CHAPTER-I
INTRODUCTION

With the present liberalization in the National Mineral Policy, 1993, foreign participation in the mining sectors will likely generate technological and clearer production competition in the mining industry of the country. A recession in the process would naturally hinder the overall economic growth of the country. Mining projects supply basic raw materials to the mineral-based industries, thus influence the country's economy. With the increased awareness of the environmental hazards and issues, global competition, mining projects with committed environmental responsibility and corporate commitment for clearer production will only be able to undertake mining operations in an eco-friendly manner causing least damage to the prevailing environmental conditions.

As per EIA notification dated 14 September, 2006 of MOEF Govt. of India, a pre feasibility Report has to be submitted along with the application for obtaining Terms of reference for obtaining environmental clearance. So, accordingly M/s Sadasiva Tripathy has entrusted the job to Envomin Consultant Pvt. Ltd. for preparation of pre feasibility report of the Khatkurbahal Limestone Mines as the lessee intends exceed the present production level.

The pre feasibility report has been prepared by M/s. Envomin Consultant (pvt.) Ltd. after visiting the area and subsequently collected the primary and secondary data from the approved mining plan as well as other sources.

Brief description of the company and mines

M/s Sadasiva Tripathy is a mining company, located at Rourkela, Orissa having its regd. office at Kolkata carrying out business in excavation of minerals and its trading to local industries and aboard. The Khatkurbahal mines is a mine for exploitation of Limestone and Dolomite mineral is in the village Khatkurbahal, Dist, Sundergarh, Orissa. The lease area over 113.583 hectares was granted for mining of Limestone & Dolomite on 12.07.1994 for a period of twenty (20) years The mining operation in the area has been started in the year 1998 & is continuing with a annual production of

24,000MT both Limestone & Dolomite each . Generally the lime stone and dolomite of the mines is consumed by near by cement and steel industries. Now as demand in the relevant industries has been increased to many folds, the company is unable to supply due to restriction in production capacities of the mine. So the lessee has proposed for enhancement of production up to 70,000MT of Limestone and 30,000MT of Dolomite.

Statutory obligations.

1. Mining lease was granted for a period of twenty years with effect from 12.07.1994.
2. Mining plan and scheme has been approved from Indian Bureau of Mines, Govt. of India vide letter no. CAL/SG/Lst. & Dolo-404 dt.11.04.1996 and MS/OTF.MECH/19-ORI/BHU/2010-11 dt. 10.08.2010 respectively.

CHAPTER-II

DETAILS OF THE LEASE AREA

1. Details of the Area. :

Khatkurbahal lease area over 113.583 hectares was granted for mining of limestone & dolomite on 12.07.1994 for a period of twenty (20) years in favour of M/s Sadasiva Tripathy. The tenure of the lease expired on 12.07.2014. The lease is situated in village Khatkurbahal, P.S. Rajgangpur, Sundergarh Dist. Orissa. Lease plan of the said area is attached as Plate no. -II.

2. Name & address of the Lessee.

M/s Sadasiva Tripathy.
JJ/7, Civil Township
Rourkela-769004
Telephone 0661-2400890

3. Communication and accessibility.

The leasehold can be approached from Kutra town through all weather roads, which is 7km to the south of the ML area. Rajgangpur town is about 18km in the SE direction.

4. Location of the Lease area.

Khatkurbahal mining lease area is located in Rajgangpur P.S. of sundergarh District, Orissa and is a part of Survey of India Toposheet bearing no. 73B/7 on a scale of 1 : 50,000/- within the Latitudes 22^0 16' 41" to 22^0 16' 58" North and Longitudes 84^0 27' 35" to 84^0 28' 54" East.

5. Location Map

Location map showing the buffer zone within the 10km. radius of the lease area with all topography features. Ref Plate no. -I.

