

***EXECUTIVE
SUMMARY***
FOR
PUBLIC HEARING
(As per EIA NOTIFICATION SEPT' 06)
FOR
MUGOLI OC
EXPANSION PROJECT
**(Expansion in production capacity only
from 2.50 MTPA TO 4.00 MTPA)**

NOVEMBER- 2010

Prepared by:-

**Environment Department
WCL (HQ), Coal Estate
Civil Lines, NAGPUR – 440 001**

EXECUTIVE SUMMARY

FOR

EIA/EMP

OF

MUGOLI OC Expn.

(For Enhanced Production from 2.50 MTPA to 4.00 MTPA)

(WANI AREA)

NOVEMBER - 2010

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**Environment Department
WCL (HQ), Coal Estate
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EXECUTIVE SUMMARY

1.0 INTRODUCTION

Mugoli Opencast Project of Western Coalfields Limited was opened in January, 1995 after having its Project Report (PR) approved by the competent authority on 6.06.1990 and the Environmental Management Plan (EMP) was also approved by the Ministry of Environment & Forest (MOEF) vide letter dated 13.08.1991. As per approved PR/EMP, the project was having a sanctioned capacity of 0.80 Million Tonnes per year (MTPA) of coal.

An adjoining mine namely Nirguda OC project with EMP Clearance & Consent for 0.75 MTPA had to be amalgamated with Mugoli OC mine recently due to reasons explained below:

- i. There is no barrier between two mines.
- ii. The two mines are having a common catchment area.
- iii. The two mines are being worked with a common access trench.

This amalgamation has got the approval of competent authority of WCL as well as Directorate General of Mines Safety (DGMS).

The salient feature of the amalgamated mine are as under: -

- i. **Name: - Mugoli OC Extension**
- ii. **Land: - 818 .05 Ha** [Mugoli OC – 539.0 Ha (as per approved PR/EMP) + Nirguda OC – 279.05 Ha (as per approved PR/EMP)]

It may be noted here that there is no increase in the land requirement of individual project, but it is only an amalgamation of two projects made into one.

- iii. **Capacity: - 1.55 MTPA**
(0.80 MTPA as per approved PR/EMP of Mugoli OC
+ 0.75 MTPA as per approved PR/EMP of Nirguda OC)

As such, the EMP of amalgamated mine was prepared for seeking environmental clearance from Central Government in terms of MOEF's Circular dated 14.05.2002 for amalgamated production upto 1.55 MTPA with land area of 818.05 ha (as shown above).

The EIA/EMP for the said amalgamated mine for a production capacity of 1.55 MTPA with land area of 818.05 ha was approved by Ministry of Environment and Forests (MOEF) vide its letter no J – 11015 / 82/2005.IA. II (M) dated 20.05.2005.

Further, expansion of Mugoli OC mine for production capacity up to 2.50 MTPA only was subsequently taken up and the environmental clearance for the same has since been received from MOEF vide its letter no. J-11015/277 /2008 IA.II (M) dated 04/05/2009.

1.1 PURPOSE

Now it is seen that even after amalgamation with production of 2.50 MTPA from the existing mine the demand on WCL (especially Wani Area) for power grade coal is increasing and since the mine has the requisite potential, an expansion scheme has been taken up in right earnest. WCL, therefore, proposes to take up the expansion.

The total production including the expansion will thus be 4.00 MTPA from the amalgamated mine without any increase in land area. .

As such duly filled in Form – 1 application along with draft TOR, This feasibility report and Addendum EIA was submitted to MOEF for obtaining Environmental Clearance under Clause 7.2 of EIA Notification, 2006. As directed by MOEF, the Public Hearing document has been prepared and submitted to MPCB for conducting Public Hearing.

2.0 PROJECT DESCRIPTION

2.1 LOCATION

The existing Mugoli Opencast Project is situated in Mugoli Block of Wardha Valley Coalfield. Mugoli Block is located in Wani Tahsil of Yavatmal district in the State of Maharashtra. The Block is bounded by Latitudes 19 Deg. 15' 44" N - 19 Deg. 54' 15" N and Longitudes 79 Deg. 5' 40" E - 79 Deg. 6' 40" E.

2.2 COMMUNICATION

The area under consideration is at a distance of 35 km by road from Wani Town of Yavatmal district.

2.3 TOPOGRAPHY & DRAINAGE

Topography of the area is slightly undulating with elevations ranging from 198 m to 214 m above MSL. The main drainage channels flow towards Wardha River in the North and Penganga River in the South. Nirguda nullah joins Wardha River to the North of Mugoli Block and Penganga river joins Wardha river to the East of this Block.

2.4 JUSTIFICATION FOR ENHANCEMENT & LINKAGE

The mines of WCL are under the constant pressure to meet increasing demand of non-coking coal for powerhouses and other miscellaneous customers. To bridge this deficit, new mines will have to be opened and simultaneously production from presently operating opencast mines are to be increased substantially in Maharashtra State or else MSEB will continue to receive coal from distant coalfields like Ib Valley and Central India Coalfields thereby burdening the existing rail-road network and hence, electricity consumers. Thus, it is envisaged that the production from this mine is enhanced up to 4.00 MTPA and will, thus, be able to bridge the gap between the demand and supply to the extent of planned production from XI Plan period onwards.

2.5 MINING PARAMETERS

2.5.1 Geology & Structure

Mugoli Block is covered by thick soil. However, occasional isolated patches of Kamthi Sandstone are exposed in the gullies near riverbanks. A thick seam of 25 m split into two parts; namely top split and bottom split which is separated by a parting varying in thickness from 1.44 m to 5.49 m.

The general strike of coal seam in Mugoli Block is NW to SE in Northern Part and takes a swing to North to South in Central Part and NW to SE in Southern Part. The gradient of coal seam is 1 in 10 in Northern Part, 1 in 11 to 1 in 15 in Central Part and 1 in 3 to 1 in 9 in Southern Part of the property. The gradient of coal seam is towards South, West and West. The net mine-able reserve as per approved project reports of Mugoli OC & Nirguda OC is 25.96 Mt. In addition, 5.75 Mt is also made available within this mine lease because of amalgamation, leading to total reserve of 31.71 Mt. Till 31.03.2010, total coal extracted is 20.462 Mt. Hence, balance coal available as on 01.04.2010 is 11.248 Mt.

2.5.2 Mining Technology

As suggested in the approved PR, the mine is being worked by Shovel-Dumper System. Total OB as per approved PR of Mugoli OC & Nirguda OC has been estimated to be 98.53 Mm³ at an average Stripping Ratio of 3.86 m³/t. The OB excavated till 31.03.2010 is 54.33 Mm³ and hence balance OB to be excavated is 44.20 Mm³.

Target & Life

In order to meet the ever growing demand of power grade coal it is proposed to enhance the production capacity of the project under consideration from present level of **2.50 MTPA to 4.00 MTPA** (peak capacity) without any increase in land area. The balance life is 5 years.

Performance last Five Years

The performance of the mine in last five years in respect of coal production and OB excavation is given as below:-

Year	Coal Production in Tonnes	OB removal in Cubic Metre
2005-06	1796580	3766871
2006-07	1854690	2771144
2007 – 08	1915250	3584853
2008 – 09	2038634	8254568
2009 - 10	2326540	7374583

The projected life as per the balance coal and the peak capacity envisaged (4.00 MTPA) is coming about 5 years. The calendar programme is as given below:-

Year	Coal Production in Tonnes	OB removal in Cubic Metre
2010- 11	30,00,000	7810000
2011- 12	40,00,000	9000000
2012 – 13	30,00,000	10000000
2013 – 14	9,00,000	11000000
2014 - 15	3,48,000	6400000

Present status of HEMM's

1. Three E.K.G. Shovels (one of 4.6Cum. capacity & 02 of 5Cum. Capacity) are engaged in OB removal. In addition one Hydraulic Excavator (TATA EX-1200 D) of 5 Cum. Capacity is also engaged in OB removal in Mungoli Patch.

2. Three Hydraulic Excavators (All of 2.8 Cum. Capacity) are engaged in lifting of Coal.
3. 16 Nos. of 35T dumpers and 11 Nos. of 50T dumpers are engaged with Shovels and Excavators.
4. 05 Nos. of Dozers and 04 Nos. Drills are supporting in production work.

Mine Capacity and Capacity Utilization

The mine Capacity as on 01.04.2010 is as given below:-

(a) Loading Capacity = 4.2900 Mill. Cum.

(b) Hauling Capacity = 3.3009 Mill. Cum.

Capacity Utilization (2009-10) = 114.77% (Achieved)

Capacity Utilization (2010-11) = 130.00% (Targeted)

Capacity Utilization Achieved upto May,2010 = 130%

Concerted endeavor is being made to achieve 140% of capacity utilization with existing HEMMs of Mungoli OCM.

With the targeted Capacity Utilization, it is proposed to achieve the peak production capacity of 4.00 MTPA with the existing HEMMs.

Solid Waste Management

As already mentioned, total OB excavated till 31.03.2010 is 54.33 million cubic metre. The distribution is as follows :-

- ❖ OB in external Dump – 42.33 million cubic metre
- ❖ OB in internal Dump – 5.10 million cubic metre
- ❖ OB in embankment – 6.9 million cubic metre

The proposed programme for the balance life is as follows:-

Year	OB removal in Cubic Metre	Distribution of OB in Cubic Metre	
		In External Dump	In Internal Dump
2010- 11	7810000	6810000	1000000
2011- 12	9000000	7500000	1500000
2012 – 13	10000000	8000000	2000000
2013 – 14	11000000	7500000	3500000
2014 - 15	6400000	500000	5900000

2.5.3 LAND USE PATTERN

2.5.3.1 Pre-Mining Land Use

Total requirement of the project, as estimated in PR/EMP is 818.05 ha. Pre-mining Land Use Pattern was as follows:

Sl.No.	Particulars	Land (ha)
1.	Agricultural Land	758.54
2.	Govt. Land	59.51
	TOTAL	818.05

There is no forestland involved in this Project.

2.5.3.2 Present Land Use

S.N.	PARTICULARS	PRESENT LAND USE IN ha
1	Quarry Area	165.89 (Active backfilling is going on in 37.29 ha. The depth is about 40 m)
2	External OB Dump	170.39 (Plantation = 37.39)
3	Danger Zone for Blasting	167.00
4	Infrastructure & Roads	48.50
5	Embankment	33.42 (Plantation = 12.01)
6	Land for OB Dumping in balance life	43.35
7	Land for Quarrying in balance life	41.11
8	Rationalization Area	148.39 (Plantation = 32.80)
TOTAL		818.05

3.0 DESCRIPTION OF THE ENVIRONMENT

3.1 AMBIENT AIR QUALITY

A) Base line & Existing Scenario – Base line ambient air quality w.r.t. the mine under consideration has also been generated during the winter season at six locations during 2009 covering the core and Buffer zone. The ambient air quality data thus generated reveal that the quality of ambient air is well within the permissible limits. The summarized details are as follows:-

APPROACH METHODOLOGY

Micrometeorological data generation

A meteorology station has been set up at Core-zone and micrometeorological parameters like wind velocity, wind direction, temperature, relative humidity, cloud cover etc. are recorded on hourly basis for 90 days from 01st December`09 to 28<sup>th</sup> February`2010 representing winter season. Daily rainfall also has been recorded and reported.

Ambient air quality monitoring

Ambient air quality was monitored at 6 locations i.e. one in core zone and the remaining five in buffer zone. A total of 24 samples (24-hrly) for SPM & RPM and 72 samples (8-hrly) for SO₂ and NO_x samples were collected from each location during the study period and analyzed.

DATA ANALYSIS AND RESULTS

Micrometeorology

The wind velocity readings were ranging from 0.4 – 13.8 km/hr. Predominant wind was from Northeast (NE) direction. The maximum temperature recorded was 26.0°C and the minimum was 13.5°C. The mean relative humidity was found to 65.0% and no rainfall was recorded during the study period.

Air quality

Core zone

SPM and RPM values are ranging from 130 - 179 $\mu\text{g}/\text{m}^3$ and 36 $\mu\text{g}/\text{m}^3$ to 58 $\mu\text{g}/\text{m}^3$ respectively. SO_2 and NO_x values are varying between 5.3 to 11.1 $\mu\text{g}/\text{m}^3$ and 6.5 to 12.2 $\mu\text{g}/\text{m}^3$ respectively. **All the values are found to be well within the Standards for Coalmines stipulated by Ministry of Environment & Forests (MoEF).**

Buffer zone

SPM and RPM values are ranging from 91 $\mu\text{g}/\text{m}^3$ to 161 $\mu\text{g}/\text{m}^3$ and 34 $\mu\text{g}/\text{m}^3$ to 75 $\mu\text{g}/\text{m}^3$ respectively. SO_2 and NO_x values are varying between 5.4 – 10.7 and 6.5 – 12.3 $\mu\text{g}/\text{m}^3$ respectively. **All RPM, SO_2 and NO_x values are well within the CPCB norms.**

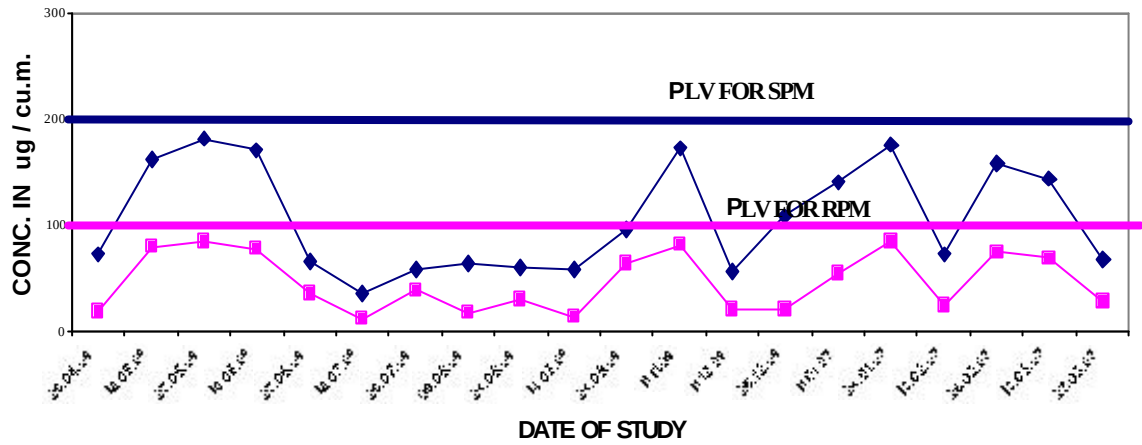
The existing environmental air quality for CO, SO_2 , NO_x , SPM and RPM (including fugitive emissions) are being monitored continuously as per Environmental Protection (Amendment) Rule, 2000 in the mine area every fortnight and analysis result of which show that the various quality parameters are well within the permissible limits.

Ambient Air Quality Monitoring locations :

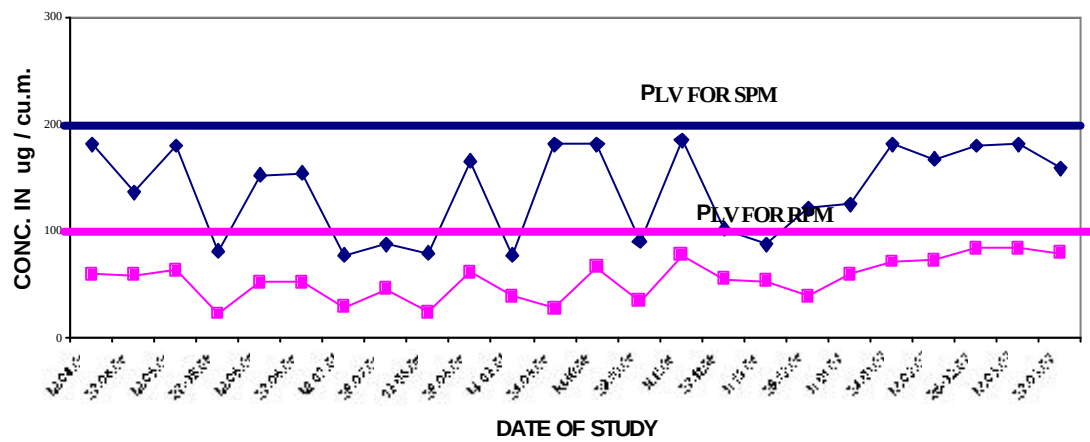
<u>S.No.</u>	<u>Location Details</u>	<u>Location Code</u>
1.	Sub-station -	WMOA-1
2.	Kailash Nagar township (Filter Plant) -	WMOA-2
3.	Tube well near Sakhara village -	WMOA-3
4.	SAM Office	WMOA-4

The representation in graphical form (2005 – 2007) is as given in subsequent pages.

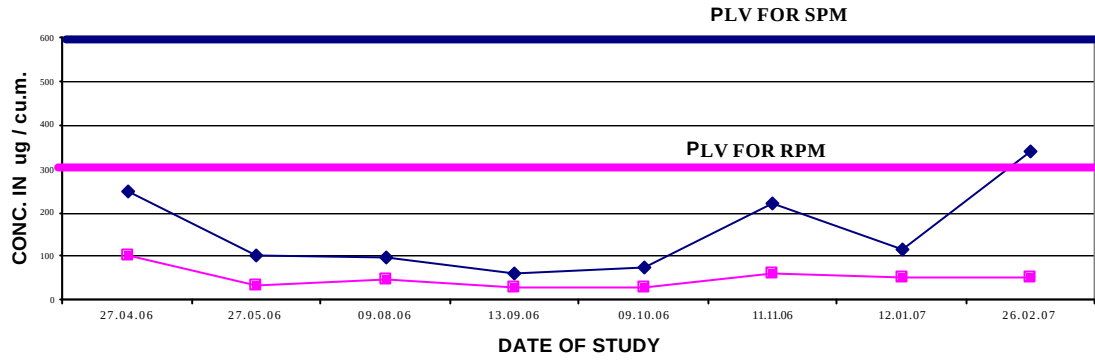
MUGOLI OC - KAILASH NAGAR TOWNSHIP



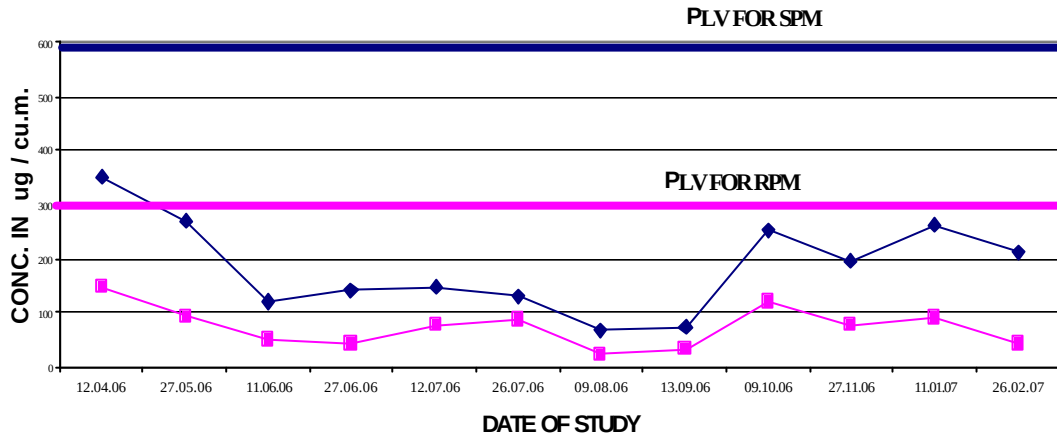
MUGOLI OC - SAKHARA VILLAGE(NEAR TUBEWELL)



MUGOLI OC - SAM OFFICE



MUGOLI OC - SUBSTATION



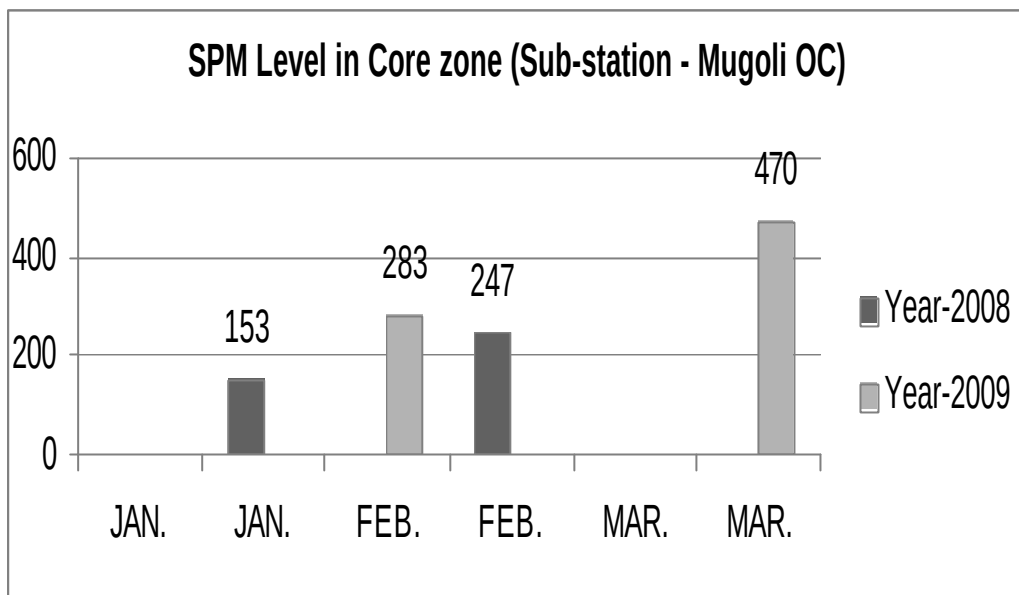
Further the results of regular environmental monitoring data from March 2009 to March 2010 is also placed below ;-

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2009
NAME OF THE AREA : WANI Q.E. : MAR.
NAME OF THE PROJECT : MUGOLI OCP

1. Sub-station : WMOA-1 (24 hourly values in $\mu\text{g}/\text{m}^3$)						
Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NO _x	SO ₂
FEB. 2009	11.02.09	12.02.09	283	99	<6	<6
MAR. 2009	27.03.09	28.03.09	470	203	<6	<6
TLV as per Env.(Protection) Amendment Rule 2000			600	300	120	120
2. Kailashnagar township near Filter Plant : WMOA-2 (24 hourly values in $\mu\text{g}/\text{m}^3$)						
Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NO _x	SO ₂
JAN. 2009	12.01.09	13.01.09	100	39	< 6	< 6
JAN. 2009	24.01.09	25.01.09	183	88	< 6	< 6
FEB. 2009	11.02.09	12.02.09	196	87	< 6	< 6
FEB. 2009	25.02.09	26.02.09	182	60	< 6	< 6
MAR. 2009	08.03.09	09.03.09	188	84	< 6	< 6
MAR. 2009	28.03.09	29.03.09	163	70	< 6	< 6
Permissible Limits			200	100	80	80

3. Tubewell near Sakhara village : WMOA-3 (24 hourly values in $\mu\text{g}/\text{m}^3$)						
Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NO _x	SO ₂
JAN. 2009	11.01.09	12.01.09	131	30	< 6	< 6
JAN. 2009	24.01.09	25.01.09	182	81	< 6	< 6
FEB. 2009	12.02.09	13.02.09	189	79	< 6	< 6
FEB. 2009	25.02.09	26.02.09	185	83	< 6	< 6
MAR. 2009	08.03.09	09.03.09	174	63	< 6	< 6
MAR. 2009	28.03.09	29.03.09	184	82	< 6	< 6
Permissible Limits			200	100	80	80
4. SAM Office : WMOA-4 (24 hourly values in $\mu\text{g}/\text{m}^3$)						
Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NO _x	SO ₂
JAN. 2009	24.01.09	25.01.09	179	84	< 6	< 6
MAR. 2009	27.03.09	28.03.09	209	72	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000			600	300	120	120



