

# MODEL ENVIRONMENTAL MANAGEMENT PLAN FOR MINOR MINERAL MINING OF B2 CATEGORY

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1. Environmental Management Plan (EMP) consists of a set of impact mitigation, management, monitoring, waste minimization and institutional measures to be taken during implementation and operation of the project to eliminate the adverse environmental impacts or to reduce them to the acceptable level. The EMP is required to ensure sustainable development as it tries to ensure judicious utilization of non-renewable resources and keep the pollution level within permissible assimilative capacity of the area. The assimilative capacity of the study area is the maximum amount of pollution load that can be discharged in the environment without affecting the designated use and is governed by dilution, dispersion and removal due to natural physicochemical and biological processes.
2. The environmental attributes, which are likely to be affected by the mining activity, are land use, topography, drainage lines / patterns, water resources, soil, air quality, socio economic status, ecology and public health. The EMP aims at controlling pollution at source level to the extent possible, with the available and affordable technology, followed by treatment measures before they are discharged.
3. An Environmental Management Plan (EMP) is a site specific plan developed to ensure that the project is implemented in an environmentally sustainable manner. An effective EMP ensures the application of best practices of environment management to a project.
4. The purpose of an EMP is to:
  - (i). Assists proponent in the preparation of an effective and user friendly activity chart for environment management.
  - (ii). Ensure that the commitments made as part of the project's life are implemented throughout the project period.
  - (iii). Ensure that environment management details is captured and documented at all stages of a project.
5. The design of EMP for operational phase should aim to achieve the following objectives:
  - (i). To ensure adoption of best affordable technological environmental control measures and implementing them satisfactorily.
  - (ii). Effectiveness of mitigatory measures in mitigation of impacts.
  - (iii). Description of monitoring program of the surrounding environment.
  - (iv). Institutional arrangements to monitor effectively and take suitable corrective steps for implementation of proper EMP.

## 6. LAND USE PATTERN

Mining can lead to soil erosion/cutting and thereby degradation of land, causing loss of properties and degradation of surrounding landscape. Thus for environmental friendly mining the proper control/abatement measures should be followed:

Mineral should be mined out in from the lease area and sufficient safety barrier should be taken during mining.

## **7. AIR ENVIRONMENT MANAGEMENT**

Mitigative measures suggested for air emission control will be based on the baseline ambient air quality situation. From the point of view of maintenance of an acceptable ambient air quality in the cluster area, it is desirable that the air quality needs to be monitored on a regular basis to check it vis-à-vis the NAAQS prescribed by MoEF&CC and in cases of non-compliance, appropriate mitigative measures will be adopted. In order to minimize impacts of mining on air and to maintain it within the prescribed limits of CPCB/ SPCB, an Environmental Management Plan (EMP) should be prepared. This will help in resolving all environmental and ecological issues likely to be caused due to mining in the area.

During the course of mining no toxic substances are released into the atmosphere posing potential threat to health of human beings. In the mining activities, the source of gaseous emissions is engines of vehicles, Operation of mining machinery/ loading operations, drilling and blasting. The reasons may be quality of fuel, improper operation of the engine, etc; proper maintenance of engines will improve combustion process and brings reduction in pollution.

## **8. Control of Gaseous Pollution**

In mining activities, the main source of gaseous emissions is from blasting and the engines of Heavy earth moving machines (HEMM). Blasting of explosive results in increase of nitrogen oxides, which are dispersed by the wind. Controlled blasting and optimization of use of explosive energy will help in reducing the above emissions. The emissions from the diesel engines of the machinery can be controlled by proper maintenance and monitoring of machines.

## **9. Control of Dust Pollution**

The main pollutant in air is PM<sub>10</sub>, which is generated due to various mining activities. However to reduce the impact of dust pollution the following steps should be taken during various mining activities.

### **a) During drilling operations**

- (i). Sharp drill bits should be used for drilling and regrinding is done periodically to reduce generation of dust.
- (ii). The drill machines will be kept leakage free and equipped with wet drilling arrangements.
- (iii). Drill operator and his helper will be equipped with personal protective equipment (ear plugs/ear muffs).

### **b) During loading operation**

- (i). Care to reduce dust emission during loading operations.
- (ii). Skilled operators to operate excavators.
- (iii). Avoid overloading of trucks and consequent spillage on the roads.

### **c) During Transport operation**

- (i). All the haulage roads including the main ramp be kept wide, leveled, compacted and properly maintained and watered regularly during the shift operation to prevent generation of dust due to movement of dumpers, and other vehicles.
- (ii). Mineral carrying trucks should be effectively covered by Tarpaulin to avoid escape of fines to atmosphere.
- (iii). Regular Compaction and grading of haul roads to clear accumulation of loose material.
- (iv). Air quality should be regularly monitored both in the core zone and the buffer zone.

**c) Plantation work carried out**

In order to reduce air pollution in the surroundings, green belt will be developed around mines / cluster, mine approach road.