CHAPTER-III

GEOLOGY, STRATIGRAPHY AND RESERVE

1. Topography :

The lease area is a flat terrain with gentle to very gentle sloping topography. The highest altitude point (HAP) is 235m. above the mean sea level and the lowest altitude point (LAP) is 227.5m. above mean sea level. Altitude difference between the HAP and LAP is 7.5m., which indicates a very gentle slope.

2. General Geology:

The Limestone and Dolomite deposits in the area belong to "Biramitrapur stage" of Gangpur series of middle Dharwarian age. Dolomite forms the lower member over which the limestone is super imposed; both are associated with mica schistes, phyllites and quartzites. All these rock formations are characteristic rock types of gangpur series and do not occur in the younger Iron-ore series.

The occurrence of calcitic and dolomitic formations in gangpur belt is confined mainly to two zones, the northern and the southern limbs of the east-west trending anticlinorium. The limestone and dolomite formations are sandwitched between the lower mica schists and phylites of kuarmunda stage and upper metapelites of laingar stage. Iron ore series made up of phyllites, slates, lavas and basal conglomerates. The outline of this successions are as follows:

	Raghunathpalli Conglomerate
	----------Shear zone----------
	Mica – schists and phyllites
	Carbonaceons phyllites
	Marble (Calcitic and dolomitic)
Gangpur series	Mica-schists and phyllite
	Carbonaceous quartzites and
	Phyllitic gondaites

	Base not known

3. Local Geology:

The rock-types encountered in this area correspond mainly to Biramitrapur formation of Gangpur Group representing limestone and dolomite only. However, calcareous shale is found to be traced in the central part of the lease hold area. The limestone and dolomite beds are observed to have general east-west trend dipping at an average angle of 65^0 due south, although horizons having low angle (15^0 - 20^0) dip due north are encountered. This is normally due to the presence of asymmetrical folds in both limestone and dolomite horizons. The limestone and dolomite bands are observed to be exposed in the quarry alternatively having same orientation as discussed. In addition some sporadic occurrences of limestone and dolomite are encountered in southern and western parts of the area. A Geological Map is attached as Plate no. – III.

4. Reserve and Life of the Mines:

Geological reserve for proved, probable and possible category has been estimated as per mining plan to be 1,959,207 MT for Limestone and 2,795,057 MT for Dolomite. Mineable reserve of the Limestone and Dolomite in the M.L. area has been estimated to the tune of 1,343,207MT and 1,915,057 MT respectively, which has been taken excluding non mineable due to statutory restriction from geological reserve. Therefore reserve would be depleted within about 20 years & 64 years with the projected annual production of 70,000MT for Limestone and 30,000MT for Dolomite. Therefore anticipated life of the mines would be 64 years.

CHAPTER-IV

MINING

1. Mining process

The mining operations is being carried out in a opencast semi-mechanized method followed by the process such as drilling, blasting, excavation, loading, sizing and transportation on a single shift basis.

Drilling is performed by 32mm dia jack hammer associated with compatible size compressors. Powergel explosive in conjunction with safety fuse & ordinary / electric detonators are used for blasting to loosen hard rock mass for ease in excavation.

Sizing is done manually through hammering. Loading of ore/waste materials in to the tipper is also done manually.

2. Proposed Production

There are four quarries in the ML area. Out of these two namely Q-1 & Q-2 are water filled. Remaining two quarries Q-3 & Q-4 are under active operation and have been planned to work further. The present annual production of Limestone & Dolomite is 24,000 MT /annum each.

The proposed Planning has been made to obtain the limestone upto 70,000 MT/annum which will simultaneously yield dolomite (as an associated economic mineral) upto 30,000 MT/annum. During the proposed 5 years, 256,200 MT limestone and 109,800 MT dolomite will be produced.

During the mining, height and width of the benches will be maintained at 3m each. Slope of individual bench will be maintained at 80^0-85^0 while overall quarry slope angle will be less than 45^0 with the horizontal line.

