

RISK ASSESSMENT

Mining and allied activities are associated with several potential hazards to both the employees and the public at large. Therefore, it is necessary to consider specific issues as applicable to individual projects to take precautions against these issues. A worker in a mine should be able to work under condition, which are adequately safe and healthy. At the same time the environmental conditions should be such as not to impair his working efficiency.

Risk Assessment is all about prevention of accidents and to take necessary steps to prevent it from happening. Risk assessment is mainly based on the environmental impact of various parameters. The methodology of risk assessment will involve following steps as below:

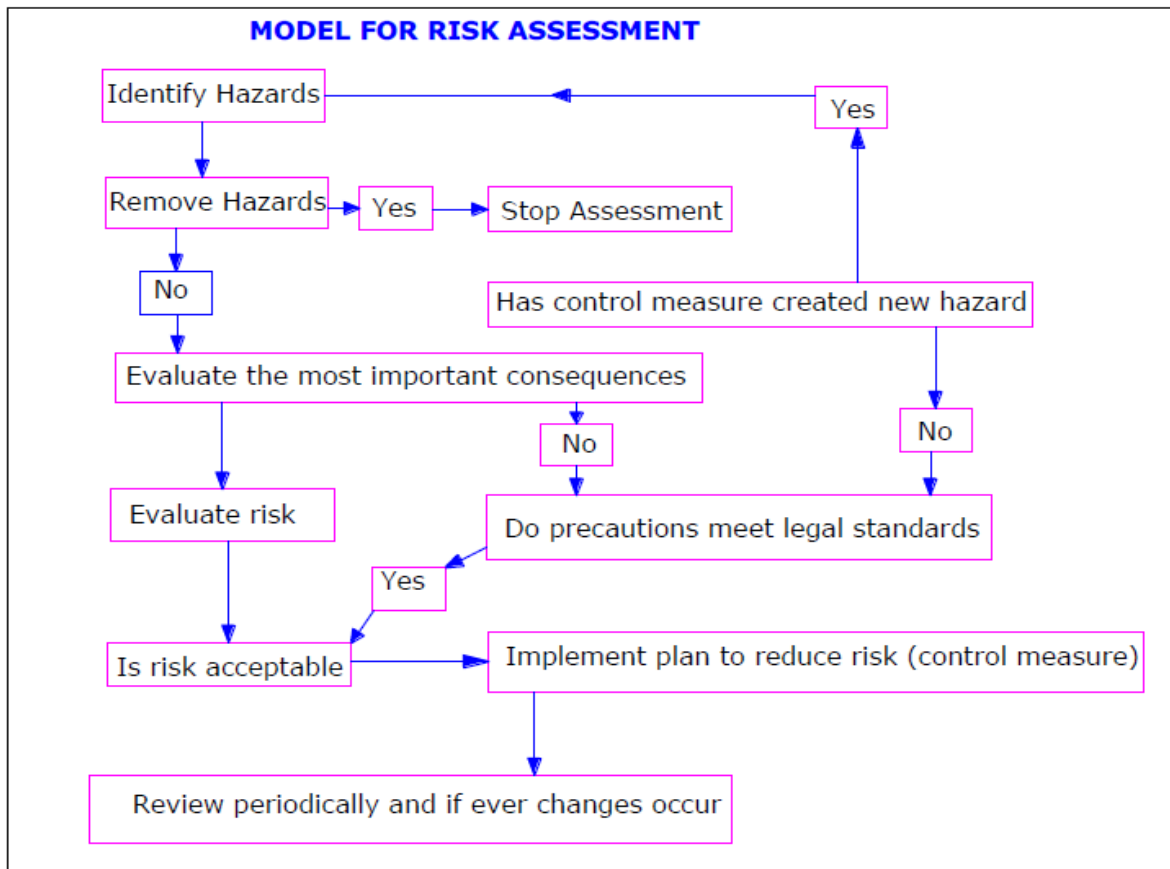


Fig.7.7: Risk Assessment Methodology

Factors of risk involved due to human induced activities in connection with mining operations are given below:

- ✓ Identifying hazardous activities
- ✓ Assessment of risk level and severity in different operations

- ✓ Identification of control measures
- ✓ Setting monitoring process
- ✓ Reduce the impact of mishaps of all kinds
- ✓ Reduce the inherent potential for major accidents.