FUGITIVE DUST MONITORING DATA

1. Security Check Post

(24 hourly values in $\mu\text{g}/\text{m}^3$)

Month	Dates of Sampling		Parameters
	From	To	SPM
FEB. 2009	26.02.09	27.02.09	994

CO MONITORING DATA

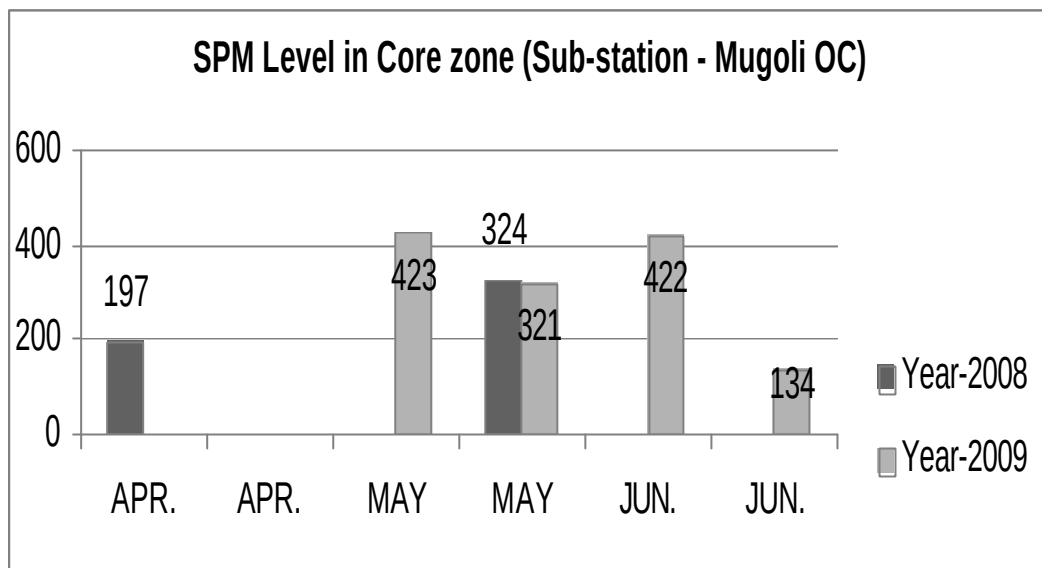
(All values are given in $\mu\text{g}/\text{m}^3$)

Sl. No.	Monitoring Location	Monitoring Date	Observed Value	NAAQ Standards (1 hour)
1.	Substation	12.02.09	< 114.3	10000
2.	Kailashnagar township	12.02.09	< 114.3	4000
3.	Sakhara village	12.02.09	< 114.3	4000
4.	SAM office	12.02.09	< 114.3	10000

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2009
 NAME OF THE AREA : WANI Q.E. : JUN.
 NAME OF THE PROJECT : MUGOLI OCP

1. Sub-station				: WMOA-1			
				(24 hourly values in $\mu\text{g}/\text{m}^3$)			
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
MAY 2009	13.05.09	-	14.05.09	423	194	< 6	< 6
MAY 2009	27.05.09	-	28.05.09	321	140	< 6	< 6
JUN. 2009	13.06.09	-	14.06.09	422	163	< 6	< 6
JUN. 2009	27.06.09	-	28.06.09	134	51	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120
2. Kailashnagar township near Filter Plant				: WMOA-2			
				(24 hourly values in $\mu\text{g}/\text{m}^3$)			
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
APR. 2009	13.04.09	-	14.04.09	138	54	< 6	< 6
APR. 2009	28.04.09	-	29.04.09	97	47	< 6	< 6
MAY 2009	13.05.09	-	14.05.09	189	63	< 6	< 6
MAY 2009	27.05.09	-	28.05.09	186	86	< 6	< 6
JUN. 2009	13.06.09	-	14.06.09	190	87	< 6	< 6
JUN. 2009	26.06.09	-	27.06.09	193	85	< 6	< 6
Permissible Limits				200	100	80	80
3. Tubewell near Sakhara village				: WMOA-3			
				(24 hourly values in $\mu\text{g}/\text{m}^3$)			
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
APR. 2009	13.04.09	-	14.04.09	179	56	< 6	< 6
APR. 2009	27.04.09	-	28.04.09	178	83	< 6	< 6
MAY 2009	13.05.09	-	14.05.09	162	75	< 6	< 6
MAY 2009	27.05.09	-	28.05.09	146	63	< 6	< 6
JUN. 2009	13.06.09	-	14.06.09	192	85	< 6	< 6
JUN. 2009	26.06.09	-	27.06.09	158	63	< 6	< 6
Permissible Limits				200	100	80	80
4. SAM Office				: WMOA-4			
				(24 hourly values in $\mu\text{g}/\text{m}^3$)			
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
APR. 2009	27.04.09	-	28.04.09	152	67	< 6	< 6
MAY 2009	28.05.09	-	29.05.09	267	108	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120



FUGITIVE DUST MONITORING DATA

1. Security Check Post

(24 hourly values in $\mu\text{g}/\text{m}^3$)

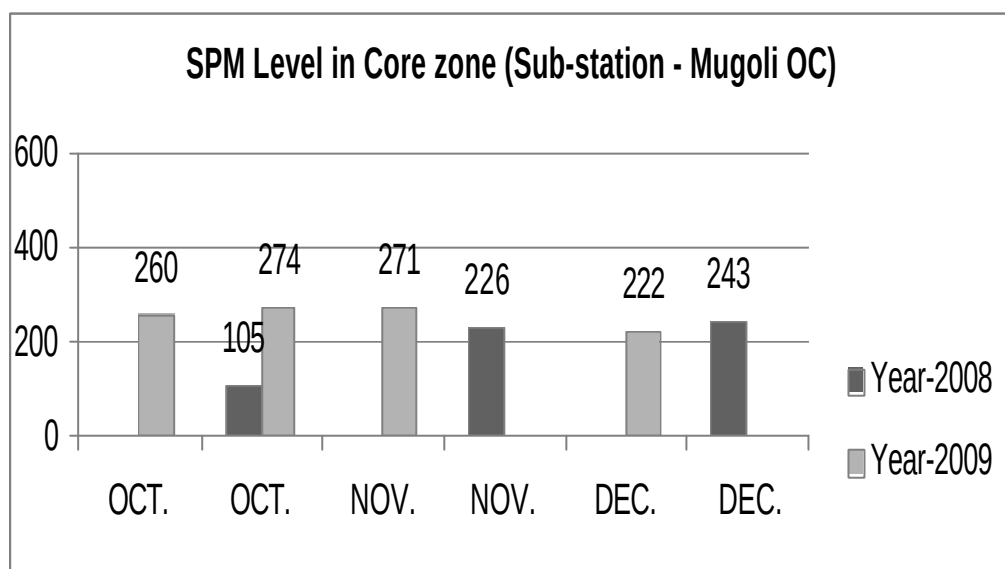
Month	Dates of Sampling		Parameters
	From	To	SPM
MAY 2009	13.05.09	14.05.09	659

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2009
 NAME OF THE AREA : WANI Q.E. : DEC.
 NAME OF THE PROJECT : MUGOLI OCP

1. Sub-station			: WMOA-1				
(24 hourly values in µg/m ³)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
OCT. 2009	13.10.09	-	14.10.09	260	102	< 6	< 6
OCT. 2009	27.10.09	-	28.10.09	274	119	< 6	< 6
NOV. 2009	10.11.09	-	11.11.09	271	123	< 6	< 6
DEC. 2009	11.12.09	-	12.12.09	222	105	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120
2. Kailashnagar township near Filter Plant			: WMOA-2				
(24 hourly values in µg/m ³)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
OCT. 2009	27.10.09	-	28.10.09	183	87	< 6	< 6
NOV. 2009	11.11.09	-	12.11.09	182	84	< 6	< 6
NOV. 2009	25.11.09	-	26.11.09	181	81	< 6	< 6
DEC. 2009	11.12.09	-	12.12.09	76	16	< 6	< 6
Permissible Limits				200	100	80	80

3. Tubewell near Sakhara village				: WMOA-3			
				(24 hourly values in $\mu\text{g}/\text{m}^3$)			
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
OCT. 2009	27.10.09	-	28.10.09	193	86	< 6	< 6
NOV. 2009	11.11.09	-	12.11.09	108	47	< 6	< 6
NOV. 2009	25.11.09	-	26.11.09	96	38	< 6	< 6
DEC. 2009	11.12.09	-	12.12.09	80	19	< 6	< 6
DEC. 2009	24.12.09	-	25.12.09	91	41	< 6	< 6
Permissible Limits				200	100	80	80
4. SAM Office				: WMOA-4			
				(24 hourly values in $\mu\text{g}/\text{m}^3$)			
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
OCT. 2009	12.10.09	-	13.10.09	226	104	< 6	< 6
DEC. 2009	11.12.09	-	12.12.09	208	92	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120



FUGITIVE DUST MONITORING DATA

1. Security Check Post

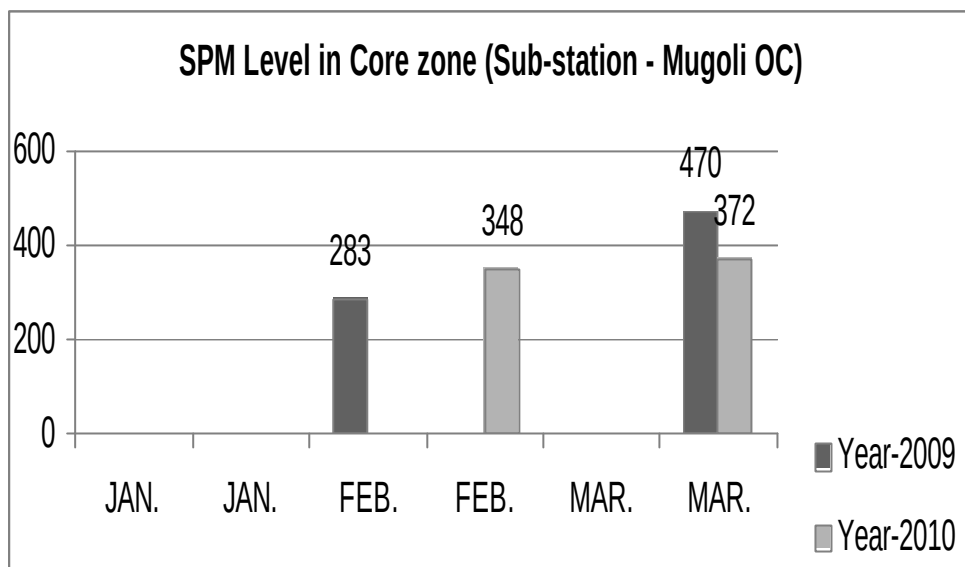
				(24 hourly values in $\mu\text{g}/\text{m}^3$)	
Month	Dates of Sampling			Parameters	
	From	-	To	SPM	
OCT. 2009	27.10.09	-	28.10.09	263	

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
 NAME OF THE AREA : WANI
 NAME OF THE PROJECT : MUGOLI OCP

YEAR : 2010
 Q.E. : MAR.

1. Sub-station					: WMOA-1		
(24 hourly values in $\mu\text{g}/\text{m}^3$)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2010	23.01.10	-	24.01.10	305	131	< 6	< 6
MAR. 2010	11.03.10	-	12.03.10	315	139	< 6	< 6
MAR. 2010	24.03.10	-	25.03.10	412	181	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120
2. Kailashnagar township near Filter Plant					: WMOA-2		
(24 hourly values in $\mu\text{g}/\text{m}^3$)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2010	11.01.10	-	12.01.10	190	82	< 6	< 6
JAN. 2010	24.01.10	-	25.01.10	175	84	< 6	< 6
FEB. 2010	11.02.10	-	12.02.10	180	76	< 6	< 6
FEB. 2010	23.02.10	-	24.02.10	190	86	< 6	< 6
MAR. 2010	10.03.10	-	11.03.10	146	42	< 6	< 6
MAR. 2010	25.03.10	-	26.03.10	176	87	< 6	< 6
Permissible Limits				200	100	80	80
3. Tubewell near Sakhara village					: WMOA-3		
(24 hourly values in $\mu\text{g}/\text{m}^3$)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2010	11.01.10	-	12.01.10	150	60	< 6	< 6
JAN. 2010	23.01.10	-	24.01.10	111	44	< 6	< 6
FEB. 2010	11.02.10	-	12.02.10	177	68	< 6	< 6
MAR. 2010	25.03.10	-	26.03.10	185	87	< 6	< 6
Permissible Limits				200	100	80	80
4. SAM Office					: WMOA-4		
(24 hourly values in $\mu\text{g}/\text{m}^3$)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
FEB. 2010	23.02.10	-	24.02.10	348	159	< 6	< 6
MAR. 2010	24.03.10	-	25.03.10	372	174	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120



FUGITIVE DUST MONITORING DATA

1. Security Check Post

(24 hourly values in $\mu\text{g}/\text{m}^3$)

Month	Dates of Sampling		Parameters
	From	To	SPM
FEB. 2010	23.02.10	24.02.10	386

CO MONITORING DATA

(All values are given in $\mu\text{g}/\text{m}^3$)

Sl. No.	Monitoring Location	Monitoring Date	Observed Value	NAAQ Standards (1 hour)
1.	Substation	11.02.10	< 114.3	10000
2.	Kailashnagar township	11.02.10	< 114.3	4000
3.	Sakhara village	11.02.10	< 114.3	4000
4.	SAM office	11.02.10	< 114.3	10000

Therefore, it can be safely concluded from the above that even after substantial increase in the production from 1.55 MTPA to 2.50 MTPA (resulting in increase in traffic density), the impact on one of the physical environmental attribute; i.e. ambient air is insignificant.

Further, it can be inferred that the various pollution control measures already undertaken have been proved to be effective, which has arrested the deterioration of the ambient air quality in the mine activity area even after substantial increase in the production level.

So it may be predicted that the ambient air quality will have no harmful effect on human being, flora and fauna, soil quality, surface structures and aesthetic value of the surrounding environment as suitable mitigative measures will continue to be taken during the further enhancement production up to 4.00 MTPA to make the operations eco-friendly. This fact has been further corroborated by the interpretation of regular monitoring results in respect of Niljai OC (Production capacity 3.50 MTPA operating in the same coalfield, with similar geo- mining conditions, topographical features and climatological features).

The existing practice of fortnightly monitoring of ambient air quality will continue with the expansion project also and the results will be examined critically so as to identify the affected area and mine authorities will thereafter be able to take appropriate control measures to minimize the adverse effects, if any, as far as possible.

3.2 WATER QUALITY: -

A) Base line & Existing Scenario - In order to assess the **baseline water quality** w.r.t the mine under consideration, six sampling locations were fixed during 2009 Winter Season covering surface as well as ground water sources in the buffer zone. The quality of water has been found to be well within the permissible limits.

APPROACH METHODOLOGY

Water quality monitoring

Representative water samples 6 nos. namely Handpump, Takli (W1), Handpump, Borgaon village (W2), handpump, Khairgaon village (W3), Handpump, Wirur village (W4), Penganga river U/s (W5) and Penganga D/s (W6) were collected, preserved and transported and analyzed as per standard methods.

DATA ANALYSIS AND RESULTS

Water quality

The water samples (6 Nos.) collected from different water sources i.e. Wastewater, Surface & ground water etc. are analyzed as per procedures outlined in IS : 2488 / IS : 3025 / AWWA / APHA.

At all locations, oil and grease, phenolic compounds, cyanides, sulphides and insecticides are found to be absent and all heavy metal values except Iron are found to be below the detectable limit.

In general, water quality at six locations is found to be within the prescribed limits.

The existing quality of mine pumped out water is being continuously monitored as per Environmental Protection (Amendment) Rule, 2000 every fortnight and the analysis results show that the quality is well within the permissible limits of Indian Standards.

With enhanced production from the mine within the existing mine lease area, the quality of mine pumped out water is not going to change, as such the impact of enhanced production from the mine on water quality will be insignificant.

3.3 AMBIENT NOISE QUALITY:-

Base line & Existing Scenario - The baseline ambient noise quality w.r.t. the mine under consideration has also been generated during the winter season during 2009 at six locations covering the core and Buffer zone. The ambient noise quality data thus generated reveal that the quality of ambient noise is well within the permissible limits.

APPROACH METHODOLOGY

Noise levels recording

Noise levels were recorded by using CYGNET Integrated sound level meter (100X) from six ambient air quality locations during day time and night time at an interval of four hours for one day.

DATA ANALYSIS AND RESULTS

Noise levels

Mean L_{eq} noise levels at day time and night time are ranging from 41.7 to 47.6 dB(A) and 35.4 to 39.8 dB(A) respectively in the study area. While comparing with IS: 4954 - 1986 norms for acceptable outdoor noise levels in residential area (55 dB(A)) in respect of buffer zone and Industrial area (75 dB(A)) in respect of core zone.

Noise level studies are being made continuously every fortnight as per Environmental Protection (Amendment) Rule, 2000 and it is found that the range varied from 50.6 to 64 dB (A) during night and day times, which is well within the tolerable limits.

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 IMPACT ON AMBIENT AIR QUALITY –

The base line data generated at five locations covering the core zone and the buffer zone discussed in the previous paragraph also reveals that the levels of various parameters are well within the permissible limits. It can be inferred from the same that ambient air quality in and around the mine site under consideration has not been affected adversely due to continuing mining operations and it has been achieved by implementing various pollution control measures effectively.

The same has been further corroborated by the existing ambient air quality data generated at the site as well as in the surrounding area. It may be worthwhile to mention here that during the balance life (5 years) of the mine with a maximum projected production of 4.00 MTPA, the existing pollution abatement measures will continue to be taken with necessary augmentation/ strengthening so that the ambient air quality level remain well within the permissible limits.

4.1.1 AIR POLLUTION CONTROL MEASURES

The following mitigative measures have already been undertaken:

- (a) All drills are fitted with dry type dust extractors;
- (b) Permanent haul road has been made with WBM;
- (c) Mobile water sprinklers & fixed water sprinklers have been put into use.
- (d) Coal transportation road has been totally black-topped;
- (e) Plantation (about 2, 06,592) has been done around colony, OB dump and around infrastructures like CHP, etc.
- (f) Covering of coal transportation trucks by tarpaulin has been implemented and avoiding overloading of trucks;
- (g) Dry sweeping of coal transportation road is also done regularly.

Further to the above, permanent water spraying arrangement in the CHP & weighbridge has already been installed. All these measures indicated above will continue to be maintained so that the adverse impacts on ambient air and noise become insignificant.

4.2 IMPACT ON WATER QUALITY –

The major source of water pollution in the opencast mine is mine pumped out water. With enhanced production from the mine, the quality of mine pumped out water is not going to change because there is no new addition of mine lease area, as such, the impact of enhanced production from the mine on water quality will be insignificant. The other sources are effluent from Workshop and residential colony. There is an independent Workshop Effluent Treatment Plant (WETP) of 150 KLD operating at the site and the residential accommodation for the project personnel has been provided separately with 0.40 MLD Domestic Effluent Treatment Plant (DETP). The WETP has been provided with sufficient capacity to handle the requirement and is operating on ZERO DISCHARGE concept as such there is no chance of pollution even after the enhancement of production. Similarly, there is no addition of manpower and no increase in residential strength so, possibility of pollution due to domestic sewage during the balance life with enhanced production does not arise.

The impact prediction on ground water made in the approved EMP is for the final depth of the quarry 105 m. Therefore, change in mine production during intermittent stage will not affect the assessment except some local variations within the predicted influence area. In addition, to assess the likely impact of opencast coal mining on ground water, regular monitoring of ground water level is being carried out as per MOEF guideline.

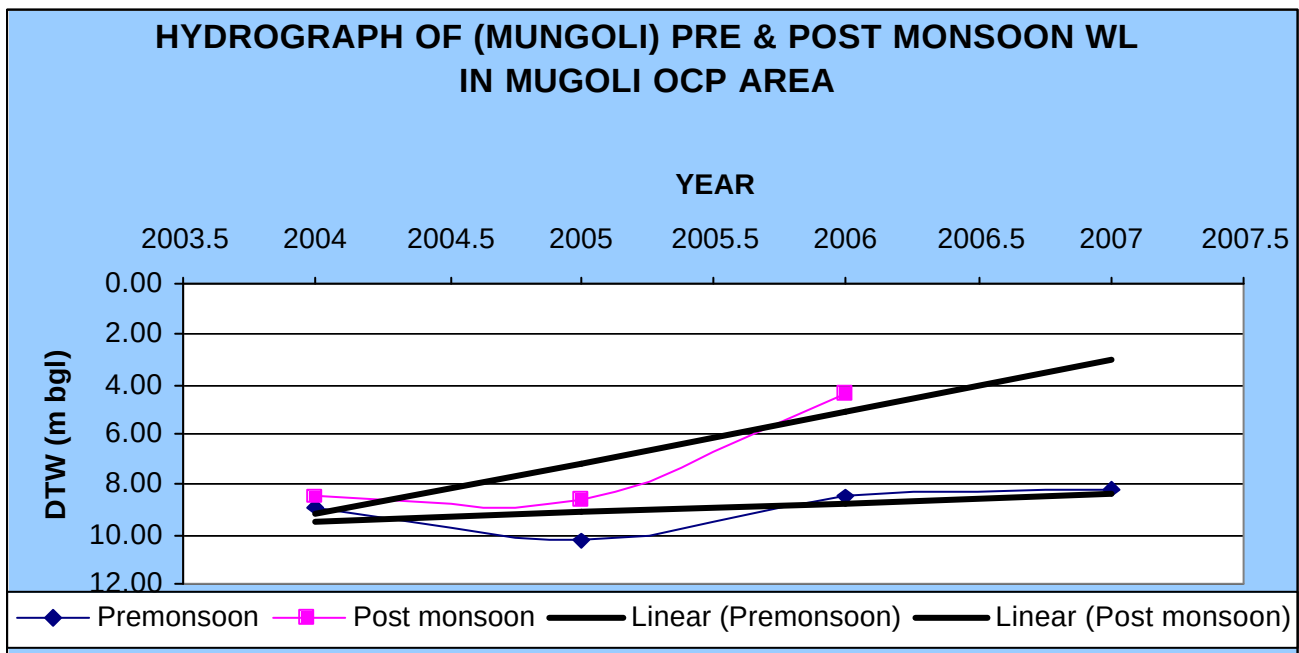
4.2.1 WATER POLLUTION CONTROL MEASURES

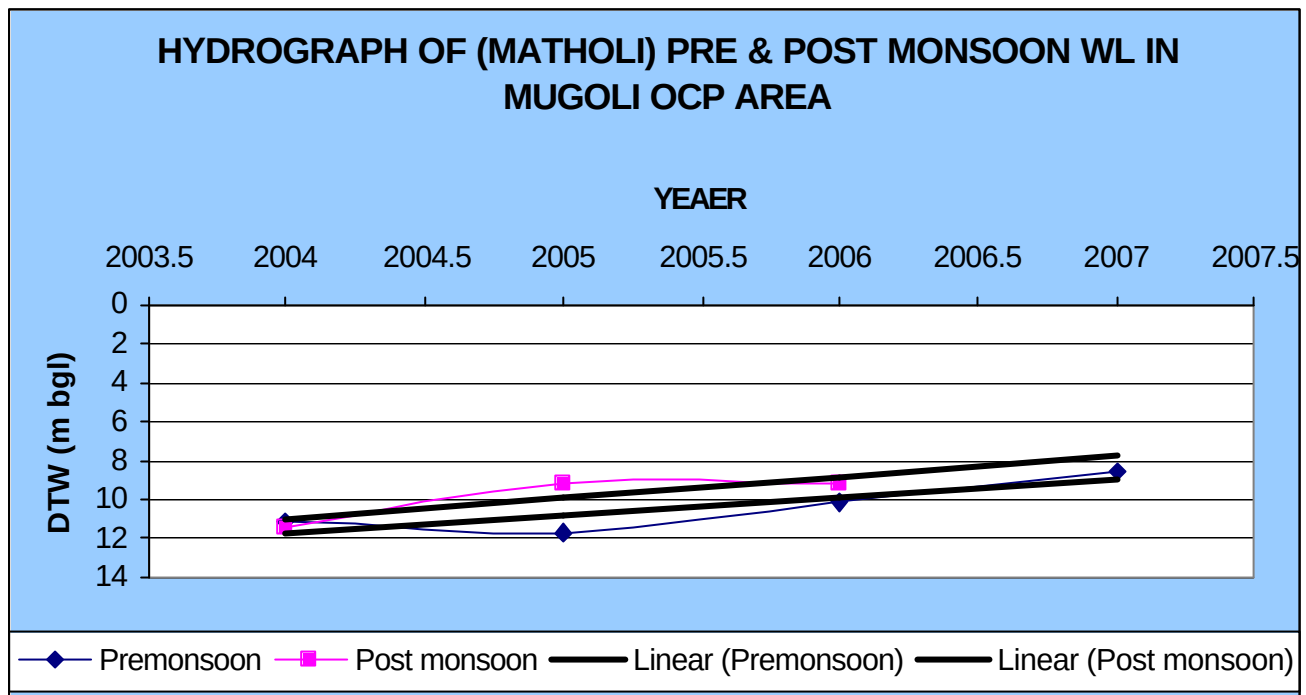
As seen from Analysis Data, the mine pumped out water does not contain significant pollution load and the discharge water quality even without treatment is quite satisfactory. One sedimentation tank for treatment of mine pumped out water is already in operation. Further, Effluent Treatment Plant (ETP) for workshop effluent for a capacity of 150 kld with oil & grease trap under zero – discharge concept and Domestic Effluent Treatment Plant (DETP) for Colony have already been put into operation.