3. Waste Management

The waste generated from mines shall be dumped in the existing dump south Q-4 in foot wall side which is barren and outside the ultimate pit limit. The dumping site shall be proved barren by putting bore holes. The materials shall be transported to the dumping site by dumpers and tippers. The dump shall be built in three steps covering a height about 30 meters in total over an area of 2.486 hects in the first five years. It will be built by contour filling and strip dumping method. As the dumping of

one strip is completed, the second strip will be carried out, leaving a width all around to maintain stability. Each of the dump of will be properly terraced with 10 mt height. The ultimate dump slope should be maintained at 22 degree with individual 37 degree. Each terrace should have inward slope with catch drains at the inward side of terrace. The catch drains of the individual terrace should be connected to the garland drain out side the periphery of the dump. These catch drains should preferable have half concrete open pipes followed by settling tanks to avoid wash offs. Each terrace have a provision of berms at the outer end to reduce gully formation due to rain water wash offs. The space left between different phase will be covered by top soil for growing plants in these areas. Moreover dump slopes will also be utilized for plantation in order to prevent damage to the dumps by the surface run-off (rain) water.

4. Sub-Grade & Top Soil Management

Limestone & Dolomite raised from the mine is fully dispatched to the consuming industries. Therefore, generation of sub-grade limestone & dolomite is not expected. Top soil generated from the mines will be stacked separately for use of plantation.

5. Drilling & Blasting

Drilling shall be done by Jack hammer 32 mm dia with 1m burden and 1.2m spacing and height would be 1.5m. As per the production of lime stone 70,000 MT per annum and Dolomite 30,000MT per annum, 52 nos of hole required per day. So, three nos of Jack hammer would be used for drilling the materials.

A powder factor 8.0 tonne of ore (limestone or dolomite) per Kg explosive is considered for estimating explosive requirement. However, this may suitably be changed depending upon the type of rock and other site conditions as will be varied from time to time. Powergel explosive of 200 mm long, 125gm weight and 25mm dia will be used as main charge for shot hole blasting. Initiation will be done with the help of detonators and safety fuse. Keeping in view the powder factor of explosives at 8/kg, about 12,500 kg explosive will be required annually for blasting.

An explosive magazine of 425 kg capacity already exists for safe and secure storage of the explosives and to prevent theft & pilferage. So far as proposed production rate is concerned, the existing magazine will be sufficient to cater the required explosive consumption of the mine. A guard house is constructed near the magazine at safe distance to for watch & ward.

6. Transportation

Transportation of Saleable Ore

Saleable limestone & dolomite will be dispatched to the M/s Scan Sponge Iron Limited located near Rajgangpur, district Sundargarh, Orissa and other local consumers. Maximum cumulative production of limestone & dolomite would be 100,200 t per annum or 333t per day. However, only six (6) tippers will be required to transport 33 trips (approximately) to the nearby industries located within 25 km to 50 km radius of the M.L area.

Transportation of Waste

Rate of waste removal per day is 20,650/300 = 69m^3. Since the dump is near the quarry, one 10t capacity tipper will be sufficient for the purpose. Apart from the above, one more truck having water tank is proposed to be used for spraying of water in dumping site, haul roads and working bench faces to control dust pollution.

Type	Size /Capacity	Make	Existing	Proposed
Tipper (for waste removal)	10 T	TATA	1	1
Tipper (for ore transport)	10 T	TATA	--	6
Water Tanker	5000 ltrs	TATA	--	1

7. Employment Potential

Administrative & supervisory personnel will be only 8 numbers which includes statutorily required personnel under MMR, 1961 & MCDR, 1988. A total of 167 workers will be employed in the mine for producing 333t ore/day. The details of above employment are as follows;

Sl. No.	Designation	Qualification	Numbers
1.	Mines Manager	Degree in Mining Engineering with First class certificate of competency	1
2.	Mines Engineer	Degree /Diploma with Second Class certificate of competency	1
3.	Blaster	Blaster certificate of competency	1
4.	Mining mate	Mate's certificate of competency	2
5.	Official staff		3
	Total		**8**

The break up of the labourer requirement is as follows;

Skilled labourer	: 45 no.
Semi-skilled labourer	: 53 no.
Un-skilled labourer	: 69 no.
Total	167 no.

