

EXECUTIVE SUMMARY

1. PREAMBLE

M/s S. N. Sunderson & Company is partner concern owned by Shri Anil kumar Jauhar. The concern is engaged in mining activity for Lime Stone at Village Badari, Tehsil Vijayraghogarh District Katni in the state of Madhya Pradesh. The mining lease was earlier sanctioned upto 02-04-1998 or mineral of limestone. The lease area is being worked under deemed renewal period. The project envisages forward mining activity for Lime Stone ore at mine area of 5.82 hectare at Village Badari at district Katni, MP for the anticipated production of ores by 50000 MT per Annum of Lime Stone.

In order to assess the likely impacts on environment due to ongoing mining activity and to have a tool of environment management, M/s S. N. Sunderson & Company has submitted the Rapid Environment Impact Assessment study report for mining project and summary of the same report is being submitted for the purpose of public hearing.

2. LOCATION

The mining area is located in village Badari, Tehsil Vijayraghogarh at district Katni, Madhya Pradesh located on Toposheet no. 63 D/12 by the following coordinates:

Latitude 23°59' to 24°30' N

Longitude 80°30' to 80°37' E

3. TRANSPORT

The applied are is located at a distance of 31 km north east of Katni and approachable from Katni on National Highway upto Jukehi (18km) and then turning right on Jukehi-Kymore PWD Road upto 13km. The lease area can also be approached by regular buses plying between Katni and Kymore via Jukehi upto Badari.

The nearest railway station is Jukehi at 13km distance falling under Itarsi – Allahabad BG section of Central Railway.

4. REASON FOR ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

The impact of mine on the environment depends to a large extent on its location with respect to Human settlements, meteorological conditions, ambient air quality, water bodies, agricultural and forest land etc.

Most of the adverse impacts of mines are amenable to technological control by providing necessary preventive and control measures and finally through effective environmental management of the operating mines. Keeping in view the likely impacts of mines on environment, this Rapid Environment Impact Assessment Report has been prepared for submission to State Pollution Control Board and Ministry for Environment and Forests (MoEF) for clearance of the mining area in operation.

5. PROJECT DESCRIPTION

5.1 Topography

The lease area is almost flat having general slope towards south. The highest elevation is 380m AMSL in North direction and lowest elevation is 374.10m AMSL towards south.

5.2 Silent Feature of the Mine

Out of total lease area of 5.82 Ha, area of 5.02 Ha mined for limestone. Details of conceptual mining plan of the lease area are given below:

Silent Feature of Mine

S. No.	Particular	Details
1	Total Lease Area	5.82 Ha
2.	Address of the lease area	Village – Badari Tehsil- Vijayraghogarh District- Katni
3	Area worked out so far Limestone (existing)	3.0 Ha
4	Existing dumps	0.50 Ha out side of lease area
5	Area to be developed for mining of Lime Stone in the lease period	2.02 Ha
6.	Area occupied by soil dumps in five years	0.35 ha out side of lease area
	Soil dumps in the lease period for	Nil

	Lime Stone	
7.	Mine waste dumps 20% in first Five years period for Lime Stone Mine waste dumps 20% in lease period for Lime Stone	0.7 Ha Nil
8	Area to be reclaimed in five years	Nil
9	Area to be reclaimed in lease period	3.07 Ha
10	Area covered by the proposed plantation in five years	0.08 Ha (Total no. 50)
11	Area covered by the proposed plantation in lease period	0.85 Ha
12	Existing plantation	0.1 Ha
13	Area covered by the existing site services including roads	0.70 Ha
14	Total un-worked area at the end of lease period	Nil
15	Present Working Depth Ultimate Working Depth	20m (360 AMSL) 38 m (342AMSL)
16	Water Table Pre Monsoon Post Monsoon	15-17 m (365-363 AMSL) 4-10 m (376-370AMSL)

5.3 Reserves

	Limestone
Geological reserve Proved category	1879635 T
Mineable reserve	734700 T

5.4 Anticipated Life of the Mine

Anticipated life of the mine will be obtained by computing the life of the mine by considering the proposed rate of production when the mine is fully developed and production for next years. It is estimated that 50000 MT per Annum of Lime Stone per annum production will be taken after complete development of mine. Almost whole of the mineable area is broken except a patch in south. The life of the mine is expected at end of envisaged lease period i.e. year 2018.