1.1. ENVIRONMENTAL RISKS

The environmental risk assessment involves two factors namely, Risk and Hazard. The definitions of environmental risk are as follows:

a) Risk: Risk is an actual or potential threat of adverse effects on environment arising out of an organization activity.

b) Hazards: Hazard is the potential to cause harm. An environmental hazard is a generic term for any situation or state of events which poses threat to the surrounding environment.

1.2. RISK IDENTIFICATION AND CONTROL MEASURES

The proposed mining activity will be opencast semi-mechanized mining project. The anticipated risks are mentioned below:

1. Land degradation and inundation due to flood,
2. Mine working faces/ Bench design parameters, Pit slope, road gradient etc...
3. Types of Explosives, handling, Storage and uses and its potential hazards,
4. Accident due to transport of vehicles, loading and their mitigation measures
5. Air Pollution in drilling and Operation of Machineries
6. Inundation, Mine Water discharge, erosion etc...
7. Noise and Vibration
8. Hydro geological Problems related to lowering of water table and depletion of ground water while mining below water table.
9. Socio economic effects for the people in core and buffer zone around 10kms.
10. All other Safety and environmental aspects related to the employees and Public in core and buffer zone.

1.2.1. LAND DEGRADATION AND INUNDATION

Land degradation is one of the major adverse impacts of opencast mining in the form of excavated voids and also in the form of waste dumps. Land reclamation plan must, therefore, be implemented simultaneously with the mining activities. Mining operations will not intercept the ground water table. Therefore, disturbance to ground water quality or depletion are not envisaged.

One of the requirements of MMRD Act, 1957 is to ensure simultaneous reclamation of land along with other mining operations. To reduce the time gap between land excavation and reclamation, year wise program of excavation including granite, top soil and OB has to be charted out.

The first step in a successful reclamation programme is to decide the post reclamation land use. In this case it is considered appropriate to convert the land under a cover of dense vegetation. Trees absorb CO₂, contribute oxygen, purify the air, conserve the soil and prevent its erosion. Trees promote precipitation and add to stabilization of slopes.

Keeping the above in view, the land reclamation shall be carried out with an emphasis on plantation. It is proposed to include local trees like Neem, Acacia, Tamarind etc... in the plantation program as they serve as sinks for gaseous emissions. Plantation will be done along the lease boundary and avenues as well as over non-active dumps at a rate of 50 trees per annum with interval of 5m in between. The rate of survival expected to be 80% in this area.

Extensive plantation comprising of pollutant resistant trees is undertaken, which will serve not only as pollution sink but also as a noise barrier. Thus the area shall be fully reclaimed within five years of completion of mining operations.

1.2. 2. MINE WORKING FACES/ BENCH DESIGN PARAMETERS, PIT SLOPE, ROAD GRADIENT ETC...

A. MINE WORKINGS : The mine working faces are designed as per the Reg 106 (2) (b) Mines Metalliferous Regulation 1961 to keep bench height as 6m equal to the boom height of the excavator. Being a dimensional cutting quarry the working face is normally kept as vertical but the overall pit slope is designed as 60°. No chance for instability due to very hard formation without any geological disturbances.

B. MINE ROAD: The mine approach road at surface as well as from pit top to bottom are to be maintained as 1: 16 except in case of short distance of ramp for safe vehicular movements. The width of road is kept three times the fleet width of the flying vehicles.

C. WASTE DUMPS: Sliding of waste dump will be a severe risk compared with quarry slope failure. Hence, it is imperative that the degree of hazard against potential failure of waste dump slope should be identified and that precautionary measures will be adopted, if required.

Since the waste dumps will be proposed to be constructed over a hard rock surface, chances of foundation failures will be remote. As controlled blasting techniques will be implemented with small size Jackhammer blast holes with limited explosive charge, there are no chances ground vibrations to reach the dump area and creating problems of liquefaction. Further the slopes of waste dumps will be afforested to provide long term stability. Thus the chances of slope failures for the dumps are remote. The height of dumps shall not exceed 30m with proper repose angle. Grading of dumps shall be maintained in addition to garland drainages to control erosion of wash outs and retaining wall at the toe of dump to a height of 1m to prevent dump collapse.