However, if required in future, the abatement measures would be strengthened.

4.2 IMPACT ON HYDRO-GEOLOGICAL REGIME

The projections on ground water inflow to the mine and the mine influence on ground water table are for the final stage of the quarry. Therefore, change in mine production during intermittent stage will not effect the assessment except for some local variation within the predicted influence area.





4.4.1 Remedial measures to control ground water depletion

The following methodology and remedial measures have been taken to minimize the mine-induced impact on ground water levels and also adverse effects in the area.

- (i) Artificial recharge to ground water system at the periphery of the anticipated influence area by local stagnation in low lying areas/drains by providing low height dams/bunds or by injection of mine water discharge. Surface water through tubewells /percolation structures.
- (ii) The water shortage in the villages, if any, in the influence area can be supplemented by supply of water from outside source or from the mine water after treatment.
- (iii) While reclamation of the mined area, void at the deepest portion of the pit has to be left. This residual pit void would initially serve as access for future expansion and subsequently it could be backfilled.
- (iv) Regular well water monitoring in nearby villages is being carried out quarterly as per MOEF's guidelines. No adverse remarks have so far been observed.

ARTIFICIAL RAINWATER HARVESTING MEASURES

Regarding artificial rainwater harvesting, following works have already been undertaken by the project both in – house and outside the mine lease in nearby villages.

1. Digging of pond in Sakhara village.
2. Digging of pond in Jugad village.
3. Roof-top rainwater harvesting at Mugoli Sub Area Manager's office.
4. Roof – top Rainwater harvesting in Community hall and School of Matholi village.

4.3 IMPACT ON AMBIENT NOISE QUALITY

The noise levels are being monitored regularly as per Env. Protection Amendment Rule, 2000 at existing OC Mine and the results show that the ambient noise levels in the mine activity areas and in the immediate surrounding are well within the permissible limit level. The base line data generated in the villages around the 10 km radius also reveals that the ambient noise levels are well within the permissible limits which also corroborate the fact that opencast mining activities at the said mine has not affected the ambient noise quality in the surrounding adversely and it has been achieved by implementing various pollution control measures effectively.

It may be worthwhile to mention here that during the balance life (5 years) of the mine with a maximum projected production of 4.00 Mty , the existing pollution abatement measures will continue to be taken with necessary augmentation/ strengthening so that the ambient noise quality level remain well within the permissible limits.

4.3.1 NOISE POLLUTION CONTROL MEASURES

Monitoring of the noise control is being carried out on regular basis as per the Environment (Protection) Amendment Rule 2000. It has been seen that the noise levels at the mine site are all below TLV. While planning for an effective noise attenuation measures, the concept of source, path and receiver has been considered.

(A) Noise Control at Source

There are two areas where the noise generation is being checked at source.

(i) Proper Design

Since the generation of noise can be reduced by reducing the vibration amplitude, the area of vibrating part and frequency of vibration is being taken care that all loose contact between metal parts are avoided.

Shock absorbing pads are being fixed in the foundation of vibrating equipment / machines. In case of aerodynamic noise producing sources, mufflers are provided with the machines.

(ii) Proper Maintenance

All machines and equipment is being properly maintained. Sound muffler system and bearing lubricating system etc. of equipment is being kept in proper condition.

(B) Noise control in Transmission Path

The measures are being taken for control of noise along the transmission path has been put in following two categories:

- (i) Air borne path
- (ii) Ground borne path

(i) Air Borne Path

The control in air – borne path has been planned in a number of ways as:

- (a) The crusher house, screen house etc., which are source of high level noise generation are enclosed.
- (b) Planting of furrows of trees along the thick foliage around the compound and wall of CHP, workshop and other industrial buildings. This reduces the spread of noise. It is also used as an acoustic enclosure to reduce ambient noise.

(ii) Ground Borne Path

In order control ambient noise in ground borne path, vibration isolators in the form of vibration absorbing pads placed at the base of vibrating equipment.

(C) Noise Control at Receiver End

Even after adopting above measures, if desired noise level is not achieved at receiver end, in that case, following measures are adopted:

- (a) The workers exposed to high noise level are provided with earplugs.
- (b) Provision of enclosed booths at the worksite to protect worker from noisy environment.
- (c) The workers are subjected to Periodic Medical Examination once in every five years.

4.4 LAND RECLAMATION

PRESENT OB RECLAMATION STATUS					
S.N.	PARTICULARS	Nos	AREA (ha)	PRESENT STATUS	
1	Existing External OB Dump & Embankment	10	163.39	i) Planted Area – 37.39 ha ii) Active Dump – 113.00 ha iii) Temp. T.S. Dump – 20.00 ha	
2	Internal Dump	--	37.29	Plantation started with 1000 trees, 0.40 ha. Reached upto GL.	
PRESENT PLANTATION STATUS					
S. N.	PARTICULARS	No. of Trees	AREA (ha)	PRERSENT STATUS	TYPE OF SPECIES
1	External OB Dump, Backfilled Area & Embankment	124482	49.80	Partly Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
2	Avenue	35820	14.33	Planted	Cassia, Neem, Imli & Gulmohar
3	Rationalization Area & Blasting Zone	13629	5.45	Partly Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan

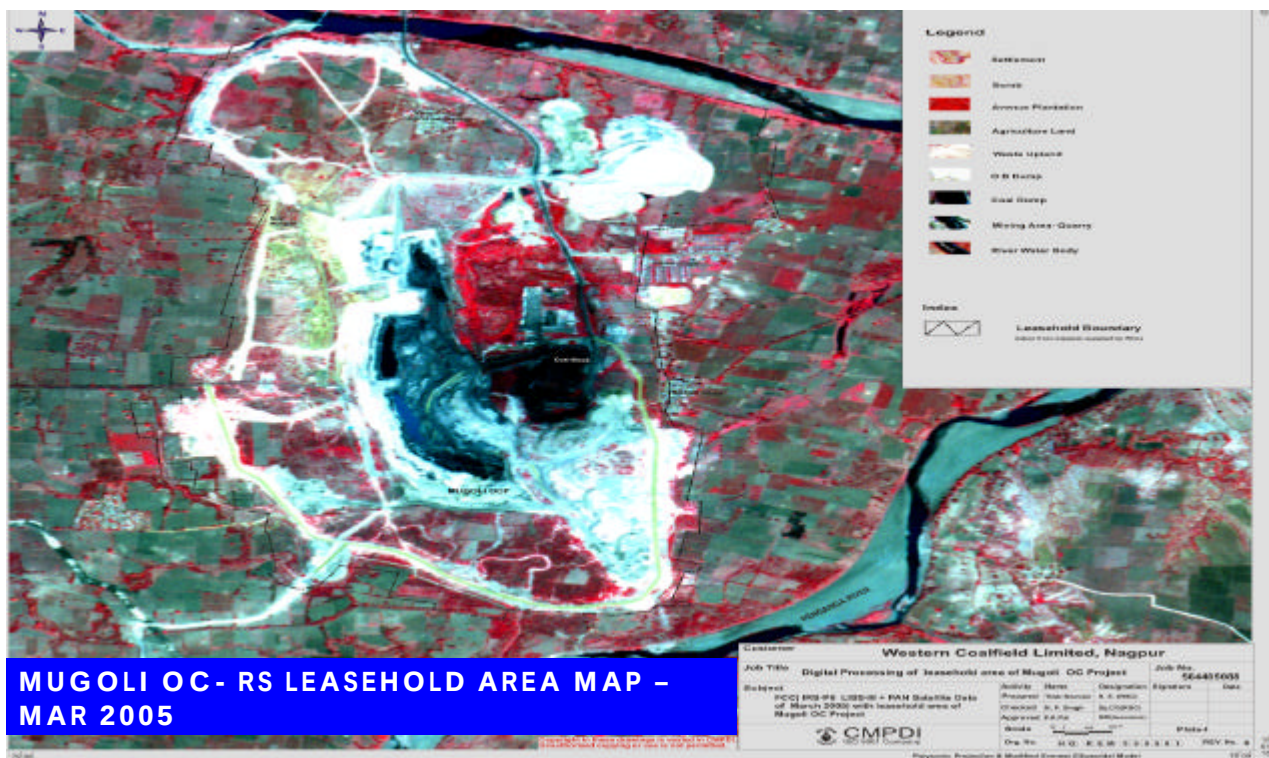
4	Around Infrastructure	10000	4.00	Partly Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
5	Around Workshop	13931	5.57	Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
6	Around CHP	8730	3.45	Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
TOTAL		2,06,592	82.60		

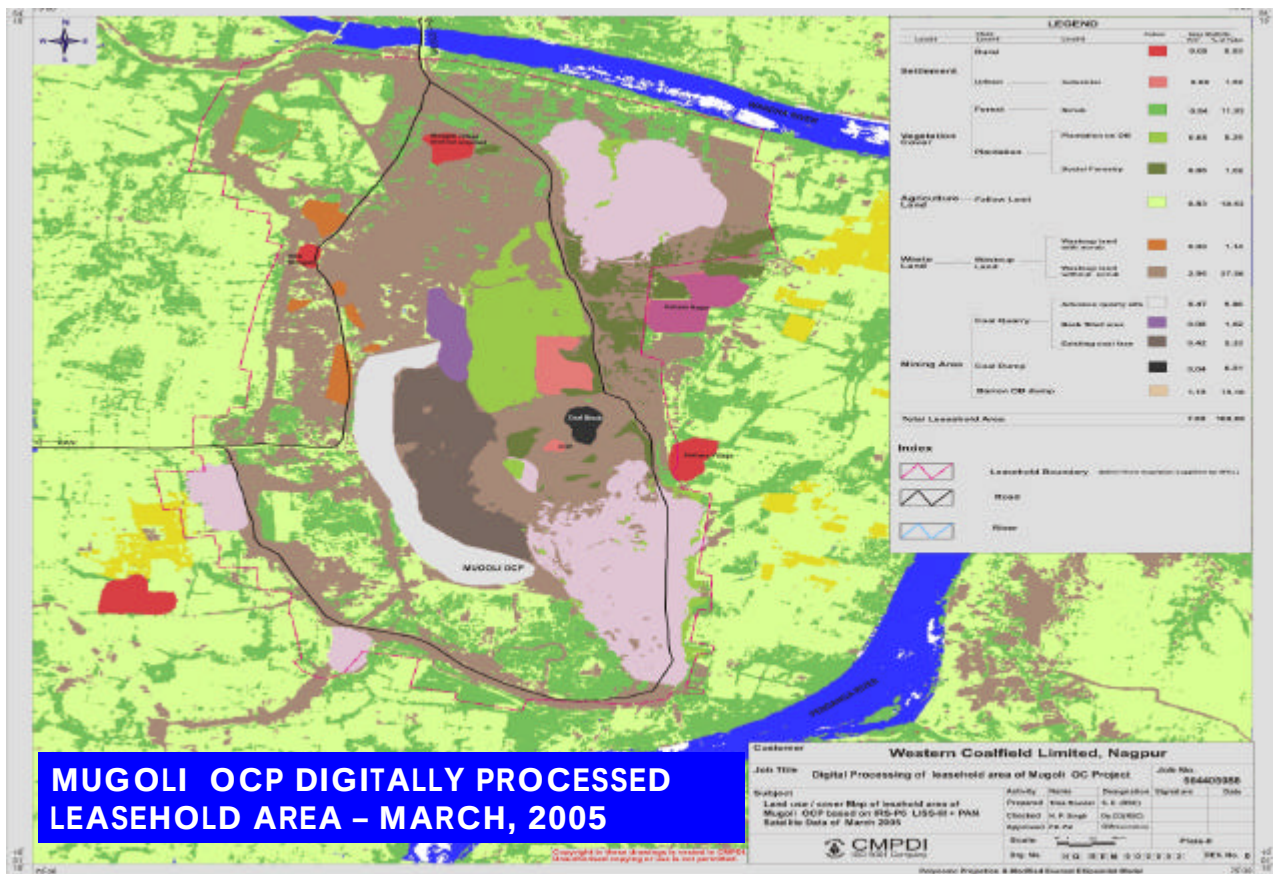
MINING LAND USE – PRESENT STATUS vis-à-vis EOM			
S.N.	PARTICULARS	PRESENT LAND USE IN ha	END OF MINE LIFE LAND USE IN ha
1	Quarry Area	165.89 (Active backfilling is going on in 37.29 ha. The depth is about 40 m)	207.00 (Void = 105.00 + Backfilled = 102.00)
2	External OB Dump	170.39 (Plantation = 37.39)	213.74 (Plantation = 71.90)
3	Danger zone for Blasting	167.00	167.00
4	Infrastructure & Roads	48.50	48.50
5	Embankment	33.42 (Plantation = 12.01)	33.42
6	Land for OB dumping in balance life	43.35	Nil
7	Land for Quarrying in balance life	41.11	Nil
8	Rationalization area	148.39 (Plantation = 32.80)	148.39 (Plantation = 32.80)
TOTAL		818.05	818.05

LAND USE COVER MAPS USING DIGITAL PROCESSING TECHNIQUES THROUGH SATELLITE IMAGERY

Objective of the land reclamation/restoration monitoring is to assess the area of backfilled, plantation, OB dumps, social forestry, active mining area, settlements and water bodies, distribution of wasteland, agricultural land and forest land in the leasehold area of the project. This is an important step taken up for assessing the progressive status of mined land reclamation and for taking up remedial measures, if any, required for environmental protection.

INTERPRETATION OF LAND USE COVER MAPS		
S.N.	PARTICULARS	DETAILS AT MARCH 2005
1	LEASEHOLD AREA	818.05 Ha.
2	SETTLEMENT	1.65 %
	a) RURAL	0.63 %
	b) URBAN	1.02 %
3	VEGETATION COVER	21.20 %
	a) PLANTATION ON OB DUMP	8.25 %
	b) BLOCK PLANTATION	1.02 %
	c) SHRUBS	11.93 %
4	AGRICULTURAL LAND	10.53 % (entirely fallow land)
5	MINING AREA	27.92 %
	a) ADVANCED QUARRY	5.96 %
	b) BACKFILLED AREA	1.02 %
	c) EXISTING COAL FACE	5.33 %
	d) COAL DUMP	0.51 %
	e) BARREN OB DUMP	15.10 %



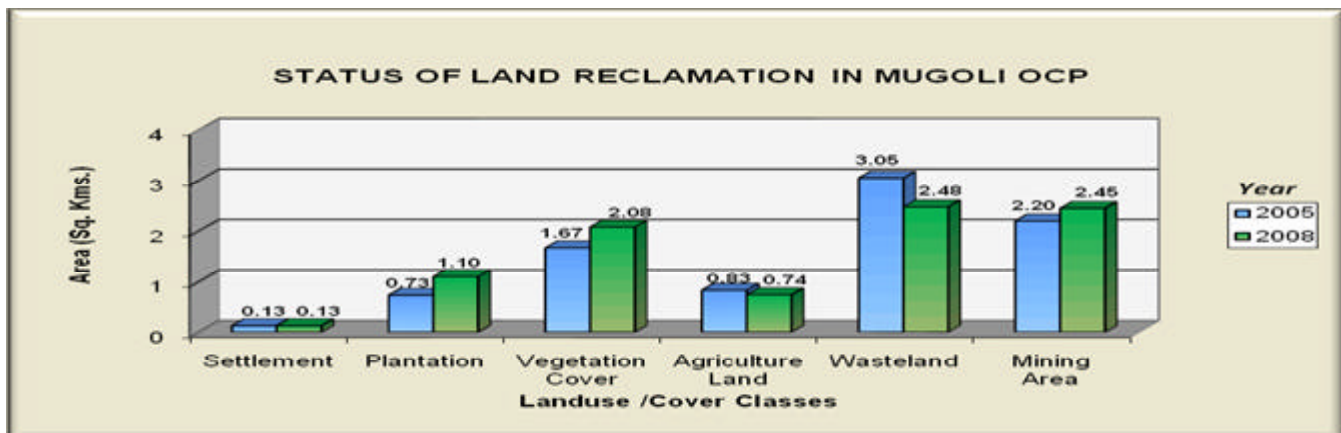


In addition to the above statutory Compliance, Opencast projects of WCL producing more than 5 million cubic m. (Coal + OB together) during the year 2008-09 have been taken up for land restoration / reclamation monitoring based on the *RESOURCESAT-1* satellite data using ERDAS Imaging digital image processing s/w on GIS platform. Land reclamation monitoring will be carried out **regularly on annual basis** to assess the progressive status of land restoration / reclamation in the above opencast mines. The report of this study has also been uploaded in the website of WCL in public domain. Following 10 OC projects producing more than 5 million cubic m. (Coal + OB together) of Western Coalfields Ltd. have been taken up for land reclamation monitoring on annual basis:

- Sasti
- Padmapur
- Durgapur
- **Mugoli**
- Umrer
- Ukni
- Niljai
- New Majri + Kawadi
- Pimpalgaon
- Ghugus

Study reveals that 78.59% of mining area has already been reclaimed by WCL out of which 41.12% area has been revegetated and 37.47% area are backfilled.

After analyzing the satellite data of year 2008, it is evident that plantation, carried out on backfilled area, OB dumps as well as under social forestry in all the mines under study in WCL, has increased from 12.42 Sq. Km. to 17.18 Sq. Km. in span of last three years.



Further after analyzing the data of 2008 vs 2009, it is evident plantation in these mines of WCL has increased 17.18 sq. km to 22.73 sq.km

Plantation programme for the balance life is as follows :-

Sl.No	Year	Plantation in Nos.	Area to be covered in ha
1	2010 -11	8750	3.50
2	2011 -12	10000	4.00
3	2012 – 13	12500	5.00
4	2013 – 14	12500	5.00
5	2014 - 15	12500	5.00
	Total	56250	22.50

5.0 ENVIRONMENTAL MONITORING PROGRAMME

5.1 ENVIRONMENTAL MONITORING – The environmental monitoring programme at present is being carried at the mine as per details given below: -

S. N.	Items	Parameters	Frequency	No. of Stations	Submission
1.	Ambient Air Quality Monitoring	SPM, RPM, SO ₂ , Nox, CO & Fugitive dust	Every Fortnight as per Environment Protection (Amendment), Rule 2000	5	Quarterly Report is submitted to SPCB & MOEF & will be continued.
2.	Water Quality Monitoring	1) 4 Parameters. 2) 35 Parameters	Every Fortnight Once in a Year	3	Quarterly Report is submitted to SPCB & MOEF & will be continued.
3.	Noise Quality Monitoring	Noise Levels	Every Fortnight	2	Quarterly Report is submitted to SPCB & MOEF & will be continued.
4.	Environmental Statement		Annual		Annually Report is submitted to SPCB before 30 th September & will be continued.
5.	Ground Water Level Monitoring & Quality	Water Level & Quality Parameters.	Water Level – Quarterly. Water Quality – Yearly.	In Buffer Zone Villages.	Quarterly Report is submitted to SPCB & MOEF & will be continued.
6.	Compliance Report of EC Conditions.	All conditions both Specific & General	1 st June & 1 st December	Not Applicable	Half yearly Report are submitted to & MOEF & will be continued.

6.0 ADDITIONAL STUDIES

6.1 RISK ASSESSMENT

Mining is a hazardous industry. There is risk to life and property associated with various mining and allied activities of the project. As such a detailed study has been carried out covering identification and assessment of risk, and recommendation of measures to prevent damage to life and property against such risks. They are discussed below.

6.1.1 LAND SLIDING IN OB DUMP AND MINE PIT:

There is only one composite coal seam, to be worked out in this opencast mine. The OB/Parting between the sections are to be removed by shovel dumper combination. It is therefore, necessary to take certain precautions while OB dumps are formed. In some cases, the top soil get mixed with rock soil in the dump, due to which there is a possibility of landslide, particularly in rainy season, unless suitable slope is maintained.

Therefore, steps are to be taken at the time of dumping of OB that the slope of dump does not go beyond the prescribed limit. Further, the topsoil dumping should be separate and it can be reused on the backfilled area.

6.1.1.1 Slope failure in OB dump :

It may be worthwhile to mention here that if proper care is not taken in designing proper bench height and bench slope, the OB dump may fail causing damage to life and property.

With this in view, a proper slope analysis has been done to determine the safe bench slope and bench height, which are given below;

Maxm. projected height of dump - 60 m.

No. of terraces and height of each stage - two, max. 30 m each

Over all slope - 28 degree.

In Mugoli OCP while forming & reclaiming external OB dumps, the above-mentioned guidelines regarding slope angle etc. are being tried.

6.1.2 MINE INUNDATION:

The mine pit receives water from three sources namely direct precipitation over mine area, surface run-off from surrounding area and seepage from strata. In heavy rainstorms, there may be situation where the mine would be flooded.

This may cause loss of human life and equipments. To guard against this situation. following steps are to be taken :

(A) Embankment has been constructed as a flood protection measures against Penganga and Wardha River.

(B) Provisions of garland drains around mine quarry are made. This will prevent surface run-off entering the mine pit. In order to divert the rainwater around the excavated portion a garland drain has to be made; which should have the gradient suitable for diverting the water to the river/or nallah part away from the mine opening. This garland drain should be cleaned and graded before the onset of monsoon. With the advance of quarry face the position of garland drain has to be shifted.

(C) Provisions of pumps: Adequate number of pumps has been provided to drain mine water even during maximum rainfall.

6.1.3 BLASTING:

For quarrying of coal and removal of overburden, blasting has to be done by use of explosives. Flying pieces generated by blasting may prove dangerous to life and property. Hence, all the precautionary measures suggested by D.G.M.S. will be strictly followed e.g. controlled blasting etc.

In addition, following precautions have been taken to avoid such dangerous situation.

(A) Blasting is to be done only once everyday.

(B) Before blasting is done, warning Sound is to be given so that people can

move to safe places.

(C) Area lying within safety zone is to be fenced.

