

CHAPTER-5

5.1 BLASTING

Granite is compact rock, at places it is fractured also. Production from the fractured zone will be obtained with the help of excavator, whereas from compact zone the production will be obtained by drilling and blasting. Drilling will be done by jack hammer with the help of air compressor.

- Whole location will be properly dressed by excavator to remove the loose boulders for efficient drilling and for avoiding jamming of drilling hammer and bits.
- Drill holes of 32mm diameter and 1.5 M in depth will be made.
- To reduce the noise level the holes will be blasted by using nitrate mixture and Millisecond delay detonators.
- To maintain the bench height of 5 M, sub bench of 2.5 m will be formed first, later on two benches will be merged and one bench of 5m will be formed and maintained.
- The spacing and burden will be kept at 1.0 M.
- About 30 to 50 holes will be blasted in one blast.
- Yield per hole will be $1.5 \times 1 \times 1 = 1.5M^3$.
- Number of blasts per day will be 2 blasts of 40 holes each.

Blasting Pattern:

The blasting pattern entirely depends on the situation of the joints present in the rocks. The drilling is done as per the requirement of the rock fragmentation with desired production of mineral.

5.2 Requirement of explosive

- Charge per hole will be 375 grams
- Yield of explosive - about $6.6 M^3$ per Kg, or 17.16 tonne/Kg
- For 21239 tonne per year 1770 tonne per month the requirement of explosive will be about 103 kg per month.



5.3 Precaution during blasting

No explosives other than those provided by company, the agent or manager shall be used in the mines and the explosives shall not be taken inside any building except magazine approved by the licensing authority under the Indian Explosives Act 1884. Cases and containers for carrying explosives shall be of substantial construction and securely locked. Containers of steel or iron shall be galvanized and not more than 5 Kg explosives shall be carried in one case or container. The manager shall fix maximum number of shots that a blaster may fire in one shift and should not exceed 80 in case of electrical firing or 50 in case of firing with igniter codes. Shot firing tools conforming will be used and provisions under 162 on drilling, charging, stemming and firing of shot holes shall also compiled with.

As static charge can be generated and stored on bodies of persons wearing synthetic fiber cloths and/ socks and such potential may go up to 60,000 volts during dry months, especially on a cold day in a dry climate, blasters /shot fires and their helpers should not ware such clothes while on duty. They will be provided only non-conducting type of shoe or boots eg leather sole footwear as prescribed under.

5.3.1 Type of Explosives to be used

Only class 2 and class 6 explosive is proposed for use as given below:-

Booster (20%)	Slurry explosive
Explosive (Column charge) (80%)	Nitrate Fuel oil (NFO). The NFO mixture can be readily produced at a site by mixing nitrate (94.5 %) with diesel oil (5.5 %).
Initiator	Delay /Electric detonators

a. Safety precautions to be adopted.

PRECAUTIONS:

- Blasting in the open cast pit will be done only during day time at designated hours.
- Only competent blasters will be appointed to handle explosives.
- Explosives will be stored in approved and licensed magazine as per Explosive Act/ Rules.
- Explosives will be brought from magazine to blasting site in licensed Explosive Van



under the care of blaster.

- Sufficient warning signals will be given before blasting the holes.
- Guards will be posted on all roads and paths at least 250 m distance to stop entrance to the danger zone during blasting hour.
- Controlled blasting will be practiced to control vibrations and flying fragments.
- Optimum charge will be used, while blasting near office complex/ infrastructure site.
- Maximum charge per day will always be less than 10kg to limit the PPV levels within the DGMS standards of 15 mm/sec.

b. Brief description on method of procurement and storage of explosives.