D. PIT SLOPE: Slope failures in mines are mostly associated with circular failure, which is controlled by the rock mechanics properties such as cohesion, angle of internal friction, joint/shear planes, ground water flow conditions, rock density and the heights to be maintained. To control the above factors the pits are designed to be developed with benches, with an overall slope angle of 60°. Further the top benches of the will be afforested to provide long term stability. Thus the chances of slope failures for the pits are remote. All necessary precautions will be taken.

E. TRANSPORT VEHICLES: The main hazards arising from the use transport vehicles will be incompetent drivers, brake failure, lack of all around visibility from the drivers position, access to the cab, vehicle movements particularly reversing, roll over, vibration, noise, dust and maintenance. The possible risks include the driver and pedestrians likely to be struck by the vehicle, and drivers of smaller vehicles, which cannot be seen from the cabs of large vehicles. Concave should be kept at all corners and invisible roads to view the opposite sides. All vehicles are fitted with reverse horn with one spotter at every tipping point.

1.2.3. TYPES OF EXPLOSIVES, HANDLING, STORAGE AND USES AND ITS POTENTIAL HAZARDS

The risks involved in storage of explosives and its handling are:

- i. Accidental explosion due to adopting unsafe practices; and
- ii. Poor blasting parameters leading to excessive ground vibrations, noise, air blast and fly rock during blasting.
- iii. Surface Fire

i. Accidental explosion due to adopting unsafe practices

All activities involving storage, handling and transportation will be in accordance with the rules made under the Indian Explosive Act and conducted with proper

licenses and approval from concerned authorities. All blasting operations will be performed by competent persons (Qualified blaster approved by DGMS) taking adequate precautions to make the operation totally safe under the supervision of qualified Mines Manager. A detailed code of procedures for storage, handling and use of explosives will be prepared and strictly followed. All the employees will be trained and made conscious of adopting safe practices as per the safety policy and procedures laid down by the company.

ii. Poor blasting parameters leading to excessive ground vibrations, noise, air blast and fly rock during blasting

The frequency of blasting will be optimized by conducting blasting once a week and also adopting multi-row blasting using delay detonators. The blasting pattern, stemming column, charge per hole, etc. will be designed so as to control the fly rock and the ground vibrations. Non-electric shock tube initiation systems will be deployed to enhance safety of operations, better blasting control and reduce noise due to air blast. Depending on the actual experience once the excavation commences, blasting parameters can be changed suitably to adhere to strict safety measures.

Taking the above risks into account the mines management has proposed a specific disaster management plan to minimize the risks.

iii. Surface fire

Sufficient fire extinguishers will be installed at selected locations on surface like office, workshop, Garage, Stores etc. for fire protection.

1.2.4. ACCIDENT DUE TO TRANSPORT OF VEHICLES, LOADING AND MITIGATION MEASURES

- Possibilities of road accidents are possible due to rash driving.
- Possibility of overloading may injure the passerby public.
- The possibility of accident during vehicular movement in the mine in case pathway is not compacted or movement is at the embankment.
- All transportation within the mining lease working should be carried out directly under the supervision and control of the management.
- The vehicles will be maintained in good 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 equipments/ vehicles especially at the working place/loading points, stopper should be posted to properly guide reversing/spotting operating, otherwise no person should be there within 10m radius of machine.
- The maximum permissible speed limit should be ensured and Overloading of material will be avoided.
- A statutory provision of the fences, constant education, training etc will go a long way in reducing the incidents of such accidents.

i. Accident at loading point and its mitigation measures

- The Granite will be loaded into the trucks mechanically *i.e.* by Hydraulic Excavator and cranes. There is a possibility of injury to the person during loading operation at the quarry.
- No persons shall be allowed to work or go within the reach of swing area of the excavator.
- All operators and assistants shall be provide with safety devices like helmet, mask, goggles etc to keep them protected from accident due to fall of objects and inhaling respirable dust.

1.2.5. DUST DURING DRILLING AND VEHICULAR MOVEMENT

Quarry operation will be carried out by mechanized opencast method which involves drilling, blasting, loading of blasted material by excavators to tippers for transport, hauling of tippers wire saw cutting, block lifting etc... The risk involved here is the air borne particulate matter which is the major air pollutant contributed by opencast mining.