6.1.4 OTHER MEASURES:

Other measures have also been recommended for avoiding risk in mine operation. They are discussed below;

(A) Provision of proper illumination in quarry, O.B. dumps area, along roads, in workshop & other work area.

(B) Communication system - Efficient communication system (based on VHF system) have been provided for the project. This will allow proper communication link between various work centers and helps in avoiding accidents.

(C) Maintenance facilities - The project will employ a large number of HEMMs for quarrying and transportation of local and OB. Ill - maintained HEMMs may prove to be the source of grave risk. A well-equipped workshop will be provided for scheduled maintenance of HEMMs to avoid their failures.

(D) Training - Coal industry has set up a number of training institutes for imparting training to its employees. These training raise the safety awareness among workers and train them to carry out their assignments safely.

(E) Medical aid - The project has provided for well equipped hospital and qualified doctors. They can attend to medical emergencies arising out of accidents.

6.1.5 CONCLUSIONS:

Following conclusions may be drawn from the above discussion:

(a) Coal mining is associated with a number of hazards.

(b) These hazards can be identified and assessed, which has been done for this project.

(c) Preventive measures against identified risks have been provided in this report

(d) With adoption of such protective measures, the operation of the mine would be safe.

6.2 SOCIO-ECONOMIC IMPACT ASSESSMENT

Peripheral development:

As per the present practices in WCL coal mines, adequate steps are being taken for the local villagers by providing various infrastructure and welfare facilities and giving assistance in health care in Wani Area of WCL, under which the existing Mugoli OC project is in operation.

The various development works like construction of Primary, School, Post office, Shopping center, diversion of cart track for villagers, establishment of bank, diversion of irrigation canal etc; have been completed, mainly for catering to the needs/socio-economic upliftment of the neighbouring population. The details are as follows:-

YEAR	NAME OF WORK	AMOUNT SPENT (Rs.)
1994-95	For providing Borehole / Hand pump for drinking water & furniture for Primary school / High school to Sakhara, Mugoli & New Kolgaon village	75000/-
1995-96	Nil	Nil
1996-97	a) Furniture for Sakhara / Mugoli / Kolgaon Z.P. school	65000/-
	b) Construction of Bus stand at Kolgaon	25000/-
	SUB TOTAL	90000/-
	CD WORK:-	
	a) Rural sports / sports for villagers, furniture for Z.P. school of Sakhara, Mugoli / Kolgaon etc.	15000/-
1997-98	Nil	
1998-99	Nil	
1999-00	Construction of Community Centre at Bhimnagar, Mugoli	100000/-
2000-01	Chairs / Table / Almirah, Sound System to Community Centre, Bhimnagar, Mugoli	40000/-
	CD WORK:-	
	a) Construction of laboratory hall to Adarsha High School, Sakhara	122000/-
	b) Tatpatti, Chair, Almirah, Music Instrument, Playing materials to Z.P. school of Matholi, Kolgaon, Sakhara & Mugoli	30000/-
	c) Sakhara, Kolgaon village sports	2500/-
	SUB TOTAL	154500/-
2001-02	CD WORK:-	
	a) Village sports, Mugoli	5000/-
2002-03	a) One additional Hand pump, Drain repair at Bhimnagar & Hand pump repair at Mugoli	30000/-
	b) Books for library of Mugoli	2000/-
	c) One Hand pump & repair of Kolgaon school building	40000/-
	d) Repairing of WBM road from Matholi to Sakhara	45000/-
	e) Providing & fixing of Barbed wire fencing for SC / ST land at Kolgaon	30000/-
	f) Furniture for library of Kolgaon village	25000/-
	g) Furniture for Jyotiba Fule library, Kailashnagar	15000/-
	h) Books for Jyotiba Fule library, Kailashnagr	5000/-
	SUB TOTAL	192000/-
2003-04	a) Construction of drain at Bhimnagar rehabilitation site at Mugoli	120000/-
	b) Repairing of WBM road at Kolgaon village	110000/-
	c) Pipeline alongwith water tank at Matholi vilage	30000/-
	SUB TOTAL	260000/-

YEAR	NAME OF WORK	AMOUNT SPENT (Rs.)
2004-05	a) Construction of compound wall of community center, Bhimnagar	79000/-
	b) Construction of one room for library of Kolgaon	50000/-
	c) Mats for 3 Primary Z.P. school Mugoli, Matholi & Kolgaon	30000/-
	SUB TOTAL	159000/-
2005-06	a) Extension of drain at Bhimnagar	44000/-
	b) Hand pump at Kolgaon rehabilitation village	30000/-
	c) Repairing of WBM road to Arterial road to Mugoli village	100000/-
	d) Books & furniture for Kolgaon library	50000/-
	SUB TOTAL	224000/-
2006-07	a) Roofing of Stage at Bhimnagar	125000/-
	CD WORK:-	
	a) Extension of 2 rooms for primary school at Matholi village	97000/-
	SUB TOTAL	2,22,000
2007-08	Construction of approach road to Mungoli village joining to Arterial road (Balance work upto culvert at Mungoli OCP)	1,00,000/-
	Construction of shed for community Hall at Mothli	4,97,000/-
	Fencing & Miscellaneous works for Ramabai Ambedkar Library at Kolgaon village under SC-ST & 20 Poing programme at Mungoli OCP	1,19,000/-
	Making culvert for Shioni village under CD works	3,59,000/-
	Approach road from Embankment to culvert of Shioni village under C.D. wrks at Mungoli OCP	1,48,000/-
	SUB TOTAL	12,23,000/-
2008-09	Construction of road at Bhimnagar SC/ST Programme	5,29,000/-
	Development works to Primary School & Community Hall at Matholi village	4,01,000/-
	Construction of shed for community place jugad	5,19,000/-
	SUB TOTAL	14,49,000
2009-10	Drinking water tank & toilets for students of Adarsh High School at Sakhra village.	1,24,000/-
	Development work at Community place at Jugad	82,000/-
	Protective work at culvert on approach to Shioni village	82,000/-
	Concrete road at Sakhra village 150 x 3 mtr.	2,32,000/-
	SUB TOTAL	5,20,000/-

Wani area is doing excellent job in the field of education, sanitation, cultural activities, tree plantation in the nearby villages through Mahila Mandal and other social organization. In addition to above community development work camps of different medical activities are regularly organized on yearly basis.

The socio – economic measures already undertaken have been discussed earlier. It may be seen that the eco-development measures including welfare measures are regularly undertaken and, in future, the welfare measures will continue to be taken based on the assessment of the "felt needs" of the community around the project.

REHABILITATION SCHEME

Resettlement of 11 families of Bhimnagar Basti & 40 families of Kolgaon village had been completed and land losers have been suitably compensated as per norms. No further resettlement of any House Oustees as well as rehabilitation of land oustees envisaged during the balance life of the mine.

7.0 PROJECT BENEFITS

The benefits of the project can be summarized as below:-

- The physical infrastructure in the area has already been improved substantially by following ways:-

- a) Development of road, Road Bridge over Wardha River, thereby improving the communication.
- b) Improvement in Power, Telephone (including Mobile) facility.
- c) Improvement in Health Care facility & Educational facility.
- d) Improvement in Market / Trade & Business.

- The social infrastructure by way of cultural mixing of people of other states with local community glorifying "UNITY IN DIVERSITY".

- Substantial employment in the project & indirect employment for business & trading, contractor, transportation, vehicle contractor, nursery development.

8.0 ENVIRONMENTAL MANAGEMENT PLAN

The administrative organization for ensuring that the mitigative measures for control of pollution are continued to be maintained and operated (& if necessary augmented) and also for monitoring the effectiveness of the total system there is three tier set– up.

MONITORING ORGANISATION

To have a close watch on the environmental condition and implementation of the various measures suggested, a multi-disciplinary approach is essential.

(a) WCL headquarter acts as an apex body which supervises the activities relating to environment at project level through the General Manager.

(b) General Manager of the area coordinates the activities of various disciplines in the area to render all necessary assistance at the implementing level i.e. the Project. Area Nodal Officer (Environment) monitors all aspects of environment on behalf of the General Manager. He also takes suitable steps for generation of environment data along with its analysis and interpretations.

As far as plantation is concerned horticulturist with suitable backup staff shall be provided in the area for undertaking the plantation jobs including raising of a nursery. Plantation will have to be done on a large area. Therefore, it may be desired that an outside agency may have to be employed for this purpose. The horticulturist along with the supervisor shall only monitor and guide the agency for selection of site,

treatment of soil, selection of species etc.

(c) Sub Area Manager is responsible for mechanical reclamation of the area. He is also responsible for biological reclamation with the assistance of GM's office.

ORGANISATION FOR ENVIRONMENT MANAGEMENT

S.N	Measures/Actions		Agency
1.	Environmental Control	1	Chief General Manager, Wani Area
		2	Nodal Officer, (Environment), Wani Area
		3	Sub Area Manager, Mugoli OC Expn.
		4	Staff Officer (Civil), Wani Area
		5	Environmental Cell (WCL H.Q.)
2.	Environmental Monitoring	1	Chief General Manager, Wani Area
		2	Staff Officer (Civil), Wani Area
		3	Nodal Officer (Environment), Wani Area.
		4	Sub Area Manager, Mugoli OC Expn.
		5	Environment Cell of WCL Headquarters
		6	Environmental Laboratory of CMPDI, RI-IV
3.	Reclamation	1	Sub Area Manager, Mugoli OC Expn.
		2	Nodal Officer (Environment), Wani Area
		3	Environmental Supervisor
		4	Horticulturist

8.1 ENVIRONMENTAL COST

The details of expenditure incurred till date on environmental mitigation measures both under Capital & Revenue head is given as below :-

CAPITAL EXPENDITURE:-

ACCOUNT HEAD	PROGRESSIVE
Reclamation (HEMM)	3.01 Lakhs
Air Pollution Control	109.85 Lakhs
Water Pollution control	36.76 Lakhs
TOTAL	149.62 Lakhs

REVENUE / OTHER EXPENDITURE:-

ACCOUNT HEAD	PROGRESSIVE
Afforestation	60.22 Lakhs
Monitoring	20.45 Lakhs
Air Pollution	23.65 Lakhs
Water Pollution	28.22 Lakhs
Legal Expenses (Consent fee for Air, Water & Hazardous Waste)	17.675 Lakhs
Environment Statement	1.08 Lakhs
Rainwater Harvesting	4.65 Lakhs
Total	150.855 Lakhs

9.0 CONCLUSION

From earlier paragraphs, it can be inferred that the adverse impact on physical environmental attributes due to increase in the production from sanctioned capacity is almost insignificant/negligible. This has mainly been possible because of various control measures already undertaken in the project.

As such, even during the future years, when production targets are likely to be above the sanctioned capacity, the impacts of coal mining (with higher production) on environment are not likely to be significant and the pollution control measures already undertaken and being undertaken will be capable enough to tackle extra pollution load generated due to enhanced production and pollution control measures will be further strengthened, if need arises.

In view of the above, Public Hearing for Mugoli OC expansion project, Tahsil – Wani, Dist. – Yavatmal for enhancement of production capacity from 2.50 MTPA to 4.00 MTPA with same land area of 818.05 ha may be conducted as per direction of MOEF under EIA Notification 2006 based on the attached EIA/EMP and Executive Summary as above.

***ENVIRONMENTAL
IMPACT ASSESSMENT
AND
ENVIRONMENTAL
MANAGEMENT PLAN
(PUBLIC HEARING DOCUMENT)
FOR
MUGOLI OC EXPN. PROJECT***

Wani Area, WCL

**(For expansion in Production capacity from 2.50 MTPA to 4.00
MTPA & within same Land Area 818.05 ha)**

(PREPARED AS PER MoEF DIRECTIVES)

NOVEMBER - 2010

Prepared by.

**Environment Department
WCL (HQ), Coal Estate
Civil Lines, NAGPUR – 440 001**

EIA/EMP
FOR
PUBLIC HEARING
(AS PER EIA NOTIFICATION SEPT' 06)
OF
MUGOLI OC
EXPANSION PROJECT
(Expansion from 2.50 MTPA TO 4.00 MTPA)

NOVEMBER – 2010

Prepared by :-

Environment Department
WCL (HQ), Coal Estate
Civil Lines, NAGPUR – 440 001

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SL.NO	CHAPTER NO.	PARTICULARS	PAGE NO.
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LIST OF PLATES

SL.NO	PLATENO.	PARTICULARS
1.	I	Location plan of mine.
2	II	Index Plan showing Main Drainage in Core & Buffer zone.
3	III	Index Plan Showing important features in Core & Buffer Zone
4	IV	Existing Quarry & Surface layout Plan
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6	VI	Final Stage Land Use Plan
7	VII	Section (Final Stage)

LIST OF ANNEXURES

SL.NO	Annexure – No.	PARTICULARS
1	I	Copy of MOEF Letter

EXECUTIVE SUMMARY

FOR

EIA/EMP

OF

MUGOLI OC Expn.

(For Enhanced Production from 2.50 MTPA to 4.00 MTPA)

(WANI AREA)

NOVEMBER - 2010

Prepared by.

**Environment Department
WCL (HQ), Coal Estate
Civil Lines, NAGPUR – 440 001**

EXECUTIVE SUMMARY

1.1 INTRODUCTION

Mugoli Opencast Project of Western Coalfields Limited was opened in January, 1995 after having its Project Report (PR) approved by the competent authority on 6.06.1990 and the Environmental Management Plan (EMP) was also approved by the Ministry of Environment & Forest (MOEF) vide letter dated 13.08.1991. As per approved PR/EMP, the project was having a sanctioned capacity of 0.80 Million Tonnes per year (MTPA) of coal.

An adjoining mine namely Nirguda OC project with EMP Clearance & Consent for 0.75 MTPA had to be amalgamated with Mugoli OC mine recently due to reasons explained below:

- j. There is no barrier between two mines.
- ii. The two mines are having a common catchment area.
- iii. The two mines are being worked with a common access trench.

This amalgamation has got the approval of competent authority of WCL as well as Directorate General of Mines Safety (DGMS).

The salient feature of the amalgamated mine are as under: -

iv. Name: - Mugoli OC Extension

- v. Land: - 818 .05 Ha** [Mugoli OC – 539.0 Ha (as per approved PR/EMP) + Nirguda OC – 279.05 Ha (as per approved PR/EMP)]

It may be noted here that there is no increase in the land requirement of individual project, but it is only an amalgamation of two projects made into one.

- vi. Capacity: - 1.55 MTPA**
(0.80 MTPA as per approved PR/EMP of Mugoli OC
+ 0.75 MTPA as per approved PR/EMP of Nirguda OC)

As such, the EMP of amalgamated mine was prepared for seeking ex-post facto environmental clearance from Central Government in terms of MOEF's Circular dated 14.05.2002 for amalgamated production upto 1.55 MTPA with land area of 818.05 ha (as shown above).

The EIA/EMP for the said amalgamated mine for a production capacity of 1.55 MTPA with land area of 818.05 ha was approved by Ministry of Environment and Forests (MOEF) vide its letter no J – 11015 / 82/2005.IA. II (M) dated 20.05.2005.

Further, expansion of Mugoli OC mine for production capacity up to 2.50 MTPA only was subsequently taken up and the environmental clearance for the same has since been received from MOEF vide its letter no. J-11015/277 /2008 IA.II (M) dated 04/05/2009.

1.2 PURPOSE

Now it is seen that even after amalgamation with production of 2.50 MTPA from the existing mine the demand on WCL (especially Wani Area) for power grade coal is increasing and since the mine has the requisite potential, an expansion scheme has been taken up in right earnest. WCL, therefore, proposes to take up the expansion.

The total production including the expansion will thus be 4.00 MTPA from the amalgamated mine without any increase in land area. .

As such duly filled in Form – 1 application along with draft TOR, This feasibility report and Addendum EIA was submitted to MOEF for obtaining Environmental Clearance under Clause 7.2 of EIA Notification, 2006. As directed by MOEF, the Public Hearing document has been prepared and submitted to MPCB for conducting Public Hearing.

2.0 PROJECT DESCRIPTION

2.1 LOCATION

The existing Mugoli Opencast Project is situated in Mugoli Block of Wardha Valley Coalfield. Mugoli Block is located in Wani Tahsil of Yavatmal district in the State of Maharashtra. The Block is bounded by Latitudes 19 Deg. 15' 44" N - 19 Deg. 54' 15" N and Longitudes 79 Deg. 5' 40" E - 79 Deg. 6' 40" E.

2.6 COMMUNICATION

The area under consideration is at a distance of 35 km by road from Wani Town of Yavatmal district.

2.7 TOPOGRAPHY & DRAINAGE

Topography of the area is slightly undulating with elevations ranging from 198 m to 214 m above MSL. The main drainage channels flow towards Wardha River in the North and Penganga River in the South. Nirguda nullah joins Wardha River to the North of Mugoli Block and Penganga river joins Wardha river to the East of this Block.

2.8 JUSTIFICATION FOR ENHANCEMENT & LINKAGE

The mines of WCL are under the constant pressure to meet increasing demand of non-coking coal for powerhouses and other miscellaneous customers. To bridge this deficit, new mines will have to be opened and simultaneously production from presently operating opencast mines are to be increased substantially in Maharashtra State or else MSEB will continue to receive coal from distant coalfields like Ib Valley and Central India Coalfields thereby burdening the existing rail-road network and hence, electricity consumers. Thus, it is envisaged that the production from this mine is enhanced up to 4.00 MTPA and will, thus, be able to bridge the gap between the demand and supply to the extent of planned production from XI Plan period onwards.

2.9 MINING PARAMETERS

2.5.1 Geology & Structure

Mugoli Block is covered by thick soil. However, occasional isolated patches of Kamthi Sandstone are exposed in the gullies near riverbanks. A thick seam of 25 m split into two parts; namely top split and bottom split which is separated by a parting varying in thickness from 1.44 m to 5.49 m.

The general strike of coal seam in Mugoli Block is NW to SE in Northern Part and takes a swing to North to South in Central Part and NW to SE in Southern Part. The gradient of coal seam is 1 in 10 in Northern Part, 1 in 11 to 1 in 15 in Central Part and 1 in 3 to 1 in 9 in Southern Part of the property. The gradient of coal seam is towards South, West and West. The net mine-able reserve as per approved project reports of Mugoli OC & Nirguda OC is 25.96 Mt. In addition, 5.75 Mt is also made available within this mine lease because of amalgamation, leading to total reserve of 31.71 Mt. Till 31.03.2010, total coal extracted is 20.462 Mt. Hence, balance coal available as on 01.04.2010 is 11.248 Mt.

2.5.2 Mining Technology

As suggested in the approved PR, the mine is being worked by Shovel-Dumper System. Total OB as per approved PR of Mugoli OC & Nirguda OC has been estimated to be 98.53 Mm³ at an average Stripping Ratio of 3.86 m³/t. The OB excavated till 31.03.2010 is 54.33 Mm³ and hence balance OB to be excavated is 44.20 Mm³.

Target & Life

In order to meet the ever growing demand of power grade coal it is proposed to enhance the production capacity of the project under consideration from present level of **2.50 MTPA to 4.00 MTPA** (peak capacity) without any increase in land area. The balance life is 5 years.

Performance last Five Years

The performance of the mine in last five years in respect of coal production and OB excavation is given as below:-

Year	Coal Production in Tonnes	OB removal in Cubic Metre
2005-06	1796580	3766871
2006-07	1854690	2771144
2007 – 08	1915250	3584853
2008 – 09	2038634	8254568
2009 - 10	2326540	7374583

The projected life as per the balance coal and the peak capacity envisaged (4.00 MTPA) is coming about 5 years. The calendar programme is as given below:-

Year	Coal Production in Tonnes	OB removal in Cubic Metre
2010- 11	30,00,000	7810000
2011- 12	40,00,000	9000000
2012 – 13	30,00,000	10000000
2013 – 14	9,00,000	11000000
2014 - 15	3,48,000	6400000

Present status of HEMM's

1. Three E.K.G. Shovels (one of 4.6Cum. capacity & 02 of 5Cum. Capacity) are engaged in OB removal. In addition one Hydraulic Excavator (TATA EX-1200 D) of 5 Cum. Capacity is also engaged in OB removal in Mungoli Patch.

2. Three Hydraulic Excavators (All of 2.8 Cum. Capacity) are engaged in lifting of Coal.
3. 16 Nos. of 35T dumpers and 11 Nos. of 50T dumpers are engaged with Shovels and Excavators.
4. 05 Nos. of Dozers and 04 Nos. Drills are supporting in production work.

Mine Capacity and Capacity Utilization

The mine Capacity as on 01.04.2010 is as given below:-

- a) Loading Capacity = 4.2900 Mill. Cum.
- b) Hauling Capacity = 3.3009 Mill. Cum.

Capacity Utilization (2009-10) = 114.77% (Achieved)

Capacity Utilization (2010-11) = 130.00% (Targeted)

Capacity Utilization Achieved upto May,2010 = 130%

Concerted endeavor is being made to achieve 140% of capacity utilization with existing HEMMs of Mungoli OCM.

With the targeted Capacity Utilization, it is proposed to achieve the peak production capacity of 4.00 MTPA with the existing HEMMs.

Solid Waste Management

As already mentioned, total OB excavated till 31.03.2010 is 54.33 million cubic metre. The distribution is as follows :-

- ❖ OB in external Dump – 42.33 million cubic metre
- ❖ OB in internal Dump – 5.10 million cubic metre
- ❖ OB in embankment – 6.9 million cubic metre

The proposed programme for the balance life is as follows:-

Year	OB removal in Cubic Metre	Distribution of OB in Cubic Metre	
		In External Dump	In Internal Dump
2010- 11	7810000	6810000	1000000
2011- 12	9000000	7500000	1500000
2012 – 13	10000000	8000000	2000000
2013 – 14	11000000	7500000	3500000
2014 - 15	6400000	500000	5900000

2.5.4 LAND USE PATTERN

2.5.3.1 Pre-Mining Land Use

Total requirement of the project, as estimated in PR/EMP is 818.05 ha. Pre-mining Land Use Pattern was as follows:

Sl.No.	Particulars	Land (ha)
1.	Agricultural Land	758.54
2.	Govt. Land	59.51
	TOTAL	818.05

There is no forestland involved in this Project.

2.5.3.2 Present Land Use

S.N.	PARTICULARS	PRESENT LAND USE IN ha
1	Quarry Area	165.89 (Active backfilling is going on in 37.29 ha. The depth is about 40 m)
2	External OB Dump	170.39 (Plantation = 37.39)
3	Danger Zone for Blasting	167.00
4	Infrastructure & Roads	48.50
5	Embankment	33.42 (Plantation = 12.01)
6	Land for OB Dumping in balance life	43.35
7	Land for Quarrying in balance life	41.11
8	Rationalization Area	148.39 (Plantation = 32.80)
TOTAL		818.05

3.0 DESCRIPTION OF THE ENVIRONMENT

3.1 AMBIENT AIR QUALITY

A) Base line & Existing Scenario – Base line ambient air quality w.r.t. the mine under consideration has also been generated during the winter season at six locations during 2009 covering the core and Buffer zone. The ambient air quality data thus generated reveal that the quality of ambient air is well within the permissible limits. The summarized details are as follows:-

APPROACH METHODOLOGY

Micrometeorological data generation

A meteorology station has been set up at Core-zone and micrometeorological parameters like wind velocity, wind direction, temperature, relative humidity, cloud cover etc. are recorded on hourly basis for 90 days from 01st December`09 to 28<sup>th</sup> February`2010 representing winter season. Daily rainfall also has been recorded and reported.

Ambient air quality monitoring

Ambient air quality was monitored at 6 locations i.e. one in core zone and the remaining five in buffer zone. A total of 24 samples (24-hrly) for SPM & RPM and 72 samples (8-hrly) for SO₂ and NO_x samples were collected from each location during the study period and analyzed.

