries)</td>
<td>2</td>
<td>Level 3</td>
</tr>
<tr>
<td>5.</td>
<td>Bench Formation</td>
<td>Rock falls or slide due to lack of bench face stability (bodily injuries)</td>
<td>15</td>
<td>Level 1</td>
</tr>
<tr>
<td>6.</td>
<td>Crushing and sizing of ROM</td>
<td>Hit by Machineries — Electrical Equipment (bodily injuries)</td>
<td>9</td>
<td>Level 2</td>
</tr>
<tr>
<td>7.</td>
<td>Transportation of minerals</td>
<td>Vehicle Accident (bodily injuries)</td>
<td>50</td>
<td>Level 3</td>
</tr>
<tr>
<td>8.</td>
<td>Transportation of minerals</td>
<td>Accidental fire in vehicle (bodily injuries, exposure to heat radiation)</td>
<td>5</td>
<td>Level 3</td>
</tr>
</tbody>
</table>

**Hazard Analysis**

Broadly, the hazards cover explosive material management, working at heights, 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**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Hazard Description (Risk)</th>
<th>Risk Score</th>
<th>Risk Level</th>
<th>Cause Analysis</th>
</tr>
</thead>
</table>
| 1      | Travel in moving vehicle in uneven terrain | 2          | Level 3    | • Poor visibility  
• Incompetent driver  
• Poorly maintained vehicles |
| 2      | Unintended explosions (exposure to overpressure) | 15         | Level 1    | • Defective explosives  
• Improper storage of explosives  
• Force majeure conditions such as |
<table>
<thead>
<tr>
<th>No.</th>
<th>Hazard</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
</table>
| 3   | Unintended explosion or exposure (exposure to overpressure)            | 3     | • Lightning strike  
     • Fire (can be caused by unsafe practices or as ignition)  
     • Sabotage  
     • Defective explosives  
     • Outdated explosives  
     • Improper storage of explosives  
     • Force majeure conditions such as lightning strike  
     • Fire (can be caused by unsafe practices or as arson)  
     • Sabotage |
| 4   | Hit by fly rock (bodily injuries)                                      | 2     | • Poor access control of blast area  
     • Poor blasting practices (leading to excessive fly rock)  
     • Improper design of bench  
     • Force Majeure (such as heavy floods or rainfall)  
     • Improper blasting practices  
     • Incompetent blasting personnel |
| 5   | Rock falls or slide due to lack of bench face stability (bodily injuries) | 15    | • Improper design of bench  
     • Force Majeure (such as heavy floods or rainfall)  
     • Improper blasting practices  
     • Incompetent blasting personnel  
     • Improper design of equipment  
     • Improper maintenance  
     • Non usage of required PPE.  
     • Incompetent Personnel |
| 6   | Hit by Machineries – Electrical Equipment (bodily injuries)            | 9     | • Improper design of equipment  
     • Improper maintenance  
     • Non usage of required PPE.  
     • Incompetent Personnel  
     • Hard on collision between vehicle and another vehicle (due to poor visibility or Incompetent drivers)  
     • Poor vehicle maintenance |
| 7   | Vehicle Accident (bodily injuries)                                     | 50    | • Accident to vehicle carrying fuel, and subsequent ignition of split 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 split fuel  
     • Hard on collision between vehicle and another vehicle (due to poor visibility or Incompetent drivers)  
     • Poor vehicle maintenance |
| 8   | Accidental fire in vehicle (bodily injuries, exposure to heat radiation) | 5     | • Hard on collision between vehicle and another vehicle (due to poor visibility or Incompetent drivers)  
     • Poor vehicle maintenance  
     • Accident to vehicle carrying fuel, and subsequent ignition of split 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 split 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 as described in Table. 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.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Hazard</th>
<th>Causes</th>
<th>Control</th>
<th>Relevant Legislation</th>
<th>Procedure</th>
<th>Existing Procedure (Y/N)</th>
<th>Responsible Person (Designation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unintended explosions</td>
<td>Defective explosives</td>
<td>Explosive should be purchased</td>
<td>Metalliferous</td>
<td>If any defective explosive is found,</td>
<td>Authorized supplier of</td>
<td></td>
</tr>
<tr>
<td>Exposure to</td>
<td>Overpressure during storage of explosives in magazines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Only from approved and licensed authority. Mines Regulation 1961 and 1884. It is returned back to the original supplier for disposal at their end as per Rule 16 of The Explosive Rules 1983.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Explosives and detonators are stored separately as per approved design and licensed capacity of magazines under Explosive Act, 1884.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outdated explosives</td>
<td>Records and accounts of explosive stock and issue is to be maintained. Stock should be drawn upon strict rotation. Well planning for requirement of explosives shall be exercised. Disposal of outdated explosives as the chief controller or controller of explosive may issue.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maintaining registers for Explosives receipt, issue and stock as per Reg. 154, 156 of MMR 1961.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Explosives and detonators are stored separately as per approved design and licensed capacity of magazines under Explosive Act, 1884.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improper storage of explosives</td>