5.5 Mining Method

Opencast manual method of mining will be adopted as done in the past. The presence of bedding planes several sets of joints and fractures and cavities are added advantage for opencast manual method. The mine has been developed in 4 to 6 benches. The height of the benches is on average 6m while it varies from 1.5m to 11m. The width of the bench varies from 2m to 30m.

5.6 Proposed Rate of Production

It will be about 50000 MT per Annum of Lime Stone of saleable ore for full year after complete development of the mines.

5.7 Present rate of Production

(1) Production detail of last 5 years

Years	Production (MT) Lime Stone
2001-02	6486.32
2002-03	4097.95
2003-04	5504.25
2004-05	7158.75
2005-06	21768.9

(2) Production detail for Next Five Years

Years	Production (MT) Lime Stone
2006-07	50000
2007-08	50000
2008-09	50000
2009-10	50000
2010-11	50000

5.8 Loading

Loading of ore has been done manually to the trolley/trucks and has been sending to the end users. The overburden has been removed and stacked in a place in the surface. Subsequently it has been manually loaded to the tipper for onward dumping to the predetermined space in the lease boundary.

5.9 Hauling/Transport

The ore has been transported to the sorting yards by means of tubs on tracks.

5.10 Broad Blasting Parameters

As stated earlier that blasting is not required for the block mining of the Dolomite; however considering the massive nature of the applied are of lime stone, blasting is required on regular basis.

Broad Blasting Parameters

Burden	:	0.8 m
Spacing	:	1.0 m
Depth of drill hole	:	1.5 m
Type of explosive to be used		
Gun Powder with ordinary/electric detonator and Safety fuse has been used.		
Diameter of blast hole	:	32mm
No. of holes in a row	:	10nos.
Quantity of explosive/hole	:	350 gm

5.11 Mine Drainage

The ground water table in the lease area varies from 363m to 365m and mining will be done upto 342mRL, hence ground water table will be affected. The water seeps into the ground through different water channels. The behaviour of ground water table has been noticed to be uniform. Pump test also indicate very poor recharge even in post monsoon period. Thus the mining activity does not affect the existing GWL in view of small scale of mining. In view of heavy rain and future seepage of water expected the lessee will be maintained by continuous dewatering by using 60 HP pump. The discharged water will be provided a settling tank for settling of suspended solid and then it will be utilised for agricultural use in the nearby area. The settling tank is proposed along with western boundary of the area. The accumulated water in the developed pit during the rainy season will be used for green belt development.

5.12 Solid Waste

During the first five year 8567 cum top soil will be generated, which will be dumped in out side of the lease area. The mine waste (OB) from lime stone mining is estimated to be generated about 29278 cum during first five year, which will be dumped in outside of the lease area. It is estimated that total 2.5 lacs ton wastes will be generated in the lease period. At about 2.72 lacs tones of solid waste generated till date. Out of 5.82 Ha, 5.02 Ha work out for lime stone in lease period. Hence 0.85 Ha will be un-worked area at the end of lease period. Out of excavated area, 3.07 Ha areas will be reclaimed at the end of lease period while green belt will be developed over 0.85 Ha areas. Rest of the 1.90 ha area at the end of lease period will be left as Pond.

5.13 Source Requirement

The present proposal is to carry out mining for Limestone at Village Badari Tehsil Vijayraghgarh Dist Katni, and MP. For efficient operation of the Mines all necessary utilities will be made available, a brief description of the same is given below:

5.13.1 Storage facility

M/s S. N. Sunderson & Company has already provided adequate storage facilities for the excavated mineral, explosives, which is generated/ used during mining process. Proposed excavated minerals and waste dumps will be kept in the barrier zone of existing mining lease area.

5.13.2 Project Cost

Details of expenditure of the Mining project

Project	Estimated Cost in Rupees
Mining of Limestone	Rs. 1.3 lacs

5.13.3 Electric System

The power requirement for the project has been met by Madhya Pradesh Electricity Board.