DATA ANALYSIS AND RESULTS

Micrometeorology

The wind velocity readings were ranging from 0.4 – 13.8 km/hr. Predominant wind was from Northeast (NE) direction. The maximum temperature recorded was 26.0°C and the minimum was 13.5°C. The mean relative humidity was found to 65.0% and no rainfall was recorded during the study period.

Air quality

Core zone

SPM and RPM values are ranging from 130 - 179 $\mu\text{g}/\text{m}^3$ and 36 $\mu\text{g}/\text{m}^3$ to 58 $\mu\text{g}/\text{m}^3$ respectively. SO_2 and NO_x values are varying between 5.3 to 11.1 $\mu\text{g}/\text{m}^3$ and 6.5 to 12.2 $\mu\text{g}/\text{m}^3$ respectively. **All the values are found to be well within the Standards for Coalmines stipulated by Ministry of Environment & Forests (MoEF).**

Buffer zone

SPM and RPM values are ranging from 91 $\mu\text{g}/\text{m}^3$ to 161 $\mu\text{g}/\text{m}^3$ and 34 $\mu\text{g}/\text{m}^3$ to 75 $\mu\text{g}/\text{m}^3$ respectively. SO_2 and NO_x values are varying between 5.4 – 10.7 and 6.5 – 12.3 $\mu\text{g}/\text{m}^3$ respectively. **All RPM, SO_2 and NO_x values are well within the CPCB norms.**

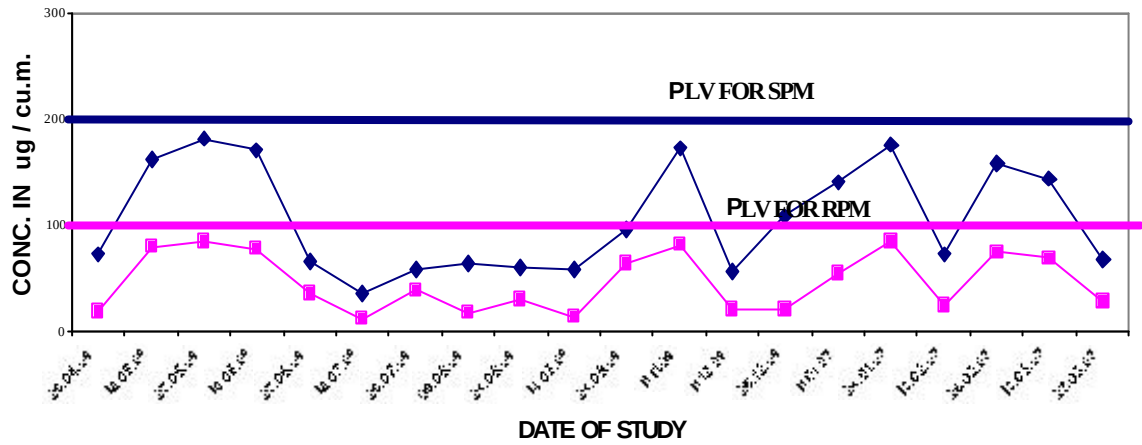
The existing environmental air quality for CO, SO_2 , NO_x , SPM and RPM (including fugitive emissions) are being monitored continuously as per Environmental Protection (Amendment) Rule, 2000 in the mine area every fortnight and analysis result of which show that the various quality parameters are well within the permissible limits.

Ambient Air Quality Monitoring locations :

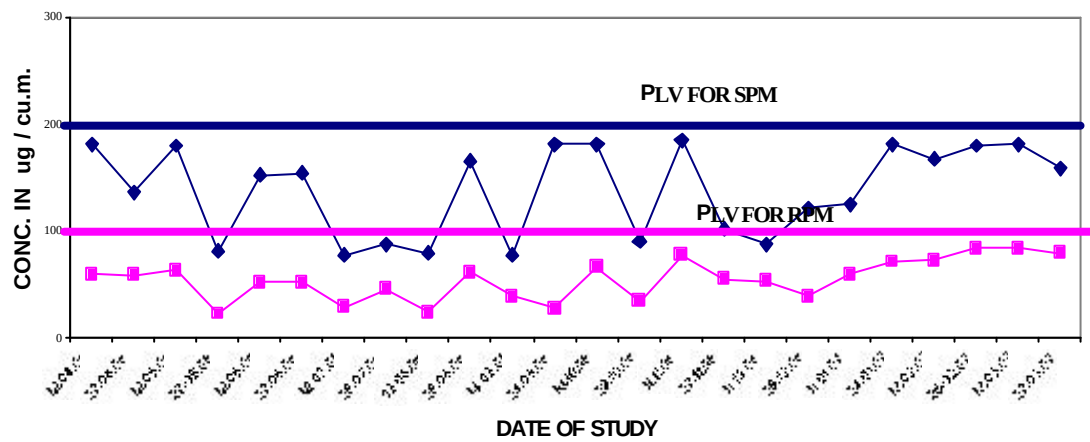
<u>S.No.</u>	<u>Location Details</u>	<u>Location Code</u>
1.	Sub-station -	WMOA-1
2.	Kailash Nagar township (Filter Plant) -	WMOA-2
3.	Tube well near Sakhara village -	WMOA-3
4.	SAM Office	WMOA-4

The representation in graphical form (2005 – 2007) is as given in subsequent pages.

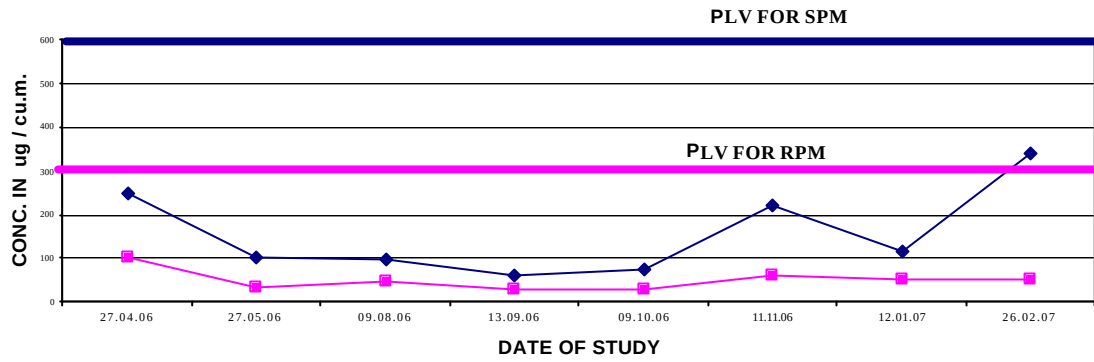
MUGOLI OC - KAILASH NAGAR TOWNSHIP



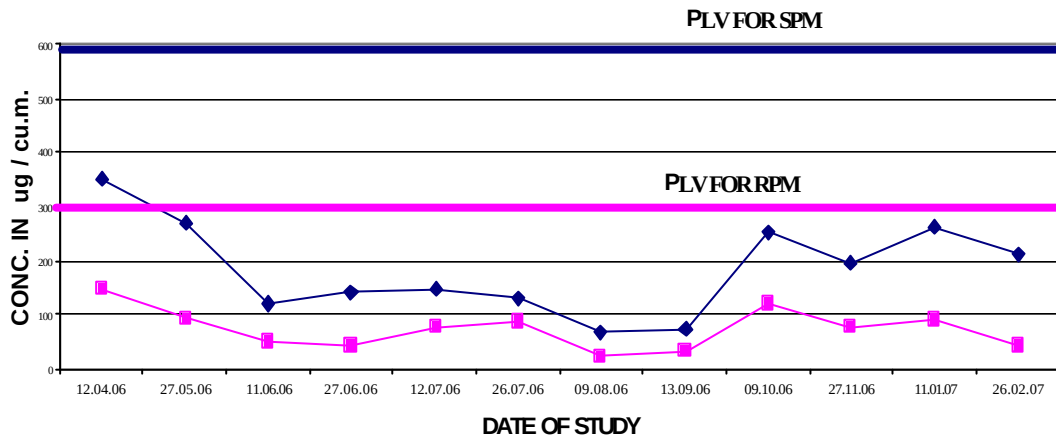
MUGOLI OC - SAKHARA VILLAGE(NEAR TUBEWELL)



MUGOLI OC - SAM OFFICE



MUGOLI OC - SUBSTATION

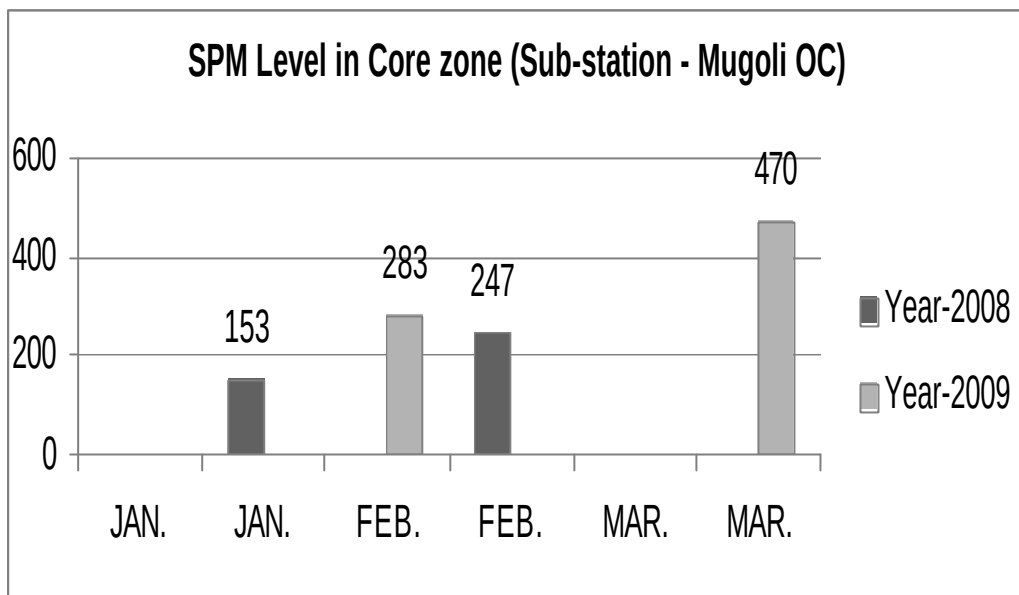


Further the results of regular environmental monitoring data from March 2009 to March 2010 is also placed below ;-

NAME OF THE COMPANY : WCL YEAR : 2009
NAME OF THE AREA : WANI Q.E. : MAR.
NAME OF THE PROJECT : MUGOLI OCP

1. Sub-station					: WMOA-1 (24 hourly values in µg/m ³)		
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
FEB. 2009	11.02.09	-	12.02.09	283	99	<6	<6
MAR. 2009	27.03.09	-	28.03.09	470	203	<6	<6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120
2. Kailashnagar township near Filter Plant					: WMOA-2 (24 hourly values in µg/m ³)		
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2009	12.01.09	-	13.01.09	100	39	< 6	< 6
JAN. 2009	24.01.09	-	25.01.09	183	88	< 6	< 6
FEB. 2009	11.02.09	-	12.02.09	196	87	< 6	< 6
FEB. 2009	25.02.09	-	26.02.09	182	60	< 6	< 6
MAR. 2009	08.03.09	-	09.03.09	188	84	< 6	< 6
MAR. 2009	28.03.09	-	29.03.09	163	70	< 6	< 6
Permissible Limits				200	100	80	80

3. Tubewell near Sakhara village : WMOA-3							
(24 hourly values in µg/m³)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2009	11.01.09	-	12.01.09	131	30	< 6	< 6
JAN. 2009	24.01.09	-	25.01.09	182	81	< 6	< 6
FEB. 2009	12.02.09	-	13.02.09	189	79	< 6	< 6
FEB. 2009	25.02.09	-	26.02.09	185	83	< 6	< 6
MAR. 2009	08.03.09	-	09.03.09	174	63	< 6	< 6
MAR. 2009	28.03.09	-	29.03.09	184	82	< 6	< 6
Permissible Limits				200	100	80	80
4. SAM Office : WMOA-4							
(24 hourly values in µg/m³)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2009	24.01.09	-	25.01.09	179	84	< 6	< 6
MAR. 2009	27.03.09	-	28.03.09	209	72	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120



FUGITIVE DUST MONITORING DATA

1. Security Check Post

(24 hourly values in $\mu\text{g}/\text{m}^3$)

Month	Dates of Sampling		Parameters
	From	To	SPM
FEB. 2009	26.02.09	27.02.09	994

CO MONITORING DATA

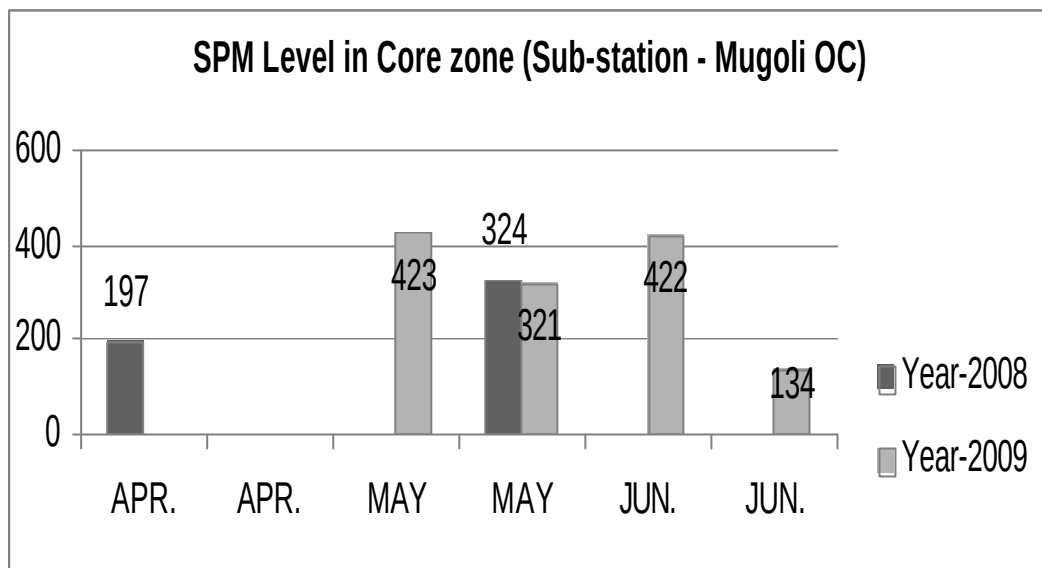
(All values are given in $\mu\text{g}/\text{m}^3$)

Sl. No.	Monitoring Location	Monitoring Date	Observed Value	NAAQ Standards (1 hour)
1.	Substation	12.02.09	< 114.3	10000
2.	Kailashnagar township	12.02.09	< 114.3	4000
3.	Sakhara village	12.02.09	< 114.3	4000
4.	SAM office	12.02.09	< 114.3	10000

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2009
 NAME OF THE AREA : WANI Q.E. : JUN.
 NAME OF THE PROJECT : MUGOLI OCP

1. Sub-station : WMOA-1 (24 hourly values in µg/m³)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO2
MAY 2009	13.05.09	-	14.05.09	423	194	< 6	< 6
MAY 2009	27.05.09	-	28.05.09	321	140	< 6	< 6
JUN. 2009	13.06.09	-	14.06.09	422	163	< 6	< 6
JUN. 2009	27.06.09	-	28.06.09	134	51	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120
2. Kailashnagar township near Filter Plant : WMOA-2 (24 hourly values in µg/m³)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO2
APR. 2009	13.04.09	-	14.04.09	138	54	< 6	< 6
APR. 2009	28.04.09	-	29.04.09	97	47	< 6	< 6
MAY 2009	13.05.09	-	14.05.09	189	63	< 6	< 6
MAY 2009	27.05.09	-	28.05.09	186	86	< 6	< 6
JUN. 2009	13.06.09	-	14.06.09	190	87	< 6	< 6
JUN. 2009	26.06.09	-	27.06.09	193	85	< 6	< 6
Permissible Limits				200	100	80	80
3. Tubewell near Sakhara village : WMOA-3 (24 hourly values in µg/m³)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO2
APR. 2009	13.04.09	-	14.04.09	179	56	< 6	< 6
APR. 2009	27.04.09	-	28.04.09	178	83	< 6	< 6
MAY 2009	13.05.09	-	14.05.09	162	75	< 6	< 6
MAY 2009	27.05.09	-	28.05.09	146	63	< 6	< 6
JUN. 2009	13.06.09	-	14.06.09	192	85	< 6	< 6
JUN. 2009	26.06.09	-	27.06.09	158	63	< 6	< 6
Permissible Limits				200	100	80	80
4. SAM Office : WMOA-4 (24 hourly values in µg/m³)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO2
APR. 2009	27.04.09	-	28.04.09	152	67	< 6	< 6
MAY 2009	28.05.09	-	29.05.09	267	108	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120



FUGITIVE DUST MONITORING DATA

1. Security Check Post

(24 hourly values in $\mu\text{g}/\text{m}^3$)

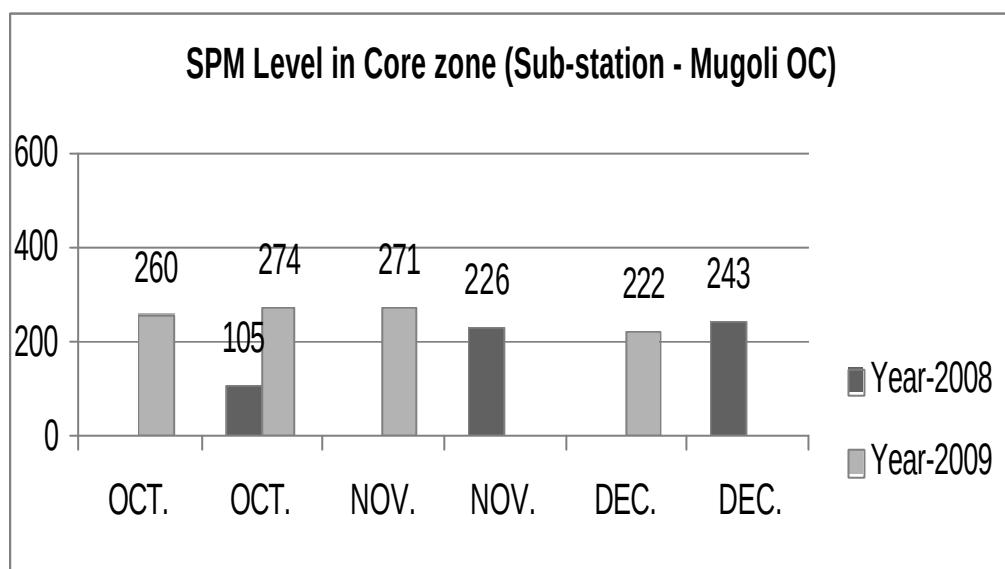
Month	Dates of Sampling		Parameters
	From	To	SPM
MAY 2009	13.05.09	14.05.09	659

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2009
NAME OF THE AREA : WANI Q.E. : DEC.
NAME OF THE PROJECT : MUGOLI OCP

1. Sub-station		: WMOA-1					
		(24 hourly values in $\mu\text{g}/\text{m}^3$)					
Month	Dates of Sampling		Parameters				
	From	To	SPM	RPM	NO _x	SO ₂	
OCT. 2009	13.10.09	14.10.09	260	102	< 6	< 6	
OCT. 2009	27.10.09	28.10.09	274	119	< 6	< 6	
NOV. 2009	10.11.09	11.11.09	271	123	< 6	< 6	
DEC. 2009	11.12.09	12.12.09	222	105	< 6	< 6	
TLV as per Env.(Protection) Amendment Rule 2000			600	300	120	120	
2. Kailashnagar township near Filter Plant		: WMOA-2					
		(24 hourly values in $\mu\text{g}/\text{m}^3$)					
Month	Dates of Sampling		Parameters				
	From	To	SPM	RPM	NO _x	SO ₂	
OCT. 2009	27.10.09	28.10.09	183	87	< 6	< 6	
NOV. 2009	11.11.09	12.11.09	182	84	< 6	< 6	
NOV. 2009	25.11.09	26.11.09	181	81	< 6	< 6	
DEC. 2009	11.12.09	12.12.09	76	16	< 6	< 6	
Permissible Limits			200	100	80	80	

3. Tubewell near Sakhara village				: WMOA-3			
				(24 hourly values in $\mu\text{g}/\text{m}^3$)			
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
OCT. 2009	27.10.09	-	28.10.09	193	86	< 6	< 6
NOV. 2009	11.11.09	-	12.11.09	108	47	< 6	< 6
NOV. 2009	25.11.09	-	26.11.09	96	38	< 6	< 6
DEC. 2009	11.12.09	-	12.12.09	80	19	< 6	< 6
DEC. 2009	24.12.09	-	25.12.09	91	41	< 6	< 6
Permissible Limits				200	100	80	80
4. SAM Office				: WMOA-4			
				(24 hourly values in $\mu\text{g}/\text{m}^3$)			
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
OCT. 2009	12.10.09	-	13.10.09	226	104	< 6	< 6
DEC. 2009	11.12.09	-	12.12.09	208	92	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120



FUGITIVE DUST MONITORING DATA

1. Security Check Post

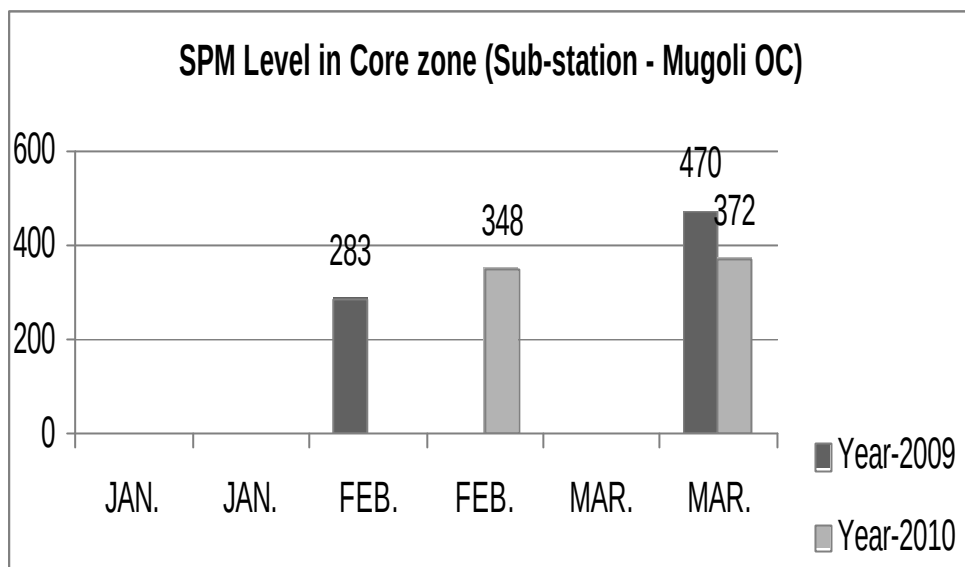
			(24 hourly values in $\mu\text{g}/\text{m}^3$)
Month	Dates of Sampling		Parameters
	From	To	SPM
OCT. 2009	27.10.09	28.10.09	263

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
 NAME OF THE AREA : WANI
 NAME OF THE PROJECT : MUGOLI OCP

YEAR : 2010
 Q.E. : MAR.