**d) Monitoring of air pollution**

Periodic air quality survey in cluster will be carried out to monitor the changes consequent upon mining activities as per the norms of State Pollution Control Board.

**10. NOISE AND VIBRATION ENVIRONMENT**

The ambient noise level monitoring carried out in and around the mine lease area /cluster to assess that ambient noise levels are well within the stipulated limits of MoEF&CC.

Noise pollution due to drilling, blasting & transportation will cause some problem to the inhabitants of this area if there is human settlement in close proximity to the link roads in lease area. Effective steps should be taken to keep the noise level well below the DGMS prescribed limit of 85 dBA.

**Noise Abatement and Control**

- (i). All the machineries including transport vehicles will be properly maintained to minimize generation of noise.
- (ii). Dense plantation in mining area will also reduce propagation of noise outside the core zone.
- (iii). Rock breakers will be used instead of secondary blasting.
- (iv). Blasting will be avoided under unfavorable atmospheric conditions
- (v). Periodical monitoring of noise will be done to adopt corrective actions wherever needed.
- (vi). Plantation will be taken up along the approach roads. The plantation minimizes propagation of noise and also arrests dust.

**Vibration Abatement (If blasting is done)**

The blasting operations in the mine should be carried out by deep hole drilling and blasting using delay detonators, which reduce the ground vibrations. Further, the ground vibrations will be controlled by using shock tubes with nonelectric delay detonators. The measures that are generally followed for abatement of ground vibration, air blast and fly rocks are detailed below:

- (i). Blasting to be performed strictly as per the guidelines specified under MMR,1961;
- (ii). Proper design of blast with correct spacing, burden and optimum charge/delay;
- (iii). Supervision of drilling and blasting operations to ensure blast design geometry as per planning;
- (iv). Sub-drilling will be kept adequate to eliminate toe formation;
- (v). Blasting operations will be carried out only during day time as per DGMS guidelines;
- (vi). Proper warning signals will be used;
- (vii). Adequate safe distance from habitation as per standards from centre of blasting be maintained;
- (viii). Drilling parameters like burden, depth, diameter and spacing will be properly designed to ensure proper blast;
- (ix). Effective stemming of the explosives be done in the drill holes.

**11. WATER MANAGEMENT**

There will be no wastewater generation from the mining operations. Only wastewater generation will be sanitary wastewater, which will be treated in septic tank followed by subsurface dispersion.

### **Surface Water Management**

- (i). If surface water source exists in lease area or cluster, impact of mining on same should be envisaged and protective measures suggested.
- (ii). Proper mitigative measures will be taken up to control the pollutants within prescribed standards and limiting the emissions to site only.
- (iii). Garland drains will be provided to prevent the entry of rainwater into the mining pit.

### **Ground Water Management**

- (i). Mining should not intersect the ground water table of the area.
- (ii). Natural pits will be used for rainwater conservation and harvesting.
- (iii). Rain water harvesting practices shall be done which will lead to ground water recharge.
- (iv). At the end of the life of mine artificial water reservoir should be proposed in mining plan

### **Water Conservation**

The project do not consume any process water except for drinking, dust suppression and plantation. Plantation is proposed, which will increase the water holding capacity and help in recharging of ground water. Artificial rainwater harvesting is proposed for the present project.

## **12. SOLID WASTE AND TOP SOIL MANAGEMENT**

### **Waste Management**

Management of Over Burden Dump be given

### **Top Soil Management**

The top soil occurs be first removed manually or by dozer and it will be stored separately. The top soil that has been extracted from the mine area should be used in plantation.

## **13. GREEN BELT DEVELOPMENT**

The green belt in the lease area be developed taking into consideration the availability of area as the efficiency of green belt in pollution control mainly depends on tree species, its width, distance from pollution sources, side of the habitat from working place and tree height. The proposed green belt should be designed to control PM<sub>10</sub>, gaseous pollutants, noise, surface run off and soil erosion etc. While considering the above aspects due care should be taken for selecting the suitable characteristics plant species such as fast growing, locally suitable plant species, resistant to specific pollutant and those which would maintain the regional ecological balance, soil and hydrological conditions.

### **Plantation Program**

Under the afforestation plan, plantation in nearby villages and connecting roads be undertaken. The implementation for development of greenbelt will be of paramount importance as it will not only add up as an aesthetic feature but will also act as a pollution sink. The species to be grown in the areas should be dust tolerant and fast growing species so that a permanent greenbelt is created. Plantation in the barrier zone and roads is necessary as these areas will contain fine particulates resulting from mining operation and vehicle movement Plantation will also be carried out as social forestry programme in village, school and the areas allocated by the Panchayat/State authorities. Native plants like Neem, Peepal, Khejri and other local species will be planted. A suitable

combination of trees that can grow fast and also have good leaf cover shall be adopted to develop the greenbelt.