Dust generated from blasting will not be considered, as the blasting activity will result in emission only for few minutes and is not a continuous source. The impact of the blasting on the environment would be minimal and localized to the operative bench. Loading activities in the mine will be carried out by an excavator. The dumpers will be well maintained so that exhaust smoke does not contribute much. The other sources of air pollution will be due to the dust generated during the movement of vehicles. While it is not presently possible to totally remove the hazard, properly applied control measures can substantially reduce the risk.

The dust prone risk areas are identified for adopting proper control measures in the mining area as follows,

1. Wet drilling to suppress the dust emission from the drill machines at its source by inbuilt water injection system.
2. Regular water sprinkling on blasted heaps and haul roads.

3. Use of sharp drill bits for drilling holes and arrangements for bit regrinding.
4. Charging the holes by using optimum charge and using time delay detonator.
5. Regular grading of haul roads to clear accumulation of loose materials.
6. Avoiding over filling of dumpers and consequent spillage on the roads.
7. The vehicles and machinery will be kept in good condition so that emissions will minimize.
8. Plantation along approach roads and on barrier zones will help suppress dust.

1.2.6. NOISE AND VIBRATION

Once the mine becomes operational, there would be various sources of noise in the area such as drilling, blasting, vehicular movement etc., Noise due to vehicular movement will be intermittent, but will also add to the background noise level. It has been observed that mechanization of mining technology generally leads to higher noise levels if not properly controlled.

The noise produced by blasting would be for extremely short duration, though with a high intensity. The impacts over the surrounding habitat can be minimized by adopting adequate precautions during blasting. All blasting operations will be performed by competent persons taking adequate precautions to make the operation totally safe.

Ground vibration, fly rock, air blast, noise, dust and fumes are the deleterious effects of blasting on environment. The explosive energy sets up a seismic wave in the ground, which can cause significant damage to structures and disturbance to human occupants if not operated in controlled manner.

When an explosive charge is fired in a confined blast hole, in addition to spontaneous release of hot gases, fumes etc intense pressure on the blast hole walls cause for Noise and Vibration. High intensity shock waves propagate in all directions and cause the rock particles to oscillate. This oscillation is felt as ground vibration. Such ground vibrations are controlled by several controlled blasting techniques like Muffle blasting, delay arrangements etc...

Ground vibration from mine blasting is expressed by amplitude, frequency and duration of blast. The variables, which influence ground vibrations, are controllable and non-controllable. The non-controllable variables include general surface terrain, type and depth of overburden. Similarly, the controllable variables include type of explosives, charge per delay, delay interval, direction of blast progression, burden, spacing and specific charge and coupling ratio. The oscillation

of rock particles is called Particle Velocity and its value is called Peak Particle velocity (PPV), which is measured in millimetre per second. The standards for safe limit of PPV are established by Director General of Mines Safety for safe level criteria through Circular No. 7 dated 29/8/1997.

$$V = 417.8 \{D / (Q^{0.5})\}^{-1.265}$$

V= Peak particle velocity in mm/s

D= Distance between location of blast and gauge point in m

Q=Quantity of explosive per blasting in kg

The safe level criteria PPV as mentioned in Circular No. 7 of DGMS is presented below:

S. No.	Type of Structure	Dominant excitation Frequency		
		< 8 Hz	8 - 25 Hz	> 25 Hz
A)	Buildings/structures not belonging to the owner			
1	Domestic houses/structures (Kuchcha brick and cement)	5	10	15
2	Industrial Buildings (RCC and framed structures)	10	20	25
3	Objects of historical importance and sensitive structure	2	5	10
B)	Buildings belonging to the owner with limited life span			
1	Domestic houses/structures (Kuchcha brick and cement)	10	15	25
2	Industrial buildings (RCC & framed structures)	15	25	50

DGMS stipulated, vide circular no 18 of 1975, the following standards for attainment in work environment

- A warning limit of 85 dB (A) is set below which there will be little risk to an unprotected ear for an eight hour exposure.
- The danger limit value of 90 dB (A), above which hearing impairment and deafness may result from an unprotected ear.
- A worker should not be allowed to enter, without appropriate ear protection, an area in which the noise level is 115 dB (A) or more.
- Personal protective equipment shall be worn, if there are single isolated outbursts of noise which can go above 130 dB (A) “impulse” or 120 dB (A) “Fast”.
- No worker shall be allowed to enter an area where the noise level exceeds 140 dB (A).