5.13.4 Water Supply

Water is required for mining operation/establishment mainly for suppression of dust. The total quantity of water will be used per day is about 8 m³/day (10000KL/day) for the domestic purposes. This quantity of water will be taken from the ground water. Out of 1000 lit, 500 lit of the water will be generated as domestic waste water which will be given the soak pit arrangement. Rest of the volume will used for dust suppression at haulage road, and green belt development. Further it is also explained that the accumulated water in the pit during the rainy season has also been used for agricultural and horticultural purposes after giving settling treatment to the suspended solids. The details of water balance of existing /proposed mining project are given below:

WATER BALANCE OF MINING PROJECT

Use	Minimum in KL	Maxiumum in KL
1) For Mine		

Dust suppression	6.0	7.0
For Green Belt Development	1.0	1.5
2) Domestic use		
Drinking and Domestic	1.0	1.0
Total	8.0	9.5
3) Waste water		
From Domestic	0.5	0.5

5.14 Implementation Period

This is the case of working mine having lease period from 1998 to 2018, but presently lease is under renewal because mine lease sectioned in year 1978.

6. EXISTING ENVIRONMENT SCENARIO

6.1 Environmental Setting of the Project

5.82 hectares of mining lease area is located at Khasara numbers 81 and 86 Village Badari Tehsil Vihayraghogarh, Dist Katni (MP). Nearest railway station is Jukehi is about 13 kms on Katni-Jabalpur section of West Central Railway. Katni is nearest city which is located at about 31km in South West of the applied area. Village Badari is almost 2.0km away at south direction from the lease area. The primary site details are as below:

DETAILS OF PROJECT SETTINGS

S.no	Particulars	Details
1	Latitude	23°59' to 24°30'N
2	Longitude	80°30' to 80°37' E
3	Height above mean sea level	374.10 - 380 m
4	Nearest Village	Badari - 2.0km
5	Nearest Railway Station	Jukehi (13 km)
6	Nearest Airport	Jabalpur

7	Nearest Highway	National Highway no. NH-7 Jabalpur- Katni
9.	Nearest Hospital	Amehta
10.	Near Post Office	Amehta
11	Hills/Valley	Kymore
12	Ecological Sensitive Zone	No
13	Historical Place	Nil
14	Reserve Forest	Surma Reserve Forest -5.0 km Banjari Reserve Forest – 6.5 km
15	Nearest River	Mahanadi river- 7 km - SE
16	Annual Climatic Conditions	Max. Temperature – 47.6°C Min ^m Temperature – 4.1 °C Average Rainfall–1168 mm
17.	Toposheet No.	63 D/12
18.	List of Near by Industries/mines	Nanwara mine, Amehta Mine
18.	Name/ Distance of Villages in core zone	Nil

6.2 Climate

The climate of the region is characteristically dry except in the monsoon season. All the three seasons are distinct. The summer season extends from February to June, till the onset of Monsoon. Rains are received from mid June to Mid September and winter season extends from October to January. The area receives an average annual rainfall of 1168 mm. The maximum rainfall is received through south-west monsoon during June to August.

6.2.1 Rainfall

The rainfall in the study area can be termed as moderate the southern and south eastern parts of the district receives more rainfall as compared to the rest of the district. As much as 95% of the annual rainfall received in the district can be attributed to the south-west monsoon. The month of August receives maximum rainfall than other months.

6.2.2 Temperature

Temperature reaches a minimum in the month of January. The climate is tropical. Month of May and June are the hottest months. The temperature in May reach as high as 47.6°C. The data is based on records of observation in the Indian Meteorological Department, Nagpur. After February, a steady rise

in temperature is observed. The onset of south-west monsoon sees an appreciable drop in temperature. January is the coldest month and the minimum temperature of 4.0°C has been recorded in this month.

6.2.3 Relative Humidity

The humidity levels are exceedingly high during monsoon months otherwise the air is generally dry over the entire district. The maximum humidity in the study area was found to be as high as 99%, the minimum humidity was found to be 5%.

6.2.4 Wind Pattern

During the study period the predominant wind direction was from S & SE direction in the morning and from NW & N direction in evening time. The average wind speed is 4.28 Km/h. The data is based on Regional Meteorological Department, Nagpur for wind speed and wind direction.

6.3 Air Quality

To establish the ambient air quality, sampling and testing were conducted. Air sampling stations were established at Eight (8) locations around the mining area to assess the background air pollution levels.