8. CONCEPTUAL MINING UPTO THE END OF THE LEASSE PERIOD

Mineable reserve of the Limestone and Dolomite in the M.L. area has been estimated to the tune of 1,343,207MT and 1,915,057 MT respectively, which has been taken excluding non mineable due to statutory restriction from geological reserve. Therefore reserve would be depleted within about 20 years & 64 years with the projected annual production of 70,000MT for Limestone and 30,000MT for Dolomite. Therefore anticipated life of the mines would be 64 years.

Since the strike of the ore body is in E – W trend dipping due north, expansion of the quarry will be due south leaving 7.5m safety barrier along the northern lease boundary during the period beyond 5 years. Keeping in view the lateral as well as depth ward continuity of ore occurrence, ultimate limit of the quarry has been earmarked. Size of quarry in the lease area will be of the order of 370m x 135m x 30m (max) at the end of life of the mine over an area of 49,950 m^2 or 4.995 hectares.

To keep the ultimate pit slope safe & stable and to mine out the optimum amount of limestone & dolomite height & width of the benches will be kept at 36m each at the time of abandonment. The aforesaid benching will form the ultimate pit slope angle at less the 45^0 with the horizontal. The Conceptual Map is attached as Plate no. – IV.

Reclamation/Rehabilitation

The waste generated in the mines, which will be dumped by extending the existing dump towards south & west. Top soil, which is fertile in nature, will be scrapped of during mining and stacked suitably for future utilization. Top soil and cow dung will be spread on the top of the waste dump and plantation will be undertaken. Since the waste materials available for back-filling is not sufficient, mined out/exhausted area over 8.675 hectares will be used as water reservoir for irrigation after land scapping and development of final land from in and around it.

Afforestation

A total of 2,240 saplings such as Mango, Jack-fruit, Neem, Tamarind etc will be planted in the virgin area over 1.400 hectares conceptually. Similar type of saplings is also to be planted in the rehabilitated waste dump area of 2.486 hectares. Cumulatively, there will be plantation of 6,218 saplings over 3.886 hectares on behalf of the lessee in the lease area due to this ongoing mining project.

Utmost care will be taken to ensure the survival & growth of existing tress in the area and drought resistant & fast growing local saplings will be planted in the above no-tree land to form a comprehensive green belt.

Land Degradation / Utilization

An area of 10.747 hectares land is already degraded/ utilized for mining, dumping, office, road etc. Cumulatively, an area of 17.152 hectares is anticipated to be degraded/ utilized at the end of the conceptual planning period. However, the phase wise land use is supposed to be as follows :

Sl. No.	Type of land use	As at present (ha)	As at the end of scheme period (ha)	As at the end of life of mine (ha)
1	2	3	4	5
1	Area under excavation	6.602	7.852	9.642
2.	Storage for Topsoil	---	0.179	0.179
3.	Overburden dump	0.450	1.130	2.486
4.	Mineral storage	0.555	0.555	0.555
5.	Infrastructure (workshop, office, rest shed, magazine etc.	0.158	0.158	0.158
6.	Road	2.722	2.722	2.722
7.	Railways	---	---	---
8.	Green belt	0.250	0.700	1.400
9.	Tailing Pond	---	---	---
10.	Effluent Treatment Plant	---	---	---
11.	Mineral Separation Plant	---	---	---
12.	Township area	---	---	---
13.	Others	0.010	0.010	0.010
---	**Sub-Total**	**10.747**	**13.306**	**17.152**
14	Area which remains untouched	102.836	100.277	96.431
---	**Total lease area**	**113.583**	**113.583**	**113.583**

CHAPTER-V

USE OF MINERAL & BENEFICATION

USE OF MINERALS

Limestone & Dolomite produced from the mine is/will be utilized in its associate steel plant of M/s Scan Steel Ltd, Rajgangpur. In addition to this, Lessee also supplies the limestone & dolomite to the nearby consumers such as Konark Chrome Chemicals, Chariot Cement Ltd, Godadia Chemicals etc.