As the distance increases the PPV value is likely to reduce. The ground vibrations generated by blasting during the proposed mining operations will be kept well within standards prescribed by DGMS by controlled blasting. By adopting controlled blasting, the problems will be greatly minimized and the impacts will also be minimized by choosing proper detonating system, optimizing total charge and charge/delay.

As an alternative mitigation measures to control Noise and Vibration, the following techniques may be adopted if the PPV exceeds the prescribed limits,

- i. Use of Diamond wire saw cutting as given in the Mining Plan,
- ii. Chemical blasting and
- iii. Direct fact cutting equipments as shown in the fig. below.



Fig.7.8: Face cutting equipments with gang saw blade using rail tracks alignment

1.2.7. HYDRO GEOLOGICAL PROBLEMS RELATED TO LOWERING OF WATER TABLE AND DEPLETION OF GROUND WATER

It is draught area with poor yield of ground water. Most of the area is composed of hard rock terrain which does not allow the ground water to flow freely. However the water table or peizometric level with poor yield is observed at a depth of **23-25 m** from the ground level. No major spring or water source is interpreted around 500 m radius except in few places between the lithological contacts.

Location of the point is near to the quarry site in Jakkeri granite quarry of Tami Nadu Minerals Limited, south of dumps of Pluton-D granite quarry. The rock is very hard and massive which shall not permit the ground water to flow

freely and therefore recuperation of ground water into the quarry shall be meager or negligible.

1.2.8. MINE WATER DISCHARGE, EROSION ETC

Sudden rush of water due to heavy rain and flooding cause major damage to the men and machineries engaged at the pit bottom. Proper drainage system with perfect survey of RL at every point around 500m has to be prepared to ditch and divert the flood water into natural water course.

In case of pumping out mine water into the natural drainage the water should be periodically tested at least once in six months for its TDS, hardness, e-coli form etc . In case of high turbid slurry water coarse and sand filtration settling tank may be arranged to filter water before discharge into natural system.

Being a very hard rock there is no chance for erosion from quarry area. Dump erosion also negligible and seasoned for more than 10 years.

1.2.9. SOCIO ECONOMIC

The proposed mining project does not involve any kind of displacement of the population since the mining will be concentrated only in the quarry area. The mining operations will not disturb/relocate any village or need resettlement. No adverse impact is anticipated. The mining operation will create an employment to the local people of the surrounding villages. The mine, not only provide employment opportunities but also the industrial culture and civilization to the village people.

The project proponent will help in uplifting the poor section of the society as part of CSR activity by undertaking social welfare programmes. The Project proponent contributes 2.5% of turnover towards CSR activities. This project will have an impact on the population growth as it will provide considerable employment to the families in the nearby villages. Improved health care facilities are expected to come-up in the area for catering to the health needs of the miners. The impact of mining on the civic amenities will be substantial after the commencement of mining activities. The local people who are currently depending on forest and agriculture will have new avenue from the proposed mine.

1.2.10. ALL OTHER SAFETY AND ENVIRONMENTAL ASPECTS RELATED TO THE EMPLOYEES AND PUBLIC IN CORE AND BUFFER ZONE

Health hazards and occupational deceases of all employees should be maintained both in hard and soft copies for the persons likely to be affected in core and buffer zones. Periodical medical checkup as per the Mines Rules, 1955 has to be done in time. Free medical camp has to be arranged for the public living in buffer zone.

Basic and refresher training for the employees as part of awareness program has to be arranged as the Mines Act, 1952 amended up to date.

The mines safety and environment both has to be intact with Mines safety Regulations framed by the Expert committee of DGMS amended from time to time by way of circulars in addition to general conditions of MMR,1961. The conditions and procedures for safety of mines are laid down by them to ensure safety of persons and machineries and its working environment.