COMPARISON OF AIR SAMPLING RESULTS WITH CPCB NORMS

	A1	A2	A3	A4	A5	A6	A7	A-8	CPCB Norms	
									Industrial & mixed Area	Residential and Rural area
SPM Concentration										
Minimum	142	121	124	144	131	103	147	128		
Maximum	258	218	187	272	195	198	238	254	500	200
Avg.	187.1	168.8	162.6	192	169.6	162.16	180.4	193.73		
RPM Concentration										
Minimum	46	52	38	64	47	54	52	42		
Maximum	98	104	83	96	87	89	93	128	150	100
Avg.	74.5	73	66.75	80.5	67	70	71.1	88.8		
SO₂ Concentration										
Minimum	11.1	8.2	8.6	9.6	8.6	9.1	10.4	9.9		
Maximum	16.6	16.2	13.9	17.9	14.4	13.8	16.4	17.8	120	80
Avg.	13.7	13.4	10.8	14.9	12.0	11.25	13.6	13.3		
NO_x Concentration										
Minimum	14.4	13.5	12.3	15.2	12.9	12.9	13.3	13.2		
Maximum	18.7	18.2	17.3	19.8	18.2	17.3	18.9	19.2	120	80
Avg.	16.9	16.9	15.07	17.8	15.5	14.7	16.6	16		

6.4 Noise Level

Ambient noise levels were measured at different locations (same as ambient air monitoring locations for two days on hourly basis) to establish present scenario which shall be described as follows.

- All the values are well within the norms prescribed by CPCB for industrial and commercial area.
- Main source of noise are traffic movements.

S. No.	Location	(Day) Leq	(Night) Leq.
1	Badari	47.43	35.75
2	Amheta	44.8	36.12
3	Nanwara Kalan	45.63	34.8
4	Mahagaon	58.3	35.75
5	Vijayraghogarh	53.5	35
6	Barigawan	64.25	34.75
7.	Near DAV school	61.75	35
8	Near Office	65.5	35.12

Units are in dB(A) Leq.

6.5 Water Quality

6.5.1 Surface Water

There is no major river within the core zone and Mahanadi River in south east direction of the buffer zone of mining lease area. Water quality assessment of surface water sources was carried out within the area of buffer zone. Sampling of pond water of the village was carried out to analysis the surface water. The data conform to the water quality standards for most of the parameters. The dissolved oxygen levels range 6.1 to 7.3 mg/l, Total Hardness ranges 242 to 294 mg/l, MPN levels are as low 10 no. The heavy metal content has been observed within the limit. The physico-chemical and biological analysis revealed that all the parameters are well within the prescribed limits of IS: 2296.

6.5.2 Ground Water

The study area falls in moderate ground water potential zone. The water table is found to be 4 m from surface during Monsoon during the monsoon period. It recedes to a level of 12-15 m from surface during dry months. The nearby

population depends upon ground water for drinking purpose. The population collect drinking water from bore wells/hand pumps. The samples were collected and analysed as per the procedures specified in “standard Methods for the examination of water & Wastewater” published by American Public Health association (APHA). pH in ground water sample was observed to be in the range 7.4 to 7.8, while turbidity was observed in the range <1 NTU. The value of alkalinity and hardness were observed in the range of 179-245 mg/l and 184-257 mg/l respectively. Whereas heavy metal was found to be within the limit.

Total coliform were found to be 03. The physico-chemical and biological analysis revealed that all the parameters were well within the prescribed limits of IS: 10500.

6.6 Soil Quality

The entire study area is covered by clayey and loamy soil. The colour of the soil varies from black to yellowish, brownish, yellow silty sometimes the colour is ashen, which is a characteristic of this area.

For general characterization of soil a few random samples from the study area to the depth of about 15 cm were collected. Soil samples were brought to the Laboratory for analysis. Samples under all the categories were analysed for various parameters like texture, colour, pH, and conductivity, using standard methods. The texture of the soil was observed to be clayey at 6 sampling point. The organic carbon was found to be in the range of 0.41 to 1.49. The nitrogen and phosphorus were observed to be in the ranges of 165.2 to 199.6 kg/Ha and 20.4 to 38.6 kg/Ha gm respectively the pH range at the soil vary in between 7.4 to 7.8.