- Proper and safe storage of explosives in approved and Licensed Magazine.
- Proper, safe and careful handling and use of explosives by competent Blasters having Blaster's Certificate of Competency issued by DGMS.
- Proper security system to prevent theft/ pilferage, unauthorized entry into Magazine area and checking authorized persons to prevent carrying of match box, lights, mobile phones, cigarette or Beedi, etc.
- The explosives of class 2 will be used in their original cartridge packing and such cartridge shall not be cut to remove explosive for making cartridge of different size.
- Detonators will be conveyed in special containers. These will not be carried with other explosives.
- 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.
- Blasting operations will be carried out in day times only.

5.3.2 Storage of explosives

Considering consumption, a 750 kg magazine is situated within the complex. The controlled blasting is proposed by adopting all the safety measures as per "MMR 1961" and with the permission of DGMS. Blasting will be performed as per requirement on the face



Vibration Control

Vibration caused due to blasting will be controlled by the following steps:

- Blast holes will always be initiated by short delay detonators, rather than adopting instantaneous detonating. Short delay in blasting of successive blast holes will effectively reduce the vibration problem.
- Number of holes per shot and blast will be kept to minimum, to guide the throw in the desired direction while keeping vibration and noise to minimum.
- Multiple blasting and "V" pattern of firing will be adopted to minimize forward throw and have a good rock pile.
- Mostly, holes will be fired towards the free face.
- Use of ANFO which has low velocity of detonation, will also reduce the vibration.
- Blasting shall not be permitted within 100 m of surface structure.
- Peak particle velocity at a distance of 100 m from the shot hole, shall not exceed 10mm/ sec.
- The flying fragments shall be controlled by muffled blasting and will not project beyond the distance of 300 m.
- Proper spacing & burden will be maintained.
- Optimum utilization of the explosives will be ensured.
- Direction of the hole will be maintained towards free face.
- Electric delay detonator will be used.
- Deck charging will be practiced for required fragmentation.

Noise Control

Noise control will be achieved by following the measures: -

1. Shooting of well-designed 5 numbers of blast holes / shot for 5 holes is planned daily, which will produce less noise momentarily.
2. Detonating fuse will not be used.
3. Blasts will be planned properly to eliminate noise.
4. No plaster shooting will be taken up, as this is the main reason of noise pollution.

Fly Rock Hazard Control

1. Stemming length will be kept not less than the burden.
2. It will be ensured that the burden will not be excessive.



3. Inter row delay will be selected in such a manner, so that each row pushes its burden in a forward direction rather than in an upward direction.

Each blasting operation will be unique in nature, involving different surface coatings, blast material quantity and working conditions. Before beginning of drilling & blasting operations, the applicant will identify the hazards from the knowledgeable person who had worked in masonry stone mining and being trained to recognize the hazards as well as to inform the authority for quickly corrective action to eliminate such hazards. The applicant will use engineering and administrative control measures, personal protective equipment's (PPE) including respiratory protection and training to protect workers involved in drilling & blasting activities. Engineering control measures such as substitution, isolation, containment and ventilation which are the primary means of preventing or reducing exposures to airborne hazards during drilling & blasting operations have to be implemented by the applicant. Administrative control measures including the use of good work and personal hygiene practices will also reduce exposure to health hazards.

Engineering Controls

1. Substitution

- Use of proper blasting material.
- Use of water soluble (slurry) explosives to reduce dust.

2. Isolation and Containment

- Use barriers and curtain walls to isolate the blasting operation from other workers.
- Use blast rooms or portable blast shelter for smaller operations.
- Use restricted areas for non-enclosed blasting operations.
- Keep co-workers away from the blaster.

Administrative Controls

Perform routine cleanup using wet methods.

- Not to use compressed air to clean the working site as this will create dust in the air.
- Clean and decontaminate the equipments on the worksite.
- Schedule blasting when the least number of workers are at the site.
- Avoid blasting in windy conditions to prevent the spread of hazardous materials.



Medical Control

Medical control measures will be taken for the miners with a view to protect their health. The medical officer will visit the mine site once in a month and shall undertake the following need based functions.