1.3. DISASTER MANAGEMENT PLAN (DMP)

The complete mining operation will be carried out under the management control and direction of a qualified mine manager. The DGMS have been issuing a number of standing orders, model standing orders and circulars to be followed by the mine management in case of disaster, if any. Moreover, mining staff is being sent to refresher courses from time to time to keep them alert. Natural calamities such as earthquakes, landslides, floods etc., can also contribute to disaster. The Disaster Management Plan for the proposed Granite quarry project will cover hazard identification due to various mining and allied activities, the risk involved due to the hazards and planning the necessary mitigation measures for the same. The following natural/ industrial hazards as follows:

- Failure of pit slope
- Accident due to transportation & other equipment etc.
- In order to take care of above hazard/disasters the following control measures have been adopted.
- Regular inspection of the mine for the observance of any visible cracks.
- Checking and regular maintenance of garland drains and earthen bunds to avoid any inflow of surface water in the mine pit during rainy season.
- Provision of high capacity pumps for pumping out water from the mining pit.
- All safety precautions and provisions of metalliferous mine regulation 1961 is strictly followed during all mining operations.
- Entry of unauthorized persons is 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. are made available to the employees and regular check for their use.
- Cleaning of mine faces is regularly done.
- Regular maintenance and testing of all mining equipment as per manufacture's guidelines.
- Suppression of dust on the haulage roads.

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

The management is able to deal with the situation efficiently to reduce confusion keeping in view of the likely sources of danger in the mine.

1.3.1. OUTLINE OF DISASTER MANAGEMENT PLAN

The purpose of disaster management plan is to restore the normalcy for early resumption of mining operation due to an unexpected, sudden occurrence resulting to abnormalities in the course of mining activity leading to a serious danger to workers or any machinery or the environment.

1.3.2. SYSTEM OF COMMUNICATION

There is an internal communication system for the department head and to their line of command with telephone. The telephone numbers and addresses of adjoining mines, rescue station, police station, fire service station, local hospital, electricity supply agency and standing consultative committee members are also maintained for any emergency requirement.

1.3.3. CONSULTATIVE COMMITTEE

In order to handle disaster/emergency situations, an organization chart entrusting responsibility to various project personnel has been prepared with their specific roles during emergency. A standing consultative committee will be formed under the head of mines manager. The members consist of safety officer/medical officer/Asst. manager/ public relation officer/Foreman/ and environmental engineer.

1.3.4. FACILITIES AND ACCOMMODATION

Accommodation and facilities for medical centre, rescue room and for various working groups will be provided.

1.3.5. FIRST AID AND MEDICAL FACILITIES

The mine management will have first aid/ medical centre for use in emergency situation. All casualties would be registered and will be given first aid. The centre will have facilities for first aid & minor treatment, resuscitation, ambulance and transport. It will have proper telephone/wireless set for quick communication with hospitals where the complicated cases are to be sent.

1.3.6. TRANSPORT SERVICES

A well defined transport control system will be provided to deal with the situation.

1.3.7. INFRASTRUCTURE

Following infrastructure and operational system shall be provided to meet any emergencies.

1.3.8. EMERGENCY CONTROL ROOM

This is situated in an area away from the places of fire and has been provided with the following facilities:

1. Master plan of the mines.
2. First aid boxes.
3. Telephone line
4. Emergency lighting system.
5. Transport facility.

Emergency control room will function as control base.

1.3.9. FUNCTIONS OF PUBLIC RELATIONS/ RESPONSIBILITY OF MINE MANAGEMENT

- To make a cordial relation with government officials and other social service organization and working groups.
- To liaise with representatives of the mine to ameliorate the situation of panic, tension, sentiments, grievances and misgivings created by any disaster.
- To ameliorate the injured, survivors and family members of affected persons by providing material, moral support and establishing contact with relatives of victims.

1.3.10. OFFSITE EMERGENCY PLAN

Offsite emergency plan defining the various steps to tackle any offsite emergencies which may affect surrounding areas of the project has to be prepared after due final discussion with local panchayat and revenue officials. As per this offsite plan, actions have to be promptly initiated to deal with any offsite disastrous situation, with help of Collector and other officials.

1.3.11. CARE AND MAINTENANCE DURING TEMPORARY DISCONTINUANCE

If the mine will be discontinued temporarily for more than 120 days, notice will be given 30 days before the date of such discontinuance to the concerned authorities.