#### Plan for Afforestation

Year	Saplings	Survival (@ 70%)	Species	Place of Plantation
I			Neem, Khejari, Imli, Bel, Ashok, Amaltas, Babool and Mango etc. as per soil condition	Nearby area of the School, at the Dump, at the govt. waste land provided by the Govt., at Own Private Land and nearby State Highway road
II				
III				
IV				
V				

#### List of Species for Greenbelt Development

S.No.	Scientific Name	Common Name	Type	Effective in Control
1.	<i>Azadirachta indica</i>	Neem	Tree	Dust, air pollution, noise pollution
2.	<i>Prosopis cineraria</i>	Khejari	Tree	Air Pollution
3.	<i>Tamarindus indica</i>	Imli	Tree	Air Pollution
4.	<i>Aegle marmelos</i>	Bel	Tree	Air Pollution, noise pollution
5.	<i>Polyalthia longifolia</i>	Ashok	Tree	Dust, Air pollution
6.	<i>Cassia fistula</i>	Amaltas	Tree	Dust
7.	<i>Acacia nilotica</i>	Babool	Tree	Air pollution
8.	<i>Mangifera indica</i>	Mango	Tree	Dust, air pollution, noise pollution

Source: Guidelines for Greenbelt Development, CPCB, March, 2000.

## 14. SOCIO-ECONOMIC ENVIRONMENT

### Management Plan for Socio-Economic Environment

- (i). In general, socio-economic environment will have positive impact due to the mining project in the area.
- (ii). The deployed laborers will be from nearby villages only as these people are mainly dependent upon such mining activities.

## 15. OCCUPATIONAL HEALTH AND SAFETY

Occupational Health and Safety are important. Periodic assessment of it will be useful. Identifying workplace hazards, assessing risks to employee health and safety, are important. Health and Safety points are also important in many of the environmental aspects of the workplace.

### Occupational Health and Safety works

- (i). The collection of sample of minor minerals from the Stone mine to analyse that it does not cause any occupational ill effects.
- (ii). Except dust generation there is no source which can show a probability for health related diseases and proper dust suppression will control dust generation and dispersion.
- (iii). Dust masks be provided to the workers working in the dust prone areas as additional personal protective equipment.
- (iv). The occupational health hazards have so far not been reported.
- (v). Awareness program be conducted about likely occupational health hazards so as to have preventive action in place.
- (vi). Any workers health related problem be properly addressed.
- (vii). Periodical medical checkup be conducted.

- (viii). Promote occupational health and safety within workers in mine and develop safer and healthier ways of working;
- (ix). Help supervise the investigation of accidents and unsafe working conditions, study possible causes and recommend remedial action;
- (x). Develop and implement training sessions for management, supervisors and workers on health and safety practices and legislation;
- (xi). Coordinate emergency procedures, mine rescues, fire fighting and first aid crews;

**Budget for Occupational Health and Safety of the workers (Lakhs)**

Items	Capital Cost	Recurring Cost
Measures to Prevent Accidents during mining		
Measures to Prevent Accidents during minerals Transportation.		
Measures to Prevent Accidents due to Trucks/ Dumpers etc.		
Measures to Prevent Dangerous Incidents during Inundation		
Education awareness and first aid kit		
Medical Examination Schedule		
<b>Total</b>		

**16. COST OF EMP MEASURES**

Following provisions are proposed to be taken for improving, control and monitoring of environment protection measures.

**Budget for EMP**

S. No.	Particulars	Capital Cost (Lakh)	Recurring Cost (Lakh)
1.	Pollution monitoring – Air, Water, Noise and Soil		
2.	Dust Suppression		
3.	Wire fencing at plantation sites		
4.	Plantation including maintenance		
5.	Rainwater harvesting		
6.	Haul road and other roads repair and maintenance		
<b>Total</b>			

**17. SUMMARY**

As per above discussion there is no major impact on the environment due to mining except fugitive emission in the form of dust generated during handling and loading of mineral. The adequate preventive measures will be adopted to contain the various pollutants within permissible limits. Plantation development will be carried out in the mine premises, along the approach roads, around Govt. buildings, schools approx ..... trees per year. It will prove an effective pollution mitigate technique, and help avoid soil erosion during monsoon season. Employment opportunities will be provided to the locals as extraction of minerals from the mine site is an important prevailing occupation for them for their livelihood. A budget of **Rs. ----- Lakhs** for Occupational Health and Safety and budget of **Rs. ----- Lakhs** for EMP are proposed for the cluster

*Note: For clusters with very small lease holders, the EMP for the cluster can be prepared by the Mining Department, Environment Department of the State or any other Agency specified by the State. The arrangement for provisioning on account of occupational health, expenses on other works required under EMP and plantations can be organized by the DEIAA with the help of line departments in the district. The implementation of EMP is basic responsibility of the lease holders in the cluster, but in view of the situation that the individual lease holders in some clusters are holding leases as small as 15x30 square meter, the DEIAA can ensure arrangements for effective implementation of EMP using respective line department or other resources available at district level.*