- Pre-employment health examination of all miners.
- Emergency medical care.
- Health Education & Training.
- Health Counseling.
- Provide necessary medical and occupational health facilities.

Statutory Control

For ensuring compliance of the statutory requirements and to maintain the desirable standard for the mine, all the places will be under the control of qualified Mine Manager assisted by number of qualified Assistant Mines Managers, designated as Safety Officer and Welfare Officer and front line supervisors like Mine Foreman, Mining Mate, Blaster/ Shot-firer, Surveyors etc to look after the Safety, Health, Sanitation & Welfare of the work persons. They all will operate in the mine and ensure proper supervision and control in all the activities of mining to avoid any untoward incidents causing injury or harm or health hazards to workforce. For coordinating the activities of mine at corporate level, an Agent will be appointed with specific responsibilities. Owner of the mine will be responsible for providing all the facilities & assistances to mine management to ensure all the standards at a desired level.

Personal Hygiene Practices

- Prohibit eating, drinking or using tobacco products during drilling & blasting.
- Provide wash stations separately for the workers to wash their hands and face routinely before eating & drinking.
- Remove contaminated work clothes before eating & drinking.
- Provide separate accommodations and storage facilities for protective clothing and equipments.



Respiratory Protection

The driller & blaster will have respirator with the wearer's head, neck, and shoulders to protect the wearer from dust & splinters.

- A certified & approved blasting airline respirator with positive pressure blasting helmet will be provided if necessary.

Personal Protective Equipments

- Hearing protection
- Eye and face protection
- Helmet for head protection
- Leather gloves to protect to full forearm and aprons (or coveralls)
- Safety shoes or boots to protect legs
- Provide training to drillers & blasters and support personnel on drilling & blasting health and safety hazards, how to use controls, personal hygiene practices, safe work practices and the use of respirators.

Preventive Measures

1. Respirators should not be used as the only means of preventing or minimizing exposures to airborne contaminants. Dust source controls such as containment systems, local exhaust systems, and good work practices should be implemented as the primary means of protecting workers. When dust source controls cannot keep exposures below the recommended exposure limits, controls should be supplemented with the use of respiratory protection.
2. Environmental monitoring by trained personnel will be conducted in all -blasting applications. This is necessary to ensure that workers will not be over expos than the prescribed exposure limit as fixed by the authorities.
3. Anytime environmental conditions, airborne contaminants and their concentrations should be within the permissible limit.



CHAPTER-6

MINE DRAINAGE

6.1 Topography:

The highest elevation of the permit area is 140 m above MSL and lowest is 100 m above MSL. Drainage in the permit area is mainly towards south.

6.2 Rain fall:

Kozhikode district experienced annual rainfall of 3698 mm in the year 2006. The high rainfall areas in the district are Kakkayam dam site and Kakkayam Power House. Kakkayam dam site has been experiencing more than 4500 mm of annual rainfall since 2000. It has been noticed that rainfall displays an increasing trend towards north-eastern areas of the district.

6.3 Water Table:

The nearest river is Kaniyankadavu which is at a distance of 25 km towards. The ground water depths were observed from the available open well within nearby sources. The observation made during the field studies indicate water level varying and between 15 m. to 20.0 m below ground level.



CHAPTER-7

7.0 STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE

7.1 Nature and Quality of Top-Soil and overburden to be generated

7.1.1 Top Soil

A total quantity of 2970 tonne of topsoil is proposed to be removed during mining operations. The topsoil excavated from the quarry will be dumped separately at predetermined place and subsequently utilized for spreading over reclaimed areas for plantation.

7.1.2 Mine Waste

About 5309tonne of mine waste will be generated throughout the mine life. This waste will be utilized within the pit for lying of haul roads. At the end use, OB can be reutilized as soil base for plantation.



CHAPTER-8

8.1 USE OF ROCKS

The rock produced from the quarry will be sold to contractors and consumers and will finally be consumed locally for road (State Highway & National Highway), building and construction works.