Limestone & dolomite was used mainly for production of cement and in metallurgical industries. Therefore, generation of sub-grade limestone & dolomite is not expected.

Dolomitic Lime Stone :- The average grade of Limestone in the area shows 36.2% Cao. The quality of marketable ores of different industries can be achieved through manual sorting,sizing and blending

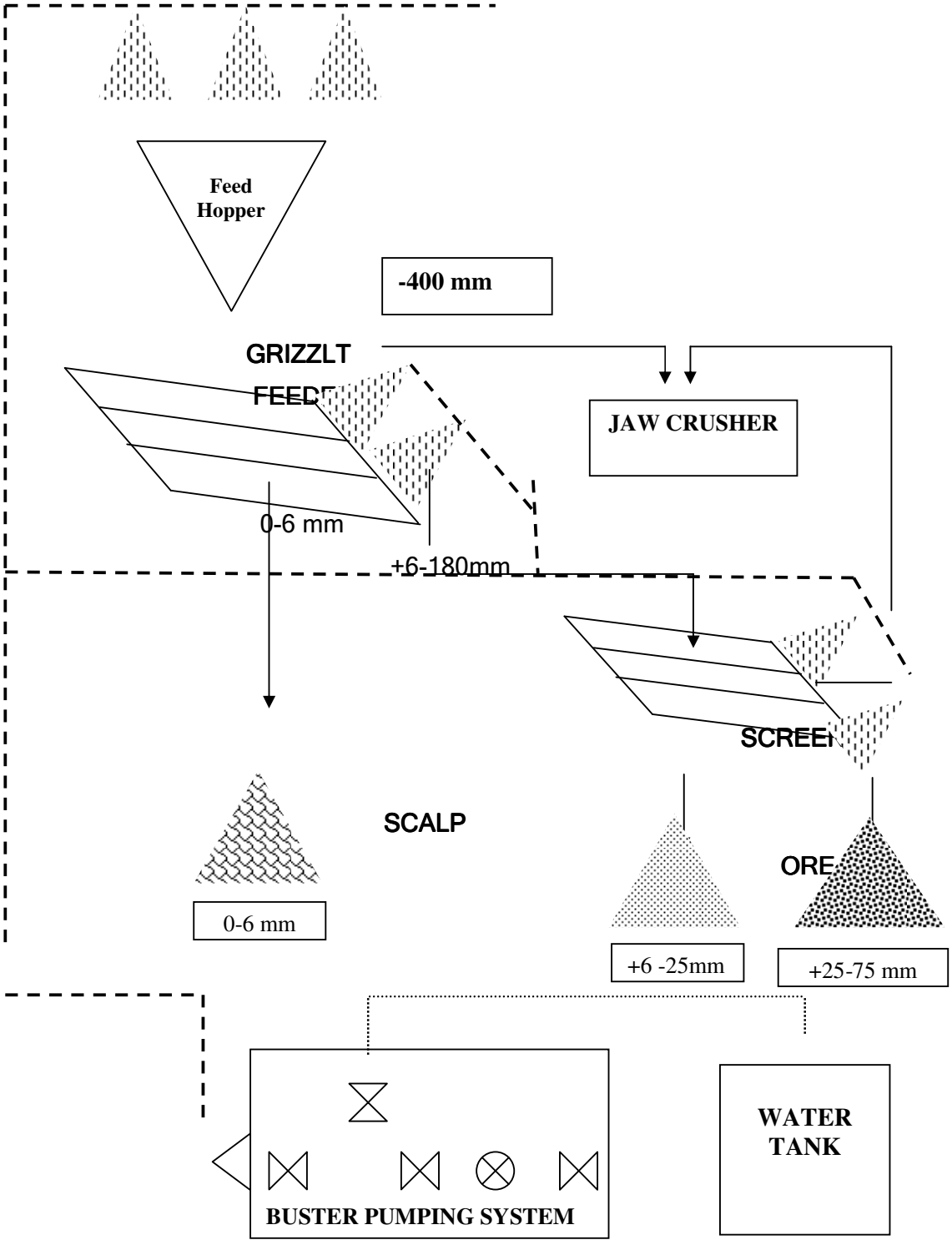
Dolomite :- It is observed that the average grade of dolomite shows MgO content to be 18% above. However, there do also occur patches of dolomite below 18% MgO, which can be up-graded by blending. Hand sorting and sizing are only required to beneficiate the ore required for various consuming industries.