6.7 Flora and Fauna

The climate, rainfall and vegetation type contribute to decide the type of faunal community in the area.

6.7.1 Flora

The core zone is devoid of any forest growth and bushes may be seen here and there. The Katni district area of the dry topical type of forest and can be divided into northern and southern tropical dry deciduous forest.

Northern tropical dry deciduous forest is confined to Katni, Sihora and Vijayraghavgarh tehsil. Sal is the predominant species in these forests. It is associated with Saj (*Terminalia tomentosa*), Dhaora (*anogeissus latifolia*),

Tendu (*Diospytos melanoxylon*), Lendia (*Lagerstremi parviflora*), Kari (*Saccopetalum tomentosa*), Bija (*Pterocarpus marsupium*), Mahua (*Madhuca latifolia*), Gunja (*Lannea gradies*), Salai (*Boswellia serrata*), Dhotin (*Dabergia paniculata*), Haldu (*Adina Cardis*), Koha (*Terminalia arjuna*), Harra (*Terminalia Chebula*), Siris (*Albizzia Lebbek*), Jamun (*Eugenia jambolana*, Achar (*Buchanania lanzan*), Alona (*Embllica officinalies*) Amaltas (*Cassia fistula*) Tinsa (*Ougenia dalber gioides*, Dhana (*Grewia tilifolia*), Palas or Chheola (*Butea monosperma*) and a few other species. Bamboo is commonly found in these forests on the slopes and occasionally in the flat country where the forest is rather open. Chhind (*Phoenix anaulis*), Kharasi or Sihore (*Nyctanthes arbortristies*), Karonda (*Caresses*), Dhawai or Jilbile (*Woodfordia floribunda*) etc occur as the undergrowth which is sparse when the canopy is dense> Teak is sparsely observed in Katni tehsil.

6.7.2 Fauna

According to Survey of India, the study area does not host natural wild life because no forest has been found within the 10 km radius of the project site. There are also no zoos or bird sanctuaries in the study area. Rodents, monkeys, jackals and large birds constitute the natural fauna in the study area. Peasants, pigeon, peacock can be sighted occasionally along with the birds of common occurrence in the study area. Even forestland has only sparse row of trees and is not able to sustain much natural fauna. The species of fauna encountered are listed in table below.

LIST OF FAUNA OF THE STUDY AREA	
Bengal Monkey (<i>Macacus rhesus</i>)	Jungle cat (<i>Felischaus</i>)
Mongoose (<i>Herpests mingo</i>)	Sambhar (<i>Crevus unicolor</i>)
Kalmuha monkey (<i>Semnapthecus on lelccs</i>)	Common haw cuckoo (<i>Cuculus micropterces</i>)
House sparrow (<i>Passer domesticus</i>)	House crow (<i>carvus splendens</i>)
Common maina (<i>Acrido tehars tristis</i>)	

6.8 Land Use Pattern

The study area covers about 65303 Ha. For computation of the land use pattern in the study area based on the village-wise land-use data given in the census records, the geographical area of all settlements covered within the study area, though many villages in the peripheries of the circular study area are partially covered. Perfect delineation and quantification of land uses for

the partially covered parts of villages of the study area is not possible, hence the entire village area is considered for the study, irrespective of its coverage within the village boundary.

The land use is classified into four types – viz. forests, area under cultivation, culturable waste and the area not available for cultivation. The land under cultivation is further sub-divided into two types viz. irrigated and un-irrigated.

Land-use Pattern in the Study Area

S. N.	Particulars	Study Area (ha)	Percentage Coverage
1.	Forest Land	3783	5.79
2.	Land under Cultivation		
	a) Irrigated Land	1755	2.69
	b) Un irrigated Land	34313	52.55
3.	Culturable Waste Land	8920	13.66
4.	Area not available for cultivation	16528	25.31
	Total Area	65303	100

6.9 Socio-Economic Conditions

The study area falls in Vijayraghgarh Development Block of Katni district. The district is dominated by rural population (about 90 % of the total population). Scheduled tribes account for about 30.23% of the total population. Scheduled Cast account for about 15.08% of the total population. Total work force of study area is reported to be about 44.23% of the total population. An examination of the occupational pattern reveals that about 21.79% of the total workers are engaged in farming or in associated activities either as cultivators or as agricultural laborers. Thus, it can be inferred that a major portion of the population derives their livelihood from agricultural sector.