<td>Detonator are to be stored separately. Explosives shall be stored in dry and well ventilated area. Protect explosives from extreme temperatures.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mines Manager</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Force majeure conditions such as lightning strike</td>
<td>Lightning conductor are to be installed on the top of magazine. Lightning conductor should not have resistance more than 10 ohms.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lightning arrestors are provided and maintained as per the requirement under Rule 116 of the Explosive Rules 1983.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mines Manager</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire (can be caused by unsafe practices</td>
<td>Empty packages shall be removed immediately and destroyed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Follow the instructions specified in Rule 154, 156 and 170 of MMR – 1961.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>or as arson)</td>
<td>No smoking or any source of light or fire shall be allowed near explosives storage</td>
<td>MMR-1961 for storage, and handling of Explosives. Rule 97 and 101 of the ER 1983</td>
<td></td>
<td></td>
<td>Foreman (Blasting)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Security shall be provided at the magazine</td>
<td></td>
<td>Round the clock security guards provided and immediate reporting to nearest Police Station and Licensing Authority done in case of thefts or sabotage as per Rule 123 of ER 1983</td>
<td></td>
<td>Y</td>
<td>Mines Manager</td>
<td></td>
</tr>
<tr>
<td>Sabotage</td>
<td>Shortage and theft of explosive shall be reported to the nearest police station and the licensing authority</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rock falls or slide due to lack of bench face stability (bodily injuries)</td>
<td>Improper design of bench</td>
<td>Proper catch bench design and proper blasting pattern reduces over break Maintain the width to height ratio as per DGMS</td>
<td>MMR-1961</td>
<td>Procedure for opencast working as per Reg. 106</td>
<td>Y</td>
<td>Mines Manager</td>
</tr>
<tr>
<td>Force Majeure (such as heavy floods or rainfall)</td>
<td>Dewatering or culverting the storm water may reduces slides of bench</td>
<td></td>
<td>Following procedures as per Reg. 127 and 130 of MMR 1961 for Dewatering or and culverting the water</td>
<td>MMR-1961</td>
<td></td>
<td>Y</td>
<td>Mines Manager</td>
</tr>
<tr>
<td>Improper blasting practices</td>
<td>Good design of blasting network is important to reduce rock fall and slides of bench face</td>
<td></td>
<td>Procedure for opencast working as per Reg. 106</td>
<td>MMR-1961</td>
<td></td>
<td>Y</td>
<td>Mines Manager</td>
</tr>
<tr>
<td>Incompetent blasting personnel</td>
<td>Shot firer should have shot firer's permit granted under explosive rules</td>
<td></td>
<td>Appointment of Shot firer as provided in Reg. 160 of MMR 1961</td>
<td>MMR-1961</td>
<td></td>
<td>Y</td>
<td>Mines Manager</td>
</tr>
<tr>
<td>3</td>
<td>Vehicle accident (bodily injuries)</td>
<td>Head on collision between vehicle and another</td>
<td>Haul road should be sprinkled Regularly Driving at night shall be avoided</td>
<td>MMR-1961 Motor Vehicle Act</td>
<td>Sprinkling of water in haul road as per Reg. 124 MMR 1961 and appointment of RTO licensed</td>
<td></td>
<td>Mines Manager</td>
</tr>
<tr>
<td>Poor vehicle maintenance</td>
<td>Periodic servicing of vehicle Brakes and steering apparatus should be in good condition</td>
<td>MMR 1961</td>
<td>y</td>
<td>Mines Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>----------</td>
<td>---</td>
<td>----------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor access control of blast area</td>
<td>Well planning is required before and after charging of blast holes. Blast sites should be secured and warning signs posted before loading boreholes.</td>
<td>MMR 1961</td>
<td>y</td>
<td>Mines Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incompetent blasting personnel</td>
<td>Shot firer should have shot firer’s permit granted under Explosive rules</td>
<td>MMR 1961</td>
<td>y</td>
<td>Mines Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor blasting practices</td>
<td>Tamping rod of wood must be used, iron or steel rods should not be used. No smoking or any source of light or fire shall be allowed near explosives storage.</td>
<td>MMR - 1961 - The Explosive Rules, 1983,</td>
<td>y</td>
<td>Certified Blaster</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Before loading the blast hole blaster should check the drillers log. Blast sites should be secured and warning signs posted before loading boreholes.</td>
<td>Procedure for drilling charging stemming and firing of holes as per Reg. 161, Rule 14 of ER ISO procedure QSP-760-06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Unintended explosion or exposure to overpressure, charging blast holes
<table>
<thead>
<tr>
<th>Defective explosives</th>
<th>Explosive used should be purchased only from approved and licensed authority only if deteriorated or unserviceable explosive is found, seek advice of licensing authority</th>
<th>The Explosive Rules, 1983</th>
<th>Explosive are purchased from Approved manufactured or authorized license holder from CCE.</th>
<th>Y</th>
<th>Mines Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdated explosives</td>
<td>Stock should be drawn upon strict rotation</td>
<td>The Explosive Rules, 1983</td>
<td>Issue of explosives on first come first ISO procedure QSP-760-06</td>
<td>Y</td>
<td>Mines Manager</td>
</tr>
</tbody>
</table>