Results of Beneficiation

A 40 MTPH crushing unit consisting of gyratory crusher with associated belts, screens etc to be established in virgin (un-worked) and barren (non-agriculture & no-ore bearing) land. The details of the crushing flowchart is given as Fig. A:

*	Capacity	:	40 tonnes per hour
*	Feed size	:	up to 400mm
*	Product	:	(a)Size = (+)6 to (-)25 mm & (+)25 to (-) 75mm
		:	Generation = 80% of feed
		:	Size (-) 6 mm
		:	Generation = 20% of feed
*	Daily Working hours	:	4 to 6 hours
*	Bottlenecks	:	(a) Irregular availability of electricity
			(b) Voltage fluctuation
			(c) Poor duration of power availability

CRUSHING PROCESS FLOW CHART



CHAPTER-VI

ENVIRONMENT MANAGEMENT PLAN

1.0 Present Baseline Informations

Khatkurbahal Limestone & Dolomite Mines covering 113.583 hectares of Non-Forest area is located in village Khatkurbahal, Kulenbahal & Jauramunda under Rajgangpur Tehsil of Sundargarh district, Orissa.

➲ CLIMATE

The area experiences subtropical dry to wet. Summer starts from March to May and monsoon from June to September. May is the hottest month and December to January is colder months.

➲ RAIN FALL

The average annual rainfall of past ten years in Sundergarh district recorded is 1238.3 mm. On an average 83 % of rainfall is received during the monsoon season (i.e. July to September).

➲ TEMPERATURE & HUMIDITY

The annual maximum temperature varies from 28.4^0 C (January) to 43.6^0 C (May) while the annual average minimum temperature varies from 14.4^0C (December) to 29.5^0C (May).

➲ WIND SPEED & DIRECTION

Wind direction and speed are most impact factors for the transportation of dusts. Maximum wind speeds is around 16 Km/hr. Predominant wind direction is S, SSW & NE.

- AIR ENVIRONMENT

Air quality within the lease hold shows slightly high concentration of PM10 & PM2.5 particles i.e. to the tune of 80-90 µgm/m3 & 40-50 µgm/m3 in 24 hours average basis. In the buffer zone their concentration is significantly low.

- NOISE ENVIRONMENT

Various activities such as Vehicular movements, Sizing etc. contribute to noise in the core zone. In the core zone during the day time it is around 60dB(A) whereas in buffer zone it is around 45dB(A).

- SOIL ENVIRONMENT

The thickness of soil is thin. It is in general reddish grey with some clay percentage. The presence of organic carbon, N, P, K, good water holding capacity of the top soil indicates that it will support plant growth.

- WATER ENVIRONMENT

The project area is having gentle topography and better permeability. The depth of water level below ground level varies depending on the local topography, geology & hydrological conditions. There is no perennial nala in the lease area There exist the upper part of of Jharia Nala in the northwestern side of the lease area, which remain dry during lean season and flows due north-east which is the tributary to Sankh river.