1. Sub-station					: WMOA-1		
(24 hourly values in µg/m ³)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2010	23.01.10	-	24.01.10	305	131	< 6	< 6
MAR. 2010	11.03.10	-	12.03.10	315	139	< 6	< 6
MAR. 2010	24.03.10	-	25.03.10	412	181	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120
2. Kailashnagar township near Filter Plant					: WMOA-2		
(24 hourly values in µg/m ³)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2010	11.01.10	-	12.01.10	190	82	< 6	< 6
JAN. 2010	24.01.10	-	25.01.10	175	84	< 6	< 6
FEB. 2010	11.02.10	-	12.02.10	180	76	< 6	< 6
FEB. 2010	23.02.10	-	24.02.10	190	86	< 6	< 6
MAR. 2010	10.03.10	-	11.03.10	146	42	< 6	< 6
MAR. 2010	25.03.10	-	26.03.10	176	87	< 6	< 6
Permissible Limits				200	100	80	80
3. Tubewell near Sakhara village					: WMOA-3		
(24 hourly values in µg/m ³)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2010	11.01.10	-	12.01.10	150	60	< 6	< 6
JAN. 2010	23.01.10	-	24.01.10	111	44	< 6	< 6
FEB. 2010	11.02.10	-	12.02.10	177	68	< 6	< 6
MAR. 2010	25.03.10	-	26.03.10	185	87	< 6	< 6
Permissible Limits				200	100	80	80
4. SAM Office					: WMOA-4		
(24 hourly values in µg/m ³)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
FEB. 2010	23.02.10	-	24.02.10	348	159	< 6	< 6
MAR. 2010	24.03.10	-	25.03.10	372	174	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120



FUGITIVE DUST MONITORING DATA

1. Security Check Post

(24 hourly values in $\mu\text{g}/\text{m}^3$)

Month	Dates of Sampling		Parameters
	From	To	SPM
FEB. 2010	23.02.10	- 24.02.10	386

CO MONITORING DATA

(All values are given in $\mu\text{g}/\text{m}^3$)

Sl. No.	Monitoring Location	Monitoring Date	Observed Value	NAAQ Standards (1 hour)
1.	Substation	11.02.10	< 114.3	10000
2.	Kailashnagar township	11.02.10	< 114.3	4000
3.	Sakhara village	11.02.10	< 114.3	4000
4.	SAM office	11.02.10	< 114.3	10000

Therefore, it can be safely concluded from the above that even after substantial increase in the production from 1.55 MTPA to 2.50 MTPA (resulting in increase in traffic density), the impact on one of the physical environmental attribute; i.e. ambient air is insignificant.

Further, it can be inferred that the various pollution control measures already undertaken have been proved to be effective, which has arrested the deterioration of the ambient air quality in the mine activity area even after substantial increase in the production level.

So it may be predicted that the ambient air quality will have no harmful effect on human being, flora and fauna, soil quality, surface structures and aesthetic value of the surrounding environment as suitable mitigative measures will continue to be taken during the further enhancement production up to 4.00 MTPA to make the operations eco-friendly. This fact has been further corroborated by the interpretation of regular monitoring results in respect of Niljai OC (Production capacity 3.50 MTPA operating in the same coalfield, with similar geo- mining conditions, topographical features and climatological features).

The existing practice of fortnightly monitoring of ambient air quality will continue with the expansion project also and the results will be examined critically so as to identify the affected area and mine authorities will thereafter be able to take appropriate control measures to minimize the adverse effects, if any, as far as possible.

3.2 WATER QUALITY: -

A) Base line & Existing Scenario - In order to assess the **baseline water quality** w.r.t the mine under consideration, six sampling locations were fixed during 2009 Winter Season covering surface as well as ground water sources in the buffer zone. The quality of water has been found to be well within the permissible limits.

APPROACH METHODOLOGY

Water quality monitoring

Representative water samples 6 nos. namely Handpump, Takli (W1), Handpump, Borgaon village (W2), handpump, Khairgaon village (W3), Handpump, Wirur village (W4), Penganga river U/s (W5) and Penganga D/s (W6) were collected, preserved and transported to R&C Environmental Engg. Laboratory, Chennai and analyzed as per standard methods.

DATA ANALYSIS AND RESULTS

Water quality

The water samples (6 Nos.) collected from different water sources i.e. Wastewater, Surface & ground water etc. are analyzed as per procedures outlined in IS : 2488 / IS : 3025 / AWWA / APHA.

At all locations, oil and grease, phenolic compounds, cyanides, sulphides and insecticides are found to be absent and all heavy metal values except Iron are found to be below the detectable limit.

In general, water quality at six locations is found to be within the prescribed limits.

The existing quality of mine pumped out water is being continuously monitored as per Environmental Protection (Amendment) Rule, 2000 every fortnight and the analysis results show that the quality is well within the permissible limits of Indian Standards.

With enhanced production from the mine within the existing mine lease area, the quality of mine pumped out water is not going to change, as such the impact of enhanced production from the mine on water quality will be insignificant.

3.3 AMBIENT NOISE QUALITY:-

Base line & Existing Scenario - The baseline ambient noise quality w.r.t. the mine under consideration has also been generated during the winter season during 2009 at six locations covering the core and Buffer zone. The ambient noise quality data thus generated reveal that the quality of ambient noise is well within the permissible limits.

APPROACH METHODOLOGY

Noise levels recording

Noise levels were recorded by using CYGNET Integrated sound level meter (100X) from six ambient air quality locations during day time and night time at an interval of four hours for one day.

DATA ANALYSIS AND RESULTS

Noise levels

Mean L_{eq} noise levels at day time and night time are ranging from 41.7 to 47.6 dB(A) and 35.4 to 39.8 dB(A) respectively in the study area. While comparing with IS: 4954 - 1986 norms for acceptable outdoor noise levels in residential area (55 dB(A)) in respect of buffer zone and Industrial area (75 dB(A)) in respect of core zone.

Noise level studies are being made continuously every fortnight as per Environmental Protection (Amendment) Rule, 2000 and it is found that the range varied from 50.6 to 64 dB (A) during night and day times, which is well within the tolerable limits.

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 IMPACT ON AMBIENT AIR QUALITY –

The base line data generated at five locations covering the core zone and the buffer zone discussed in the previous paragraph also reveals that the levels of various parameters are well within the permissible limits. It can be inferred from the same that ambient air quality in and around the mine site under consideration has not been affected adversely due to continuing mining operations and it has been achieved by implementing various pollution control measures effectively.

The same has been further corroborated by the existing ambient air quality data generated at the site as well as in the surrounding area. It may be worthwhile to mention here that during the balance life (5 years) of the mine with a maximum projected production of 4.00 MTPA, the existing pollution abatement measures will continue to be taken with necessary augmentation/ strengthening so that the ambient air quality level remain well within the permissible limits.

4.1.1 AIR POLLUTION CONTROL MEASURES

The following mitigative measures have already been undertaken:

- a) All drills are fitted with dry type dust extractors;
- b) Permanent haul road has been made with WBM;
- c) Mobile water sprinklers & fixed water sprinklers have been put into use.
- d) Coal transportation road has been totally black-topped;
- e) Plantation (about 2, 06,592) has been done around colony, OB dump and around infrastructures like CHP, etc.
- f) Covering of coal transportation trucks by tarpaulin has been implemented and avoiding overloading of trucks;
- g) Dry sweeping of coal transportation road is also done regularly.

Further to the above, permanent water spraying arrangement in the CHP & weighbridge has already been installed. All these measures indicated above will continue to be maintained so that the adverse impacts on ambient air and noise become insignificant.

Air Pollution Control Measures can be summarized as below: -

S N	PARTICULARS	DETAILS
1	COAL STOCK YARD, CHP & WEIGH BRIDGE	
	Water Spraying By	30 nos. of fixed Rain Guns
		1 no. of Mobile Rain Gun
		1 no. 12 KL Mobile Water Tanker
	Plantation around the periphery	8730 Trees
	Enclosed Crusher House & Dry Dust Exhaust System	Implemented and will be continued.
	Continuous water spraying on Belt Conveyor & Mist Water Spraying system in Crusher House	Implemented and will be continued.
2	HAUL ROADS	
	Water Spraying By	1 no. 12 KL Mobile Water Sprinkler (6 trips per shift in three shifts)
		11 nos. of fixed Rain Guns (Access Trench)
3	TRANSPORTATION	
	Black Topping Roads	8 km
	Avoiding overloading & coal transportation in trucks covered with tarpaulin	Implemented and will be continued.
	Avenue plantation	35820 Trees
	Regular Manual Brooming	Implemented and will be continued.
4	OVERBURDEN DUMPS	
	Plantation	123482 nos.
5	DRILLING & BLASTING	
	Wet Drilling	Implemented and will be continued.
	Controlled Blasting as per DGMS permission. Monitoring. Maintaining & Evaluation of records	Implemented and will be continued.
6	AAQ MONITORING	
	Fortnightly Monitoring & Annual Statement	Implemented and will be continued.
	Quarterly submission of Report to MPCB	Implemented and will be continued.

4.2 IMPACT ON WATER QUALITY –

The major source of water pollution in the opencast mine is mine pumped out water. With enhanced production from the mine, the quality of mine pumped out water is not going to change because there is no new addition of mine lease area, as such, the impact of enhanced production from the mine on water quality will be insignificant. The other sources are effluent from Workshop and residential colony. There is an independent Workshop Effluent Treatment Plant (WETP) of 150 KLD operating at the site and the residential accommodation for the project personnel has been provided separately with 0.40 MLD Domestic Effluent Treatment Plant (DETP). The WETP has been provided with sufficient capacity to handle the requirement and is operating on ZERO DISCHARGE concept as such there is no chance of pollution even after the enhancement of production. Similarly, there is no addition of manpower and no increase in residential strength so, possibility of pollution due to domestic sewage during the balance life with enhanced production does not arise.

The impact prediction on ground water made in the approved EMP is for the final depth of the quarry 105 m. Therefore, change in mine production during intermittent stage will not affect the assessment except some local variations within the predicted influence area. In addition, to assess the likely impact of opencast coal mining on ground water, regular monitoring of ground water level is being carried out as per MOEF guideline.

4.2.1 WATER POLLUTION CONTROL MEASURES

As seen from Analysis Data, the mine pumped out water does not contain significant pollution load and the discharge water quality even without treatment is quite satisfactory. One sedimentation tank for treatment of mine pumped out water is already in operation. Further, Effluent Treatment Plant (ETP) for workshop effluent for a capacity of 150 kld with oil & grease trap under zero – discharge concept and Domestic Effluent Treatment Plant (DETP) for Colony have already been put into operation.

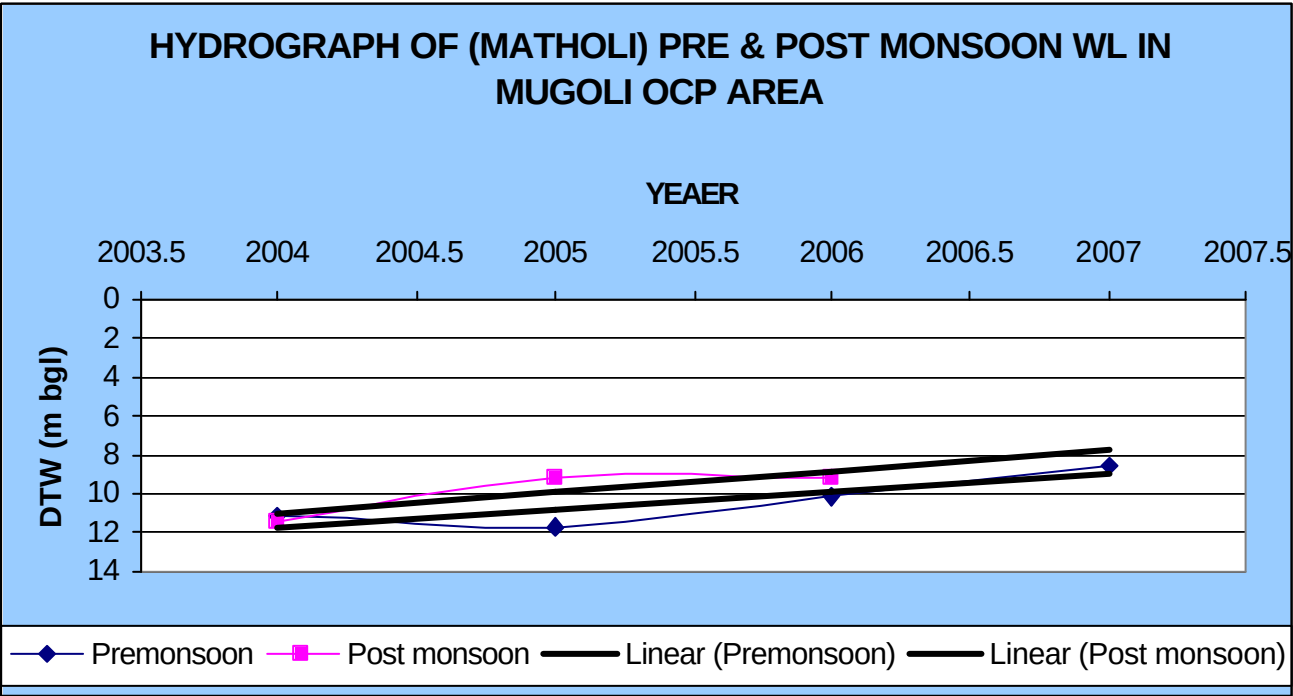
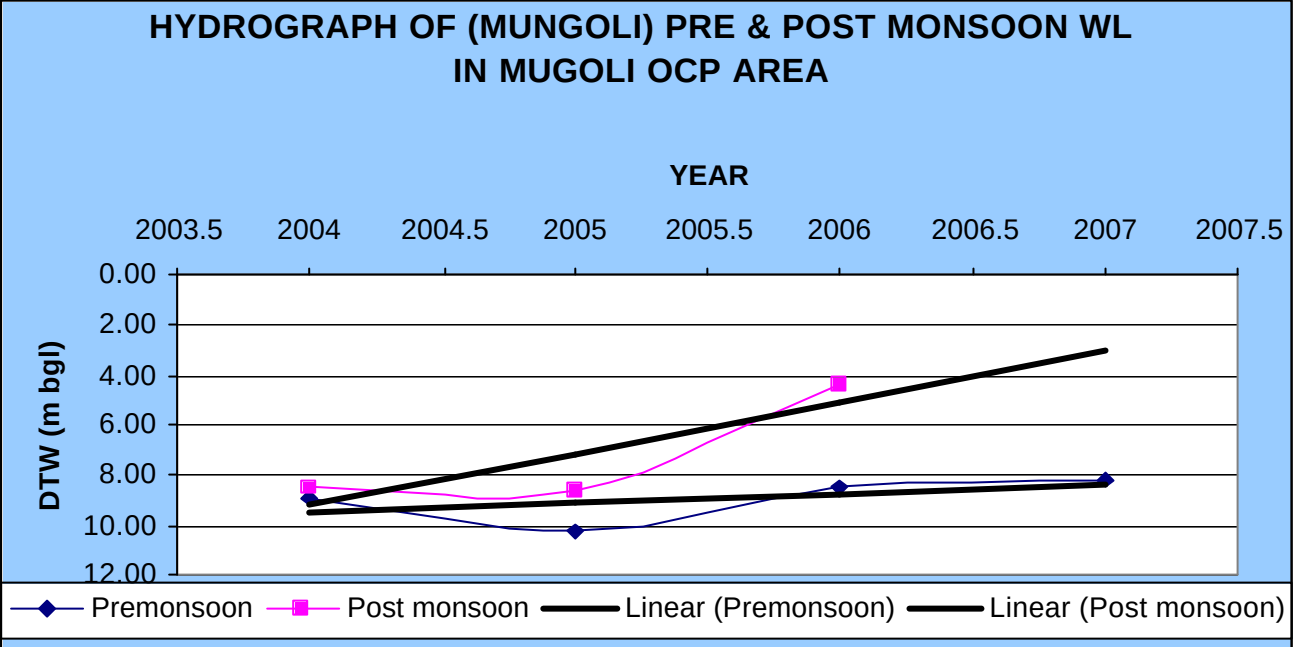
However, if required in future, the abatement measures would be strengthened.

Water Pollution Control Measures can be summarized as below: -

S.N.	PARTICULARS	DETAILS
1	MINE WATER : TWO STAGE SEDIMENTATION	
	Initial Sedimentation	At Mine Sump (190 MG)
	Final Sedimentation	Sedimentation Tank at Surface (2 X 20 X 3.5 X 0.8 m)
		In addition 2 nos. of 1,00,000 litre capacity water reservoirs (for operation of Rain Guns)
		Cross Drainages provided in Coal & OB Benches for entire silt & Sediments to mine sump
2	DOMESTIC SEWAGE EFFLUENT	
	Domestic Sewage Plant	0.40 MLD for 461 Qtrs. at Kailash Nagar Township
3	INDUSTRIAL / WORKSHOP EFFLUENT	
	Washing Ramp	HEMM Washing
	WETP	0.15 MLD with zero discharge
	Used Oil	Disposed through MPCB approved recyclers
	ETP Sludge	CHWTSDF

4.5 IMPACT ON HYDRO-GEOLOGICAL REGIME

The projections on ground water inflow to the mine and the mine influence on ground water table are for the final stage of the quarry. Therefore, change in mine production during intermittent stage will not effect the assessment except for some local variation within the predicted influence area.



4.4.1 Remedial measures to control ground water depletion

The following methodology and remedial measures have been taken to minimize the mine-induced impact on ground water levels and also adverse effects in the area.

- (i) Artificial recharge to ground water system at the periphery of the anticipated influence area by local stagnation in low lying areas/drains by providing low height dams/bunds or by injection of mine water discharge. Surface water through tubewells /percolation structures.
- (ii) The water shortage in the villages, if any, in the influence area can be supplemented by supply of water from outside source or from the mine water after treatment.
- (iii) While reclamation of the mined area, void at the deepest portion of the pit has to be left. This residual pit void would initially serve as access for future expansion and subsequently it could be backfilled.
- (iv) Regular well water monitoring in nearby villages is being carried out quarterly as per MOEF's guidelines. No adverse remarks have so far been observed.

ARTIFICIAL RAINWATER HARVESTING MEASURES

Regarding artificial rainwater harvesting, following works have already been undertaken by the project both in – house and outside the mine lease in nearby villages.

- 1. Digging of pond in Sakhara village.**
- 2. Digging of pond in Jugad village.**
- 3. Roof-top rainwater harvesting at Mugoli Sub Area Manager's office.**
- 4. Roof – top Rainwater harvesting in Community hall and School of Matholi village.**

4.6 IMPACT ON AMBIENT NOISE QUALITY

The noise levels are being monitored regularly as per Env. Protection Amendment Rule, 2000 at existing OC Mine and the results show that the ambient noise levels in the mine activity areas and in the immediate surrounding are well within the permissible limit level. The base line data generated in the villages around the 10 km radius also reveals that the ambient noise levels are well within the permissible limits which also corroborate the fact that opencast mining activities at the said mine has not affected the ambient noise quality in the surrounding adversely and it has been achieved by implementing various pollution control measures effectively.

It may be worthwhile to mention here that during the balance life (5 years) of the mine with a maximum projected production of 4.00 Mty , the existing pollution abatement measures will continue to be taken with necessary augmentation/ strengthening so that the ambient noise quality level remain well within the permissible limits.

4.3.1 NOISE POLLUTION CONTROL MEASURES

Monitoring of the noise control is being carried out on regular basis as per the Environment (Protection) Amendment Rule 2000. It has been seen that the noise levels at the mine site are all below TLV. While planning for an effective noise attenuation measures, the concept of source, path and receiver has been considered.

(A) Noise Control at Source

There are two areas where the noise generation is being checked at source.

(i) Proper Design

Since the generation of noise can be reduced by reducing the vibration amplitude, the area of vibrating part and frequency of vibration is being taken care that all loose contact between metal parts are avoided.

Shock absorbing pads are being fixed in the foundation of vibrating equipment / machines. In case of aerodynamic noise producing sources, mufflers are provided with the machines.

(ii) Proper Maintenance

All machines and equipment is being properly maintained. Sound muffler system and bearing lubricating system etc. of equipment is being kept in proper condition.

(A) Noise control in Transmission Path

The measures are being taken for control of noise along the transmission path has been put in following two categories:

- (i) Air borne path
- (ii) Ground borne path

(i) Air Borne Path

The control in air – borne path has been planned in a number of ways as:

- (a) The crusher house, screen house etc., which are source of high level noise generation are enclosed.
- (b) Planting of furrows of trees along the thick foliage around the compound and wall of CHP, workshop and other industrial buildings. This reduces the spread of noise. It is also used as an acoustic enclosure to reduce ambient noise.

(ii) Ground Borne Path

In order control ambient noise in ground borne path, vibration isolators in the form of vibration absorbing pads placed at the base of vibrating equipment.

(C) Noise Control at Receiver End

Even after adopting above measures, if desired noise level is not achieved at receiver end, in that case, following measures are adopted:

- (a) The workers exposed to high noise level are provided with earplugs.
- (b) Provision of enclosed booths at the worksite to protect worker from noisy environment.
- (c) The workers are subjected to Periodic Medical Examination once in every five years.