5

Hit by fly rock (bodily injuries) During blasting

| Poor access control of blast area | Adequate blast area security must be provided. Blast sites should be secured and warning signs posted before loading boreholes. Post guards at the access points to prevent unauthorized entry | MMR-1961 | Procedure for tacking shelter etc. during drilling and blasting Reg. 164 of MMR 1961 | Y | Mines Foreman (Blasting) |

<p>| Poor blasting practices (leading to excessive fly rock) | Burden, spacing, hole diameter, stemming, sub drilling, initiation system, and type of explosive used matched the characteristics of the rock formation. Adequate blasting Shelter must be used for the persons whose presence is required in blasting Nobody should be present within 300 m radius of blasting site as per DGMS circular except blasting personnel. Practice for controlled | DGMS/(Tech)Clr.No.2 of 2003 | Procedure for drilling and blasting, tacking shelter etc. as per Reg. 164 MMR3961, DGMS (SOMA)/(Tech) Clr.No.2 of 2003 | Y | Certified Blaster (MMR) |</p>
<table>
<thead>
<tr>
<th>6</th>
<th>Hit by Machineries — Electrical Equipment (bodily injuries)</th>
<th>Poor machinery Maintenance</th>
<th>Periodic servicing of machineries Periodic Inspection /Audit of Machineries and Structures Non Compliance to SOP</th>
<th>MMR 1961</th>
<th>Procedure laid under Section 174 Chapter XVI—Machinery and Plant of MMR 1961</th>
<th>Y</th>
<th>Mines Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Poor Cabling / Earthling To Rotating Equipments</td>
<td>Periodic servicing of electrical instruments. Periodic Inspection /Audit of Electrical equipments — cables and accessories Non Compliance to SOP</td>
<td>Indian Electricity Rules 2003</td>
<td>Section VII — Works of Licensees of Indian Electricity Rules 2003</td>
<td>Y</td>
<td>Electrical In charge under Mines Rules 1951</td>
<td></td>
</tr>
</tbody>
</table>

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 relevent information is placed at point for guidance.
Liaison with State Authorities
Government authorities, local hospital, police fire services, taluka mandatdar, 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
- Arrange for turning "OFF" main switch of electricity supply.
- 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 Explosions
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.

Natural Disasters
Quarry being a single storey building, built on elevated base is structurally safe from effects of Natural Disasters. It affords shelter against cyclone and flood.

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 and accumulate them in quarry building.
- 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 to provide of 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 Ambulance in Hospitals.
III. Patients suffering from minor problems shall be discharged and sent home after preliminary treatment.