- LOCAL ECOLOGY

By and large, the major part of the core zone i.e, mine area and mine installation areas have mostly devoid of any original vegetation cover. Only a few scattered remnants were found along roadsides, wastelands, scrub land and in and around villages. The buffer zone has Sal forest, mixed forest, degraded forest, extensive plantation and open grazing areas.

The lease area does not form a part of any Forest area, National Park, wildlife Sanctuary or Biosphere Reserve. Few Rat, Squirrel, Cuckoo, Crow are seen in the core zone.

2.0 Proposed Management Plan

➲ MEASURES FOR CONTROLLING AIR POLLUTION

Ψ Regular water spraying will be done on haul roads, waste dumps and maintaining

Ψ Approach roads to suppress the dust & as per practice.

Ψ Over loading of transport equipment should be prevented in order to stop spillage.

Ψ Peripheral plantation around ML area, Quarry and over burden dump.

Ψ Water spraying in the ore stack yard will prevent air borne dust.

➲ MEASURES FOR CONTROLLING WATER POLLUTION

Ψ Check dams will be provided around the overburden dump site to arrest flow of loose sediments before discharge into the drainage system of the region.

Ψ Construction of garland drain around quarry, waste dump yard etc.

Ψ Drains will be cleaned up periodically.

Ψ Ground water table is already punctured. Effluent water from the quarry will be pumped and discharged to the adjacent garland drains, after suitable treatment. Then the mines discharge water will be allowed to drain out side the project area.

➲ SOLID WASTE MANAGEMENT

Ψ Dumps will be planned in such a way so as to cause no interference to the forest area and cultivated land.

Ψ Garland drains (diversion ditches) will be built to avoid water from outside entering into or becoming pounded against overburden dump.

Ψ There will be settling tanks connected to garland drains so that fine sands & heavy particles coming with water will settle down and clear water is reused.

Ψ Contour trenches will be made on overburden dumps to control surface runoff & subsequent erosion.

Ψ Grasses will be planted over the dump.

➲ NOISE POLLUTION CONTROL

Ψ Proper maintenance of noise generating machinery including transporting vehicles would be ensured.

Ψ A thick tree belt shall be provided around the periphery of mine to screen the noise and mine village divide.

Ψ Reducing the exposure time of workers wherever required.

➲ OCCUPATIONAL SAFETY AND HEALTH

Ψ Periodical medical examination of all workers by medical specialists shall be conducted.

- Ψ Regular maintenance and testing of all mining equipment as per manufacturer's guidelines.
- Ψ All safety measures like use of safety appliances, safety training, safety awards, posters, slogans related to safety etc.
- Ψ Training of employees for use of safety appliances and first aid

CHAPTER-VII
CONCLUSION

The reserve of the mine is computed to be 1,343,207 MT of Limestone and 1,915,057 MT of Dolomite whereas the annual production of the mines is proposed to be 70,000 MT/annum of Limestone and 30,000 MT/annum of Dolomite. Therefore reserve would be depleted within about 20 years & 64 years for Limestone and Dolomite respectively. Hence, life of the mine is considered to be 64years, unless the production rate is altered or new reserve is explored.

If the production is continued in the mines, the annual sale value shall be around

Rs 500 .00 X 70,000 MT of Limestone = Rs 3,50,00,000.00 /annum from Limestone

Rs 500.00 X 30,000 MT of Dolomite = Rs 1,50,00,000.00 /annum from Dolomite

Total = Rs 5,00,00,000.00 /annum or say Rs 5crores

The total benefit tot eh economy would be around Rs 100crores taking total economical value of the entire reserve. The state govt. shall be benefited in the form of royalty & sales tax, which is more than Rs 10crores as a whole.

Besides to the above the mine shall give direct employment to 167 people and indirectly to more than 300 mostly from economically backward classes. If the mine continues, the allied activities like improvement of village roads, repairing of schools & health centres, improvement in education & health facilities.

The project shall be carried out in a sustainable way with a target to develop human and environment together with a eco-friendly mining method. Overall it will have not any adverse impacts on any of the environmental or socio-economic parameters.