ESTIMATED BASIC STATISTICS OF THE STUDY AREA

1. Households	5328
2. Population	25251
Male	12962
Female	12289
3. Schedule Cast	3808
4. Schedule Tribe	7635
5. Literacy Rate	57.76%
6. Occupational Pattern :	
(A) Total Working Population (% of total population)	44.23%
(i) Cultivators (% of total working population)	11.42%
(ii) Agricultural Labors (% of total working population)	10.37%

(iii) House Hold Labors (% of total working population)	1.07%
(iv) Other Workers (% of total working population)	21.37%
(1) Main workers (% of total working population)	29.27%
(2) Marginal Workers (% of total working population)	14.96%
(B) Total non working population (% of total population)	55.78%

7. IMPACT ASSESSMENT

Mining activities is bound to have an adverse impact on existent environment. An understanding of the nature and extent of various impacts is essential in devising the methods and advance planning to mitigate the impacts and ultimately restore the land to useful conditions.

8. IMPACT EVALUATION

An attempt has been made to evaluate the impact of project in terms of both quality and quantity by using modified matrix method for crucial environmental parameters. The environmental impact evaluation of possible effects as a result of proposed mining area is primarily based on study of objectives, process, surrounding environment etc. The aspects such as water, air, land and related issues have been assessed on the basis of mining operations for similar activity. The environmental impacts identify the possible relationship of proposed mining operations with respect to environmental parameters. Their relationship can be beneficial or adverse and can be further classified as short term, long term, reversible, irreversible, local or regional. The evaluations of the impact of proposed activity are presented in Table below:

Parameters	Weight PIU	Baseline EIU (a)	Without EMP EIU (b)	With EMP EIU (c)	Change EIU (c-b)	Change EIU (c-a)
Biological Environment	300	205	184	201	17	-4
Environmental Pollution	450	344	315	345	30	1
Aesthetic	100	77.25	64.25	74.25	10.0	-3.0
Human Interest	150	119	111	129	18	10
Grand Total	1000	745.25	674.25	749.25	75	+4

9. ENVIRONMENT MANAGEMENT PLAN

9.1 Reclamation of Land

Out of 5.82 Ha, 5.02Ha area will be developed for excavation of lime stone in lease period. Hence 0.8 Ha will be un-worked area at the end of lease period. Out of excavated area, only 3.07 Ha areas will be reclaimed at the end of lease period while green belt will be developed over 0.85 Ha areas. Rest of the 1.90ha area at the end of lease period will be left as pond. Restoration will visualize after completion of mining, there will be no dumps in the lease area and total 3.07 ha areas will be reclaimed. Area to be rehabilitated by way afforestation is 0.85 ha.

An effective land reclamation plan of this mining lease area will again restore the aesthetic beauty.

9.2 Green Belt Development

Till date 100 trees (0.10 ha), has been planted in lease boundary area and further 50 saplings shall be planted in next five years which will cover 0.05 Ha of area.

At the end of lease period total 1000 number of trees will be planted over 0.85 ha of area.

9.3 Measures to Improve Socio-Economic Conditions

The impacts of the project would be felt in an integrated manner on the socio-economic environment in the study area. There is no village in core zone and further no displacement is required for the proposed project and therefore impact will be positive side rather negative. The impacts on the different components viz employment, housing, educational, and medical and transport facilities, fuel availability, economics, status, health agriculture is not significant because size of project is very small. However, it would definitely increase the employment opportunity (primary as well as secondary) in the project area. Some of these impacts would be beneficial.

i) The project will have a strong positive employment and income effect, both direct as well as indirect.

ii) Migrant-Non migrant ratio shall shift towards migrant side. This will happen because of (i) better employment opportunities due to this project and (ii) relatively low agricultural yield through traditional agricultural practice with monocrops.

iii) The project shall speed up the growing view on importance of education among people in study area.