4.7 LAND RECLAMATION

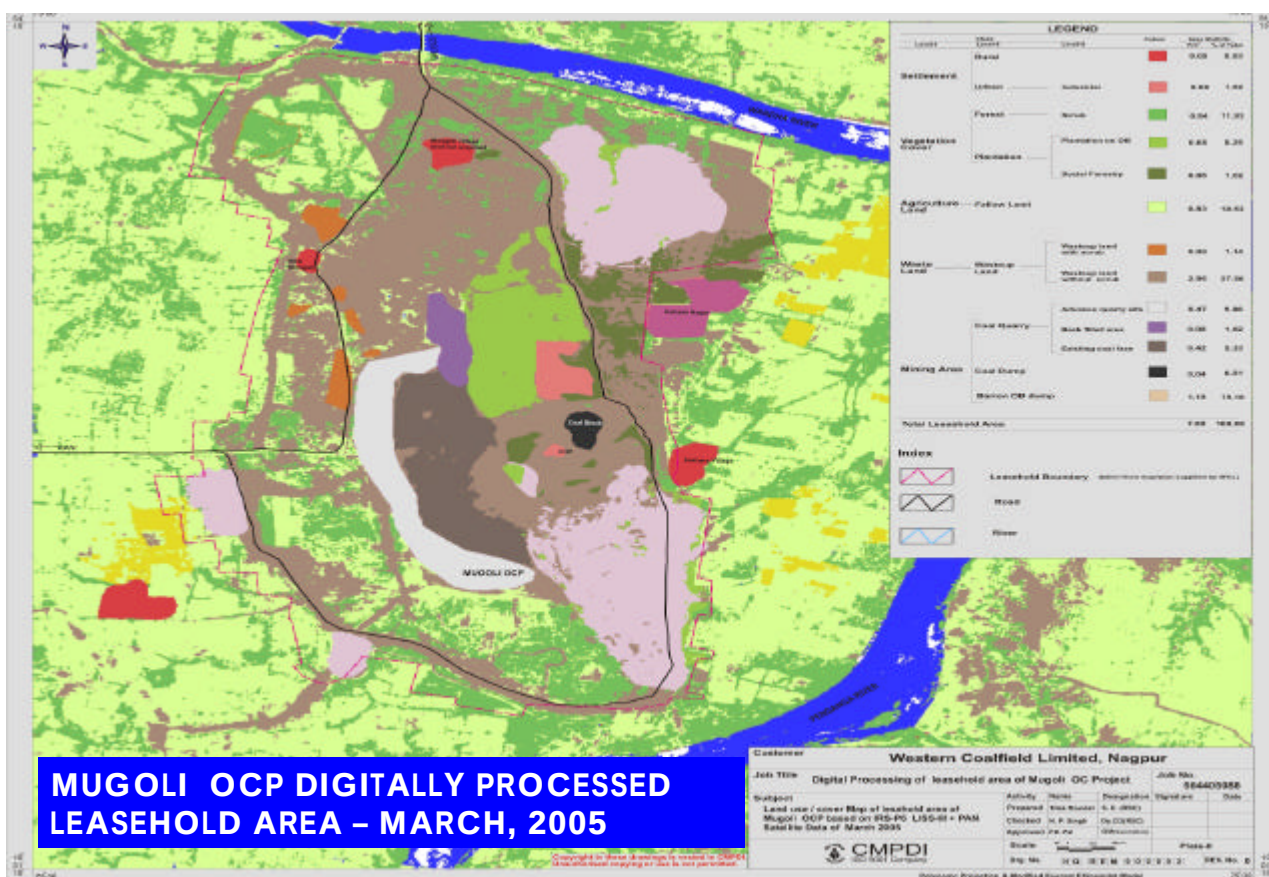
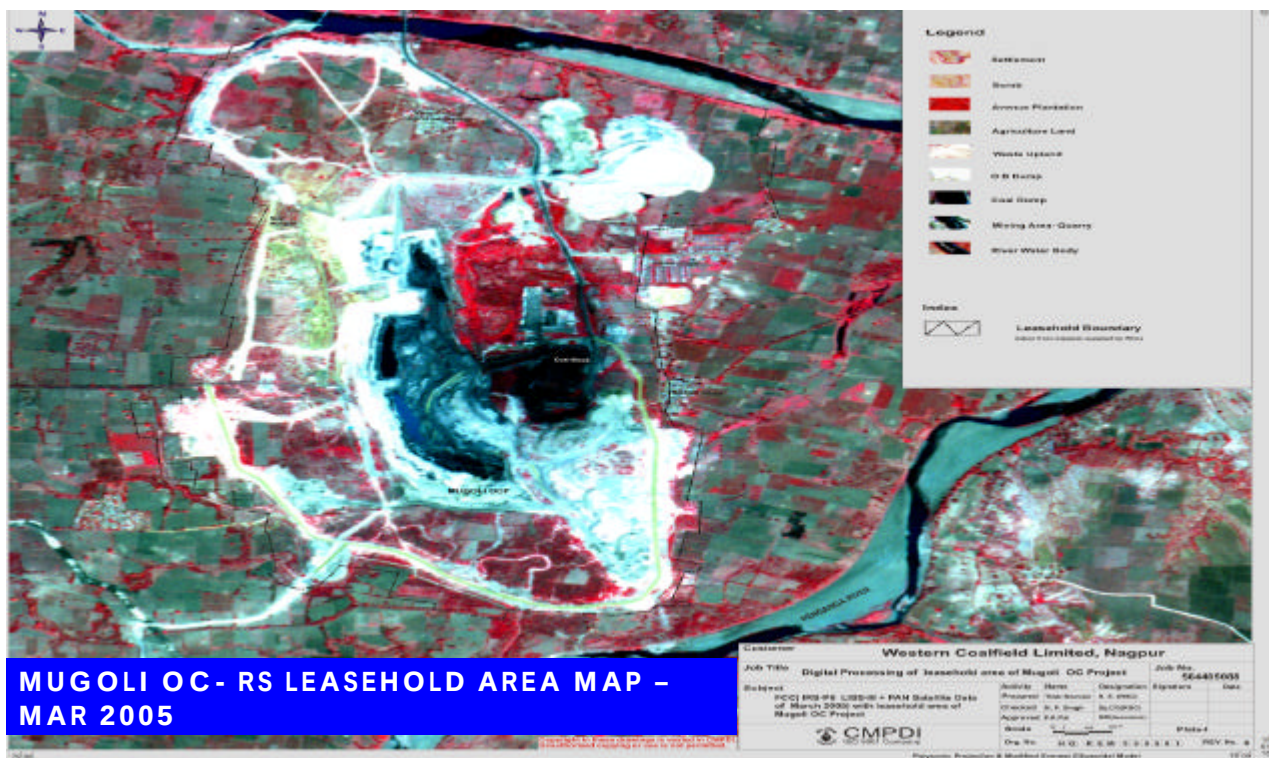
PRESENT OB RECLAMATION STATUS					
S.N.	PARTICULARS	Nos	AREA (ha)	PRESENT STATUS	
1	Existing External OB Dump & Embankment	10	163.39	i) Planted Area – 37.39 ha ii) Active Dump – 113.00 ha iii) Temp. T.S. Dump – 20.00 ha	
2	Internal Dump	--	37.29	Plantation started with 1000 trees, 0.40 ha. Reached upto GL.	
PRESENT PLANTATION STATUS					
S. N.	PARTICULARS	No. of Trees	AREA (ha)	PRERSENT STATUS	TYPE OF SPECIES
1	External OB Dump, Backfilled Area & Embankment	124482	49.80	Partly Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
2	Avenue	35820	14.33	Planted	Cassia, Neem, Imli & Gulmohar
3	Rationalization Area & Blasting Zone	13629	5.45	Partly Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
4	Around Infrastructure	10000	4.00	Partly Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
5	Around Workshop	13931	5.57	Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
6	Around CHP	8730	3.45	Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
TOTAL		2.06.592	82.60		

MINING LAND USE – PRESENT STATUS vis-à-vis EOM			
S.N.	PARTICULARS	PRESENT LAND USE IN ha	END OF MINE LIFE LAND USE IN ha
1	Quarry Area	165.89 (Active backfilling is going on in 37.29 ha. The depth is about 40 m)	207.00 (Void = 105.00 + Backfilled = 102.00)
2	External OB Dump	170.39 (Plantation = 37.39)	213.74 (Plantation = 71.90)
3	Danger zone for Blasting	167.00	167.00
4	Infrastructure & Roads	48.50	48.50
5	Embankment	33.42 (Plantation = 12.01)	33.42
6	Land for OB dumping in balance life	43.35	Nil
7	Land for Quarrying in balance life	41.11	Nil
8	Rationalization area	148.39 (Plantation = 32.80)	148.39 (Plantation = 32.80)
TOTAL		818.05	818.05

LAND USE COVER MAPS USING DIGITAL PROCESSING TECHNIQUES THROUGH SATELLITE IMAGERY

Objective of the land reclamation/restoration monitoring is to assess the area of backfilled, plantation, OB dumps, social forestry, active mining area, settlements and water bodies, distribution of wasteland, agricultural land and forest land in the leasehold area of the project. This is an important step taken up for assessing the progressive status of mined land reclamation and for taking up remedial measures, if any, required for environmental protection.

INTERPRETATION OF LAND USE COVER MAPS		
S.N.	PARTICULARS	DETAILS AT MARCH 2005
1	LEASEHOLD AREA	818.05 Ha.
2	SETTLEMENT	1.65 %
	a) RURAL	0.63 %
	b) URBAN	1.02 %
3	VEGETATION COVER	21.20 %
	a) PLANTATION ON OB DUMP	8.25 %
	b) BLOCK PLANTATION	1.02 %
	c) SHRUBS	11.93 %
4	AGRICULTURAL LAND	10.53 % (entirely fallow land)
5	MINING AREA	27.92 %
	a) ADVANCED QUARRY	5.96 %
	b) BACKFILLED AREA	1.02 %
	c) EXISTING COAL FACE	5.33 %
	d) COAL DUMP	0.51 %
	e) BARREN OB DUMP	15.10 %



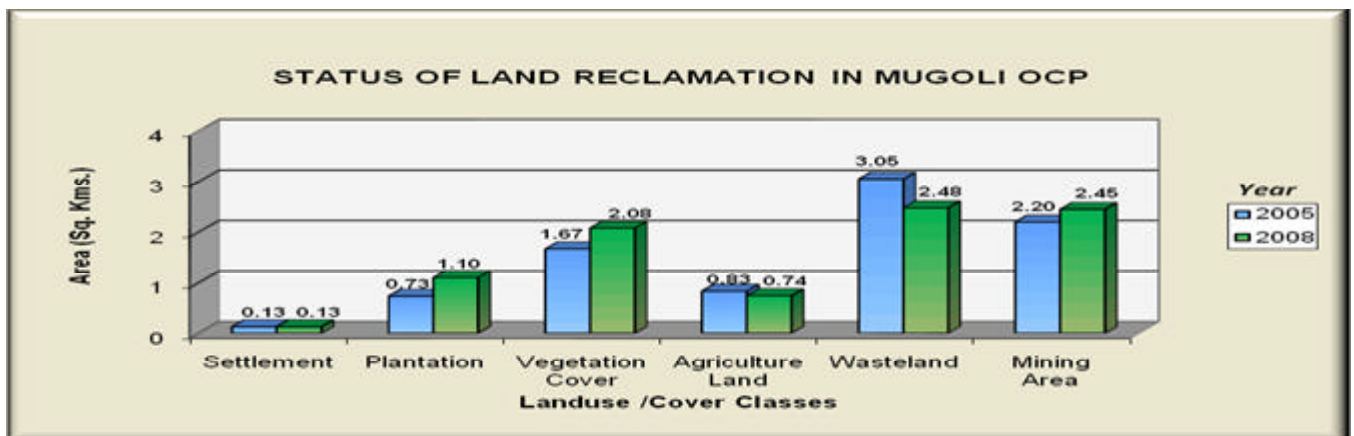
In addition to the above statutory Compliance, Opencast projects of WCL producing more than 5 million cubic m. (Coal + OB together) during the year 2008-09 have been taken up for land restoration / reclamation monitoring based on the *RESOURCESAT-1* satellite data using ERDAS Imaging digital image processing s/w on GIS platform. Land reclamation monitoring will be carried out **regularly on annual basis** to assess the progressive status of land restoration / reclamation in the above opencast mines. The report of this study has also been uploaded in the website of WCL in public domain.

Following 10 OC projects producing more than 5 million cubic m. (Coal + OB together) of Western Coalfields Ltd. have been taken up for land reclamation monitoring on annual basis:

- Sasti
- Padmapur
- Durgapur
- **Mugoli**
- Umrer
- Ukni
- Niljai
- New Majri + Kawadi
- Pimpalgaon
- Ghugus

Study reveals that 78.59% of mining area has already been reclaimed by WCL out of which 41.12% area has been revegetated and 37.47% area are backfilled.

After analyzing the satellite data of year 2008, it is evident that plantation, carried out on backfilled area, OB dumps as well as under social forestry in all the mines under study in WCL, has increased from 12.42 Sq. Km. to 17.18 Sq. Km. in span of last three years.



Further after analyzing the data of 2008 vs 2009, it is evident plantation in these mines of WCL has increased 17.18 sq. km to 22.73 sq.km

Plantation programme for the balance life is as follows :-

Sl.No	Year	Plantation in Nos.	Area to be covered in ha
1	2010 -11	8750	3.50
2	2011 -12	10000	4.00
3	2012 – 13	12500	5.00
4	2013 – 14	12500	5.00
5	2014 - 15	12500	5.00
	Total	56250	22.50

5.0 ENVIRONMENTAL MONITORING PROGRAMME

5.1 ENVIRONMENTAL MONITORING – The environmental monitoring programme at present is being carried at the mine as per details given below: -

S. N.	Items	Parameters	Frequency	No. of Stations	Submission
1.	Ambient Air Quality Monitoring	SPM, RPM, SO ₂ , Nox, CO & Fugitive dust	Every Fortnight as per Environment Protection (Amendment), Rule 2000	5	Quarterly Report is submitted to SPCB & MOEF & will be continued.
2.	Water Quality Monitoring	1) 4 Parameters. 2) 35 Parameters	Every Fortnight Once in a Year	3	Quarterly Report is submitted to SPCB & MOEF & will be continued.
3.	Noise Quality Monitoring	Noise Levels	Every Fortnight	2	Quarterly Report is submitted to SPCB & MOEF & will be continued.
4.	Environmental Statement		Annual		Annually Report is submitted to SPCB before 30 th September & will be continued.
5.	Ground Water Level Monitoring & Quality	Water Level & Quality Parameters.	Water Level – Quarterly. Water Quality – Yearly.	In Buffer Zone Villages.	Quarterly Report is submitted to SPCB & MOEF & will be continued.
6.	Compliance Report of EC Conditions.	All conditions both Specific & General	1 st June & 1 st December	Not Applicable	Half yearly Report are submitted to & MOEF & will be continued.

6.0 ADDITIONAL STUDIES

6.1 RISK ASSESSMENT

Mining is a hazardous industry. There is risk to life and property associated with various mining and allied activities of the project. As such a detailed study has been carried out covering identification and assessment of risk, and recommendation of measures to prevent damage to life and property against such risks. They are discussed below.

6.1.1 LAND SLIDING IN OB DUMP AND MINE PIT:

There is only one composite coal seam, to be worked out in this opencast mine. The OB/Parting between the sections are to be removed by shovel dumper combination. It is therefore, necessary to take certain precautions while OB dumps are formed. In some cases, the top soil get mixed with rock soil in the dump, due to which there

is a possibility of landslide, particularly in rainy season, unless suitable slope is maintained.

Therefore, steps are to be taken at the time of dumping of OB that the slope of dump does not go beyond the prescribed limit. Further, the topsoil dumping should be separate and it can be reused on the backfilled area.

6.1.1.1 Slope failure in OB dump :

It may be worthwhile to mention here that if proper care is not taken in designing proper bench height and bench slope, the OB dump may fail causing damage to life and property.

With this in view, a proper slope analysis has been done to determine the safe bench slope and bench height, which are given below;

Maxm. projected height of dump - 60 m.

No. of terraces and height of each stage - two, max. 30 m each

Over all slope - 28 degree.

In Mugoli OCP while forming & reclaiming external OB dumps, the above-mentioned guidelines regarding slope angle etc. are being tried.

6.1.2 MINE INUNDATION:

The mine pit receives water from three sources namely direct precipitation over mine area, surface run-off from surrounding area and seepage from strata. In heavy rainstorms, there may be situation where the mine would be flooded.

This may cause loss of human life and equipments. To guard against this situation. following steps are to be taken :

(A) Embankment has been constructed as a flood protection measures against Penganga and Wardha River.

(B) Provisions of garland drains around mine quarry are made. This will prevent surface run-off entering the mine pit. In order to divert the rainwater around the excavated portion a garland drain has to be made; which should have the gradient suitable for diverting the water to the river/or nallah part away from the mine opening. This garland drain should be cleaned and graded before the onset of monsoon. With the advance of quarry face the position of garland drain has to be shifted.

(C) Provisions of pumps: Adequate number of pumps has been provided to drain mine water even during maximum rainfall.

6.1.3 BLASTING:

For quarrying of coal and removal of overburden, blasting has to be done by use of explosives. Flying pieces generated by blasting may prove dangerous to life and property. Hence, all the precautionary measures suggested by D.G.M.S. will be strictly followed e.g. controlled blasting etc.

In addition, following precautions have been taken to avoid such dangerous situation.

(A) Blasting is to be done only once everyday.

(B) Before blasting is done, warning Sound is to be given so that people can move to safe places.

(C) Area lying within safety zone is to be fenced.

6.1.4 OTHER MEASURES:

Other measures have also been recommended for avoiding risk in mine operation. They are discussed below;

(A) Provision of proper illumination in quarry, O.B. dumps area, along roads, in workshop & other work area.

(B) Communication system - Efficient communication system (based on VHF system) have been provided for the project. This will allow proper communication link between various work centers and helps in avoiding accidents.

(C) Maintenance facilities - The project will employ a large number of HEMMs for quarrying and transportation of local and OB. Ill - maintained HEMMs may prove to be the source of grave risk. A well-equipped workshop will be provided for scheduled maintenance of HEMMs to avoid their failures.

(D) Training - Coal industry has set up a number of training institutes for imparting training to its employees. These training raise the safety awareness among workers and train them to carry out their assignments safely.

(E) Medical aid - The project has provided for well equipped hospital and qualified doctors. They can attend to medical emergencies arising out of accidents.

6.1.5 CONCLUSIONS:

Following conclusions may be drawn from the above discussion:

(a) Coal mining is associated with a number of hazards.

(b) These hazards can be identified and assessed, which has been done for this project.

(c) Preventive measures against identified risks have been provided in this report

(d) With adoption of such protective measures, the operation of the mine would be safe.

6.2 SOCIO-ECONOMIC IMPACT ASSESSMENT

Peripheral development:

As per the present practices in WCL coal mines, adequate steps are being taken for the local villagers by providing various infrastructure and welfare facilities and giving assistance in health care in Wani Area of WCL, under which the existing Mugoli OC project is in operation.

The various development works like construction of Primary, School, Post office, Shopping center, diversion of cart track for villagers, establishment of bank, diversion of irrigation canal etc; have been completed, mainly for catering to the needs/socio-economic upliftment of the neighbouring population. The details are as follows:-

YEAR	NAME OF WORK	AMOUNT SPENT (Rs.)
1994-95	For providing Borehole / Hand pump for drinking water & furniture for Primary school / High school to Sakhara, Mugoli & New Kolgaon village	75000/-
1995-96	Nil	Nil
1996-97	a) Furniture for Sakhara / Mugoli / Kolgaon Z.P. school	65000/-
	b) Construction of Bus stand at Kolgaon	25000/-
	SUB TOTAL	90000/-
	CD WORK:-	
	a) Rural sports / sports for villagers, furniture for Z.P. school of Sakhara, Mugoli / Kolgaon etc.	15000/-
1997-98	Nil	
1998-99	Nil	
1999-00	Construction of Community Centre at Bhimnagar, Mugoli	100000/-
2000-01	Chairs / Table / Almirah, Sound System to Community Centre, Bhimnagar, Mugoli	40000/-
	CD WORK:-	
	a) Construction of laboratory hall to Adarsha High School, Sakhara	122000/-
	b) Tatpatti, Chair, Almirah, Music Instrument, Playing materials to Z.P. school of Matholi, Kolgaon, Sakhara & Mugoli	30000/-
	c) Sakhara, Kolgaon village sports	2500/-
	SUB TOTAL	154500/-
2001-02	CD WORK:-	
	a) Village sports, Mugoli	5000/-
2002-03	a) One additional Hand pump, Drain repair at Bhimnagar & Hand pump repair at Mugoli	30000/-
	b) Books for library of Mugoli	2000/-
	c) One Hand pump & repair of Kolgaon school building	40000/-
	d) Repairing of WBM road from Matholi to Sakhara	45000/-
	e) Providing & fixing of Barbed wire fencing for SC / ST land at Kolgaon	30000/-
	f) Furniture for library of Kolgaon village	25000/-
	g) Furniture for Jyotiba Fule library, Kailashnagar	15000/-
	h) Books for Jyotiba Fule library, Kailashnagr	5000/-
	SUB TOTAL	192000/-

YEAR	NAME OF WORK	AMOUNT SPENT (Rs.)
2003-04	a) Construction of drain at Bhimnagar rehabilitation site at Mugoli	120000/-
	b) Repairing of WBM road at Kolgaon village	110000/-
	c) Pipeline alongwith water tank at Matholi vilage	30000/-
	SUB TOTAL	260000/-
2004-05	a) Construction of compound wall of community center, Bhimnagar	79000/-
	b) Construction of one room for library of Kolgaon	50000/-
	c) Mats for 3 Primary Z.P. school Mugoli, Matholi & Kolgaon	30000/-
	SUB TOTAL	159000/-
2005-06	a) Extension of drain at Bhimnagar	44000/-
	b) Hand pump at Kolgaon rehabilitation village	30000/-
	c) Repairing of WBM road to Arterial road to Mugoli village	100000/-
	d) Books & furniture for Kolgaon library	50000/-
	SUB TOTAL	224000/-
2006-07	a) Roofing of Stage at Bhimnagar	125000/-
	CD WORK:-	
	a) Extension of 2 rooms for primary school at Matholi village	97000/-
	SUB TOTAL	2,22,000
2007-08	Construction of approach road to Mungoli village joining to Arterial road (Balance work upto culvert at Mungoli OCP)	1,00,000/-
	Construction of shed for community Hall at Mothli	4,97,000/-
	Fencing & Miscellaneous works for Ramabai Ambedkar Library at Kolgaon village under SC-ST & 20 Poing programme at Mungoli OCP	1,19,000/-
	Making culvert for Shioni village under CD works	3,59,000/-
	Approach road from Embankment to culvert of Shioni village under C.D. wrks at Mungoli OCP	1,48,000/-
	SUB TOTAL	12,23,000/-
2008-09	Construction of road at Bhimnagar SC/ST Programme	5,29,000/-
	Development works to Primary School & Community Hall at Matholi village	4,01,000/-
	Construction of shed for community place jugad	5,19,000/-
	SUB TOTAL	14,49,000
2009-10	Drinking water tank & toilets for students of A darsh High School at Sakhra village.	1,24,000/-
	Development work at Community place at Jugad	82,000/-
	Protective work at culvert on approach to Shioni village	82,000/-
	Concrete road at Sakhra village 150 x 3 mtr.	2,32,000/-
	SUB TOTAL	5,20,000/-

Wani area is doing excellent job in the field of education, sanitation, cultural activities, tree plantation in the nearby villages through Mahila Mandal and other social organization. In addition to above community development work camps of different medical activities are regularly organized on yearly basis.

The socio – economic measures already undertaken have been discussed earlier. It may be seen that the eco-development measures including welfare measures are regularly undertaken and, in future, the welfare measures will continue to be taken based on the assessment of the "felt needs" of the community around the project.

REHABILITATION SCHEME

Resettlement of 11 families of Bhimnagar Basti & 40 families of Kolgaon village had been completed and land losers have been suitably compensated as per norms. No further resettlement of any House Oustees as well as rehabilitation of land oustees envisaged during the balance life of the mine.

7.0 PROJECT BENEFITS

The benefits of the project can be summarized as below:-

- The physical infrastructure in the area has already been improved substantially by following ways:-

- a) Development of road, Road Bridge over Wardha River, thereby improving the communication.

- b) Improvement in Power, Telephone (including Mobile) facility.

- c) Improvement in Health Care facility & Educational facility.

- d) Improvement in Market / Trade & Business.

- The social infrastructure by way of cultural mixing of people of other states with local community glorifying "UNITY IN DIVERSITY".

- Substantial employment in the project & indirect employment for business & trading, contractor, transportation, vehicle contractor, nursery development.

8.0 ENVIRONMENTAL MANAGEMENT PLAN

The administrative organization for ensuring that the mitigative measures for control of pollution are continued to be maintained and operated (& if necessary augmented) and also for monitoring the effectiveness of the total system there is three tier set – up as given below –

MONITORING ORGANISATION

To have a close watch on the environmental condition and implementation of the various measures suggested, a multi-disciplinary approach is essential.

- (a) WCL headquarter acts as an apex body which supervises the activities relating to environment at project level through the General Manager.

- (b) General Manager of the area coordinates the activities of various disciplines in the area to render all necessary assistance at the implementing level i.e. the Project.

Area Nodal Officer (Environment) monitors all aspects of environment on behalf of the General Manager. He also takes suitable steps for generation of environment data along with its analysis and interpretations.

As far as plantation is concerned horticulturist with suitable backup staff shall be provided in the area for undertaking the plantation jobs including raising of a nursery. Plantation will have to be done on a large area. Therefore, it may be desired that an outside agency may have to be employed for this purpose. The horticulturist along with the supervisor shall only monitor and guide the agency for selection of site, treatment of soil, selection of species etc.

(c) Sub Area Manager is responsible for mechanical reclamation of the area. He is also responsible for biological reclamation with the assistance of GM's office.