Risk Assessment Report for Colour Granite Quarry of TAMIN at Jakkery Village, Krishnagiri Dt.
Consultant: Aadhi Boomi Mining and Enviro Tech (P) Ltd, Salem, Tamil Nadu

During discontinuance period safety arrangement and fencing will be provided to avoid the entry of unauthorized persons. The accessibility to the mine from the surface will be prevented by providing fencing arrangement.

1.4. OCCUPATIONAL HEALTH RISKS

Occupational health and safety hazards occur during the operational phase of mining.

Anticipated Occupational & Safety Hazards

- Health Impact due to Physical activity, Extremes of age, poor physical condition, fatigue, Cardiovascular disease, Skin disorders
- Noise
- Burns and shocks due electricity
- Respiratory hazards due to Dust exposure
- Physical hazards
- Explosives
- Fire

1.4.1. RESPIRATORY HAZARDS

The problem of occupational health, in the operation and maintenance phases is primarily due to dust, which could affect breathing. Health and Safety Measures to control dust inhalation; precautions would be adopted to prevent dust generation at site and dispersing in the environment. Long-term exposure to silica dust may cause silicosis.

For the safety of workers at site, engaged at strategic dust generation points like loading and unloading points etc...

The following measures are proposed.

- Excavators, dumpers, dozers, drills other automated equipments will be enclosed
- Use of personal breathing protection will be made compulsory
- Spraying with water on all working faces & haul roads, by special spraying machines or water-sprinkler
- Regular health monitoring of workers.

1.4.2. NOISE

Workers are likely to get exposed to excessive noise levels during quarrying activities. The following measures are proposed for implementation.

- No employee will be exposed to a noise level greater than 75 dB(A) for a duration of more than 8 hours per day without hearing protection
- Ear muffs provided will be capable of reducing sound levels at the ear to at least 75 dB(A)
- Periodic medical hearing checks will be performed on workers exposed to high noise levels

1.4.3. PHYSICAL HAZARDS

The following measures are proposed for control of physical hazards.

- Specific personnel training on work-site safety management will be taken up;
- Work site assessment will be done by rock scaling of each surface exposed to workers to prevent accidental rock falling and / or landslide, especially after blasting activities;
- Natural barriers, temporary railing, or specific danger signals will be provided along rock benches or other pit areas where work is performed at heights more than 2m from ground level;
- Maintenance of yards, roads and footpaths, providing sufficient water drainage and preventing slippery surfaces with an all-weather surface, such as coarse gravel will be taken up.

1.4.4. ELECTRIC SHOCKS

During mining operations, all the statutory provisions of the Indian Electricity Rules 1956, and Indian Standards for installation and maintenance of electrical equipment etc. will be observed.

- For protection from electric shocks to persons, from electrical equipment with voltage up to 1000 v earth leakage relay will be provided which will automatically disconnect electrical circuits;
- Closed mobile substations and switchgears will be mechanically interlocked which exclude the possibility of opening the door when oil switch and air circuit breakers are in operation;
- All metal parts of electrical equipment will be properly earthed to avoid failure of insulation; and
- All HT lines and cables located within the blasting zones will be disconnected during blasting operations.

1.4.5. FIRE

In addition to statutory provisions, the measures for fire fighting and prevention of fires are as follows:

- Organization of special cell for systematic observation to examine and prevent fire;
- Removal of spillage on benches and cleaning to prevent cases of heating;
- Storage of lubricants and cotton waste in enclosed fire proof containers in working places; and
- Provision of fire extinguishers and fire tenders.

Emergency organization will be formed to deal with emergency during fire.

1.4.6. EXPLOSIVES

Occupational Safety hazards related to blasting activities resulting in accidental explosions. Care will be taken to evacuate the mining area completely at the time of blasting operations. The blasting will be equipped with all personal safety and precautionary measures. The following safety measures are proposed while conducting the blasting operations.

- A blasting SIREN will be used at the time of blasting for audio signal
- Before Blasting and after blasting, red and green flags will be displayed as visual signals.
- Warning notice boards indicating the time of blasting and NOT TO TRESSPASS are displayed prominently.

TAMIN will provide all necessary provisions under Factory Act. Safety shoes, helmet and other personal protective equipments will be used to each worker.