- iv) The project is going to bring about changes in the pattern of demand from food to non-food items if sufficient income is generated.
- v) The project is not going to influence the existing traditional agricultural situation significantly. It may help to improve agricultural production by way of providing additional income to the farms from supplementary sources.

People perceive that the project will bring handfull gains by way of creating significant job opportunities along with development of social infrastructure.

9.4 Air Pollution Control Measures

Following measures shall be taken to mitigate the effect of mining operation over ambient air environment:

1. Regular spraying of water by water sprinkling system over haulage roads.
2. To reduce dust generation during loading operation, water has been sprayed over the muck pile to the loaded;
3. To reduce dust generation during plying of dumpers on the haul road. Water sprinkling is done at frequent intervals. Water sprinklers shall be installed at the mine haulage road;
4. To reduce spread of dust, plantation along the mining lease boundary is under progress and plantation shall be also done along haul roads.
5. Periodic maintenance of haulage roads.
6. All over burden dumps has been stabilized with legumes and grass to prevent the erosion of soil and arrest the dust emission during windy days.

In addition to the above following additional mitigation measures has been adopted and it is expected to continue in future also:

1. Dust due to drilling has been minimised by using wet drilling method like water injection system.
2. Dust mask has been provided to all workers working in dusty atmosphere.
3. Tree Saplings has been planted at the periphery of mining lease.
4. Regular maintenance of vehicles and machinery's has been carried out in order to control emissions;
5. A good house keeping and proper maintenance has been practiced which will help in controlling pollution.

9.5 Noise Pollution Control Measures

The main sources of noise in mining activity are drilling, blasting, material handling machinery, loading equipment, etc. Following mitigation measures should be taken to control noise pollution:

1. Wherever the noise levels exceed 85 dBA, workers has been provided with earmuffs, ear plugs etc.
2. Hydraulic drills has been used for drilling;
3. All moving parts of machine has been properly lubricated;
4. Non-moving parts of machine has been properly fastened;
5. Blasting has been well designed and arranged in such a way that only one or two holes are blasted at a time with the use of short delay detonators in combination with sequential blasting machine;
6. No trunk line of detonating fuse has been used on surface (Even if detonating fuse is used as trunk line with cord relays, then it shall be covered with clay properly);
7. No blasting has been done when the sky is cloudy because cloud cover can cause reflection of pressure wave block to the ground at some distance from blast.
8. Electric detonators have been used instead of the detonating fuse as trunk line.
9. Blast has been designed in such a way that fragmentation is proper and over size boulder generation is minimum. So secondary blasting is avoided;
10. Blasting has been done between 12 noon to 4 pm when temperature inversions are not likely to be there and air density is less;
11. A barrier of overburden at mine boundaries has been made and three rows of trees are proposed to be planted to reduce propagation of noise;
12. Secondary blasting is not required and hydraulic rock breaker is used.
13. Noise barriers, silencers and enclosures have been incorporated for equipments, which emit high noise levels.
14. All the basic equipments and various machinery have been kept well maintained.
15. Thick green belt around the mining pit and along the haulage roads.
16. As far as possible heavy and noisy workers has been avoided during nighttime.

17. Unnecessary use of horns by the drivers of the vehicles has been avoided.

9.5 Water Pollution Control measures

Following measures have been taken to avoid accumulation of water:

1. Pump having required capacity has been installed to lift accumulated rain water from working pit.
2. There shall not be no over flow on wash off from dumps nor is there any beneficiation plant. Only rainwater is pumped out of the mine;
3. There is no toxic constituent in water and soil so water collected in sump is free from any toxic substances.
4. A silt-settling tank has been constructed in northern barrier zone area to settle heavy particle before discharging water into drain.
5. Quality of water accumulated in the working pit may be checked during monsoon.
6. It shall be ensured that silt content in the mines discharged is minimum.
7. It has been ensured that quality of drinking water for the worker is hygienic and good sanitation system is available.

10.0 CONCLUSION

The Limestone mining project of M/s S. N. Sunderson & company, village – Badari, Tehsil Vijayraghgarh, Katni District (MP) will be environmental compatible to the surrounding due to the high standards of pollution control measures to be adopted during the operation activity. Thus it can be safely stated that the mining activities will not have any adverse effect on the surroundings, if the proper environmental management plan is adopted.