ORGANISATION FOR ENVIRONMENT MANAGEMENT

S.N	Measures/Actions		Agency
1.	Environmental Control	1	Chief General Manager, Wani Area
		2	Nodal Officer, (Environment), Wani Area
		3	Sub Area Manager, Mugoli OC Expn.
		4	Staff Officer (Civil), Wani Area
		5	Environmental Cell (WCL H.Q.)
2.	Environmental Monitoring	1	Chief General Manager, Wani Area
		2	Staff Officer (Civil), Wani Area
		3	Nodal Officer (Environment), Wani Area.
		4	Sub Area Manager, Mugoli OC Expn.
		5	Environment Cell of WCL Headquarters
		6	Environmental Laboratory of CMPDI, RI-IV
3.	Reclamation	1	Sub Area Manager, Mugoli OC Expn.
		2	Nodal Officer (Environment), Wani Area
		3	Environmental Supervisor
		4	Horticulturist

8.1 ENVIRONMENTAL COST

The details of expenditure incurred till date on environmental mitigation measures both under Capital & Revenue head is given as below :-

CAPITAL EXPENDITURE:-

ACCOUNT HEAD	PROGRESSIVE
Reclamation (HEMM)	3.01 Lakhs
Air Pollution Control	109.85 Lakhs
Water Pollution control	36.76 Lakhs
TOTAL	149.62 Lakhs

REVENUE / OTHER EXPENDITURE:-

ACCOUNT HEAD	PROGRESSIVE
Afforestation	60.22 Lakhs
Monitoring	20.45 Lakhs
Air Pollution	23.65 Lakhs
Water Pollution	28.22 Lakhs
Legal Expenses (Consent fee for Air, Water & Hazardous Waste)	17.675 Lakhs
Environment Statement	1.08 Lakhs
Rainwater Harvesting	4.65 Lakhs
Total	150.855 Lakhs

9.0 CONCLUSION

From earlier paragraphs, it can be inferred that the adverse impact on physical environmental attributes due to increase in the production from sanctioned capacity is almost insignificant/negligible. This has mainly been possible because of various control measures already undertaken in the project.

As such, even during the future years, when production targets are likely to be above the sanctioned capacity, the impacts of coal mining (with higher production) on environment are not likely to be significant and the pollution control measures already undertaken and being undertaken will be capable enough to tackle extra pollution load generated due to enhanced production and pollution control measures will be further strengthened, if need arises.

In view of the above, Public Hearing for Mugoli OC expansion project, Tahsil – Wani, Dist. – Yavatmal for enhancement of production capacity from 2.50 MTPA to 4.00 MTPA with same land area of 818.05 ha may be conducted as per direction of MOEF under EIA Notification 2006 based on the attached EIA/EMP and Executive Summary as above.

CHAPTER – I

INTRODUCTION

1.0 INTRODUCTION

Mugoli Opencast Project of Western Coalfields Limited was opened in January, 1995 after having its Project Report (PR) approved by the competent authority on 6.06.1990 and the Environmental Management Plan (EMP) was also approved by the Ministry of Environment & Forest (MOEF) vide letter dated 13.08.1991. As per approved PR/EMP, the project was having a sanctioned capacity of 0.80 Million Tonnes per year (MTPA) of coal.

An adjoining mine namely Nirguda OC project with EMP Clearance & Consent for 0.75 MTPA had to be amalgamated with Mugoli OC mine recently due to reasons explained below:

- i. There is no barrier between two mines.
- ii. The two mines are having a common catchment area.
- iii. The two mines are being worked with a common access trench.

This amalgamation has got the approval of competent authority of WCL as well as Directorate General of Mines Safety (DGMS).

The salient feature of the amalgamated mine are as under: -

Name: - Mugoli OC Extension

Land: - 818 .05 Ha [Mugoli OC – 539.0 Ha (as per approved PR/EMP) +Nirguda OC – 279.05 Ha (as per approved PR/EMP)]

It may be noted here that there is no increase in the land requirement of individual project, but it is only an amalgamation of two projects made into one.

Capacity: - 1.55 MTPA

(0.80 MTPA as per approved PR/EMP of Mugoli OC
+ 0.75 MTPA as per approved PR/EMP of Nirguda OC)

As such, the EMP of amalgamated mine was prepared for seeking ex-post facto environmental clearance from Central Government in terms of MOEF's Circular dated 14.05.2002 for amalgamated production upto 1.55 MTPA with land area of 818.05 ha (as shown above).

The EIA/EMP for the said amalgamated mine for a production capacity of 1.55 MTPA with land area of 818.05 ha was approved by Ministry of Environment and Forests (MOEF) vide its letter no J – 11015 / 82/2005.IA. II (M) dated 20.05.2005.

Further, expansion of Mugoli OC mine for production capacity up to 2.50 MTPA only was subsequently taken up and the environmental clearance for the same has since been received from MOEF vide its letter no. J-11015/277 /2008 IA.II (M) dated 04/05/2009.

1.3 PURPOSE

Now it is seen that even after amalgamation with production of 2.50 MTPA from the existing mine the demand on WCL (especially Wani Area) for power grade coal is increasing and since the mine has the requisite potential, an expansion scheme has been taken up in right earnest. WCL, therefore, proposes to take up the expansion.

The total production including the expansion will thus be 4.00 MTPA from the amalgamated mine without any increase in land area. .

As such duly filled in Form – 1 application along with draft TOR, This feasibility report and Addendum EIA was submitted to MOEF for obtaining Environmental Clearance under Clause 7.2 of EIA Notification, 2006. As directed by MOEF, the Public Hearing document has been prepared and submitted to MPCB for conducting Public Hearing.

1.2 LOCATION

The existing Mugoli Opencast Project is situated in Mugoli Block of Wardha Valley Coalfield. Mugoli Block is located in Wani Tahsil of Yavatmal district in the State of Maharashtra. The Block is bounded by Latitudes 19 Deg. 15' 44" N - 19 Deg. 54' 15" N and Longitudes 79 Deg. 5' 40" E - 79 Deg. 6' 40" E.

1.3 COMMUNICATION

The area under consideration is at a distance of 35 km by road from Wani Town of Yavatmal district.

1.4 TOPOGRAPHY & DRAINAGE

Topography of the area is slightly undulating with elevations ranging from 198 m to 214 m above MSL. The main drainage channels flow towards Wardha River in the North and Penganga River in the South. Nirguda nullah joins Wardha River to the North of Mugoli Block and Penganga River joins Wardha River to the East of this Block.

1.5 JUSTIFICATION FOR ENHANCEMENT & LINKAGE

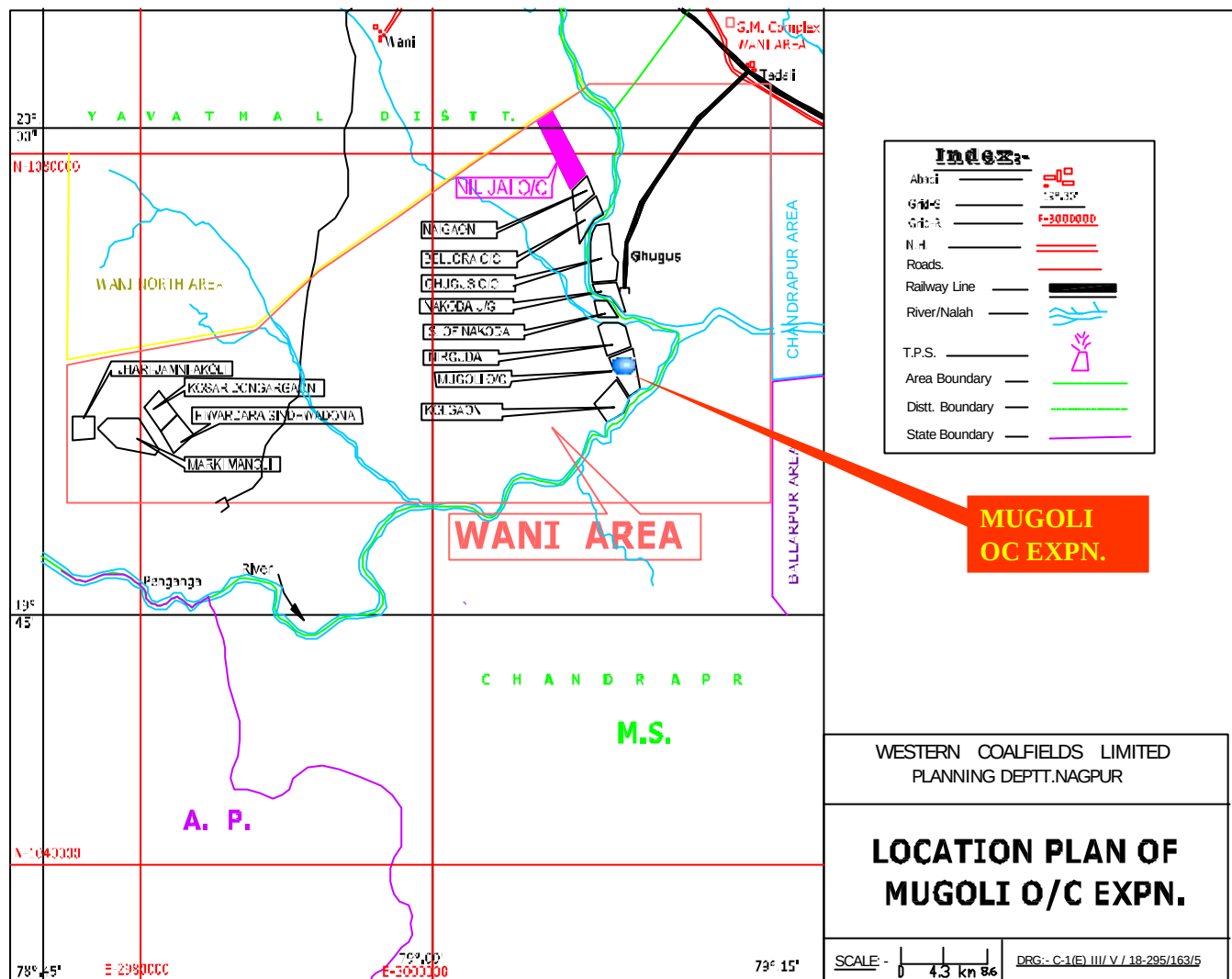
The mines of WCL are under the constant pressure to meet increasing demand of non-coking coal for powerhouses and other miscellaneous customers. From the demand and availability forecast of WCL, it is clear that there is increasing trend of deficit of coal. The requirement of MSEB alone is exceeding the availability of coal from WCL mines. To bridge this deficit, new mines will have to be opened and simultaneously production from presently operating opencast mines are to be increased substantially in Maharashtra State or else MSEB will continue to receive coal from distant coalfields like Ib Valley and Central India Coalfields thereby burdening the existing rail-road network and hence, electricity consumers.

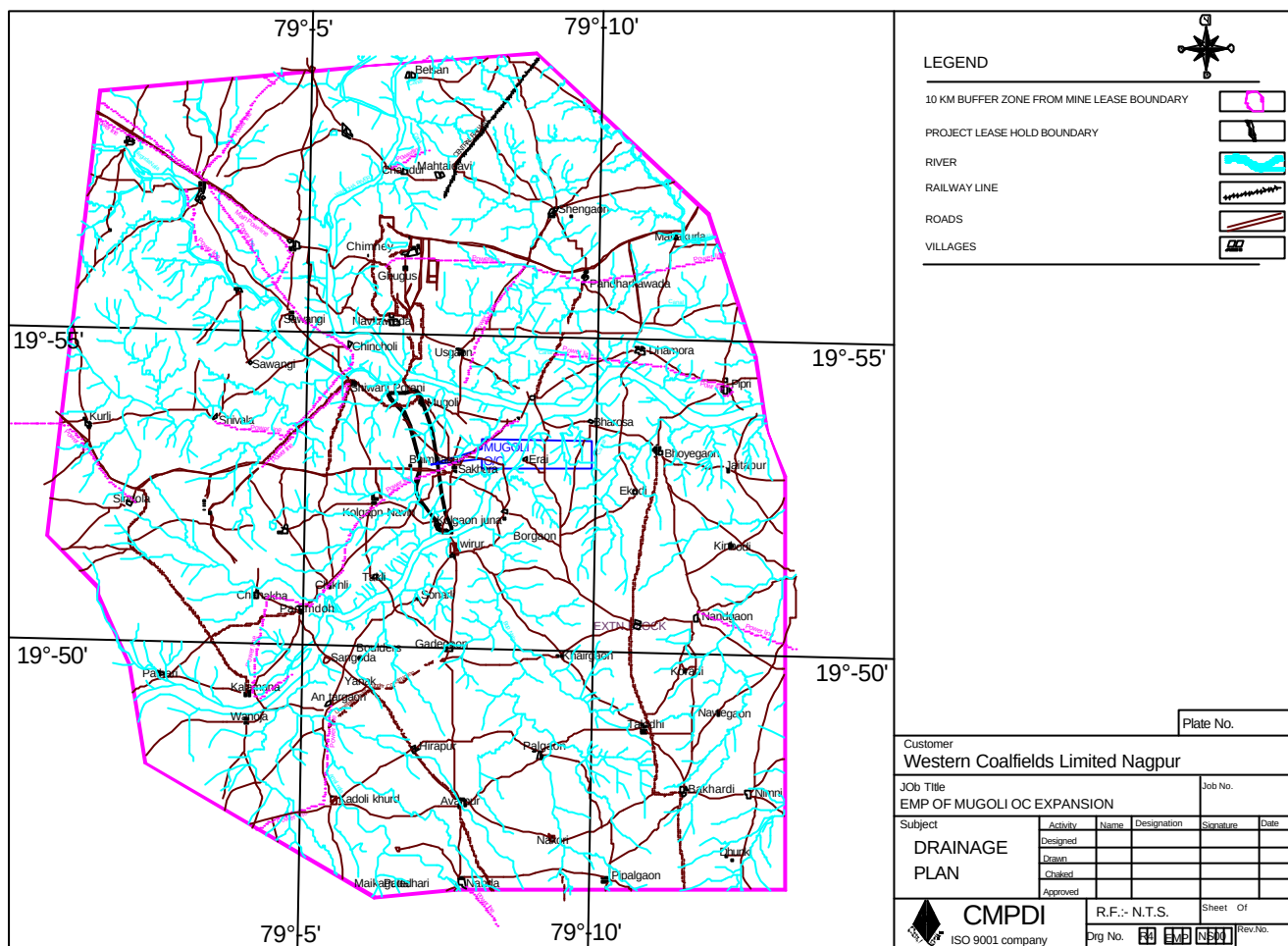
Thus, it is envisaged that the production from this mine is enhanced upto 4.00 MTPA and will, thus, be able to bridge the gap between the demand and supply to the extent of planned production from XI Plan period onwards.

1.6 SOURCES OF DATA

This report has been formulated using various data from the following sources:

Sl. No.	Type of Data	Sources
1	Mining and economic parameters and other miscellaneous data	CMPDIL and Wani Area, WCL.
2	Environmental data including meteorological data, air quality, dust fall rate, water quality and noise level data.	Environmental-data generation for Mugoli OC of Wani Area of WCL, Maharashtra carried out by CMPDI.
3	Socio-economic study & Land use/cover mapping buffer zone.	Census data 2001 & base line Socio - Economic survey.
4	Flora and fauna	Survey Report prepared by the competent authority in this field.
5	Surface hydrology and hydrogeology	CMPDIL, RI- IV, Nagpur.
6	Meteorological data	Environmental-data generation for Mugoli OC of Wani Area of WCL, Maharashtra carried out by CMPDI.
7	Land use/cover mapping core zone.	As per State Govt. Record, data supplied by the concerned WCL area office.





LEGEND

10 KM BUFFER ZONE FROM MINE LEASE BOUNDARY

PROJECT LEASE HOLD BOUNDARY

RIVER

RAILWAY LINE

ROADS

VILLAGES



Plate No.

Customer
Western Coalfields Limited Nagpur

Job Title
EMP OF MUGOLI OC EXPANSION

Subject

DRAINAGE
PLAN

CMPDI
ISO 9001 company

R.F.:- N.T.S.

Sheet Of
Drg No. **88 113 001** Rev.No.

Activity	Name	Designation	Signature	Date
Designed				
Drawn				
Checked				
Approved				

CHAPTER-II

PROJECT PROFILE

2.1 Geology & Structure

Mugoli Block is covered by thick soil. However, occasional isolated patches of Kamthi Sandstone are exposed in the gullies near riverbanks. A thick seam of 25 m split into two parts; namely top split and bottom split which is separated by a parting varying in thickness from 1.44 m to 5.49 m.

The general strike of coal seam in Mugoli Block is NW to SE in Northern Part and takes a swing to North to South in Central Part and NW to SE in Southern Part. The gradient of coal seam is 1 in 10 in Northern Part, 1 in 11 to 1 in 15 in Central Part and 1 in 3 to 1 in 9 in Southern Part of the property. The gradient of coal seam is towards South, West and West. The net mine-able reserve as per approved project reports of Mugoli OC & Nirguda OC is 25.96 Mt. In addition, 5.75 Mt is also made available within this mine lease because of amalgamation, leading to total reserve of 31.71 Mt. Till 31.03.2010, total coal extracted is 20.462 Mt. Hence, balance coal available as on 01.04.2010 is 11.248 Mt.

2.2 Mining Technology

As suggested in the approved PR, the mine is being worked by Shovel-Dumper System. Total OB as per approved PR of Mugoli OC & Nirguda OC has been estimated to be 98.53 Mm³ at an average Stripping Ratio of 3.86 m³/t. The OB excavated till 31.03.2010 is 54.33 Mm³ and hence balance OB to be excavated is 44.20 Mm³.

Target & Life

In order to meet the ever growing demand of power grade coal it is proposed to enhance the production capacity of the project under consideration from present level of **2.50 MTPA to 4.00 MTPA** (peak capacity) without any increase in land area. The balance life is 5 years.

Performance last Five Years

The performance of the mine in last five years in respect of coal production and OB excavation is given as below:-

Year	Coal Production in Tonnes	OB removal in Cubic Metre
2005-06	1796580	3766871
2006-07	1854690	2771144
2007 – 08	1915250	3584853
2008 – 09	2038634	8254568
2009 - 10	2326540	7374583

The projected life as per the balance coal and the peak capacity envisaged (4.00 MTPA) is coming about 5 years. The calendar programme is as given below:-

Year	Coal Production in Tonnes	OB removal in Cubic Metre
2010- 11	30,00,000	7810000
2011- 12	40,00,000	9000000
2012 – 13	30,00,000	10000000
2013 – 14	9,00,000	11000000
2014 - 15	3,48,000	6400000

Present status of HEMM's

1. Three E.K.G. Shovels (one of 4.6Cum. capacity & 02 of 5Cum. Capacity) are engaged in OB removal. In addition one Hydraulic Excavator (TATA EX-1200 D) of 5 Cum. Capacity is also engaged in OB removal in Mungoli Patch.
2. Three Hydraulic Excavators (All of 2.8 Cum. Capacity) are engaged in lifting of Coal.
3. 16 Nos. of 35T dumpers and 11 Nos. of 50T dumpers are engaged with Shovels and Excavators.
4. 05 Nos. of Dozers and 04 Nos. Drills are supporting in production work.

Mine Capacity and Capacity Utilization

The mine Capacity as on 01.04.2010 is as given below:-

- a) Loading Capacity = 4.2900 Mill. Cum.
- b) Hauling Capacity = 3.3009 Mill. Cum.

Capacity Utilization (2009-10) = 114.77% (Achieved)
 Capacity Utilization (2010-11) = 130.00% (Targeted)
 Capacity Utilization Achieved upto May,2010 = 130%

Concerted endeavor is being made to achieve 140% of capacity utilization with existing HEMMs of Mungoli OCM.

With the targeted Capacity Utilization, it is proposed to achieve the peak production capacity of 4.00 MTPA with the existing HEMMs.

Solid Waste Management

As already mentioned, total OB excavated till 31.03.2010 is 54.33 million cubic metre. The distribution is as follows :-

- ❖ OB in external Dump – 42.33 million cubic metre
- ❖ OB in internal Dump – 5.10 million cubic metre
- ❖ OB in embankment – 6.9 million cubic metre

The proposed programme for the balance life is as follows:-

Year	OB removal in Cubic Metre	Distribution of OB in Cubic Metre	
		In External Dump	In Internal Dump
2010- 11	7810000	6810000	1000000
2011- 12	9000000	7500000	1500000
2012 – 13	10000000	8000000	2000000
2013 – 14	11000000	7500000	3500000
2014 - 15	6400000	500000	5900000

2.3 LAND USE PATTERN

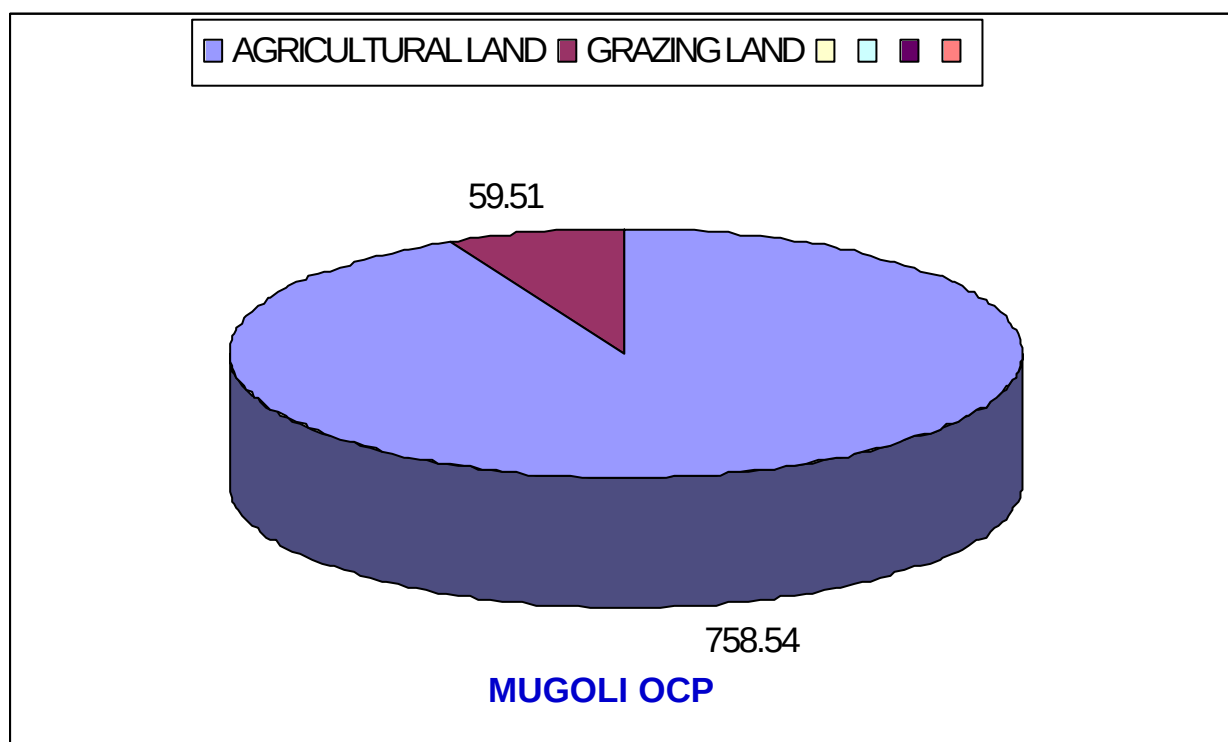
2.3.1 Pre-Mining Land Use

Total land requirement of the project is 818.05 ha.

Sl.No.	Particulars	Land (ha)
1.	Agricultural Land	758.54
2.	Govt. Land	59.51
	TOTAL.	818.05

There is no forestland involved in this Project.

PRE – MINING LAND USE (CORE ZONE) (ALL FIGURES IN HECTARES)



Present Land Use

S.N.	PARTICULARS	PRESENT LAND USE IN ha
1	Quarry Area	165.89 (Active backfilling is going on in 37.29 ha. The depth is about 40 m)
2	External OB Dump	170.39 (Plantation = 37.39)
3	Danger Zone for Blasting	167.00
4	Infrastructure & Roads	48.50
5	Embankment	33.42 (Plantation = 12.01)
6	Land for OB Dumping in balance life	43.35
7	Land for Quarrying in balance life	41.11
8	Rationalization Area	148.39 (Plantation = 32.80)
TOTAL		818.05

LAND RECLAMATION

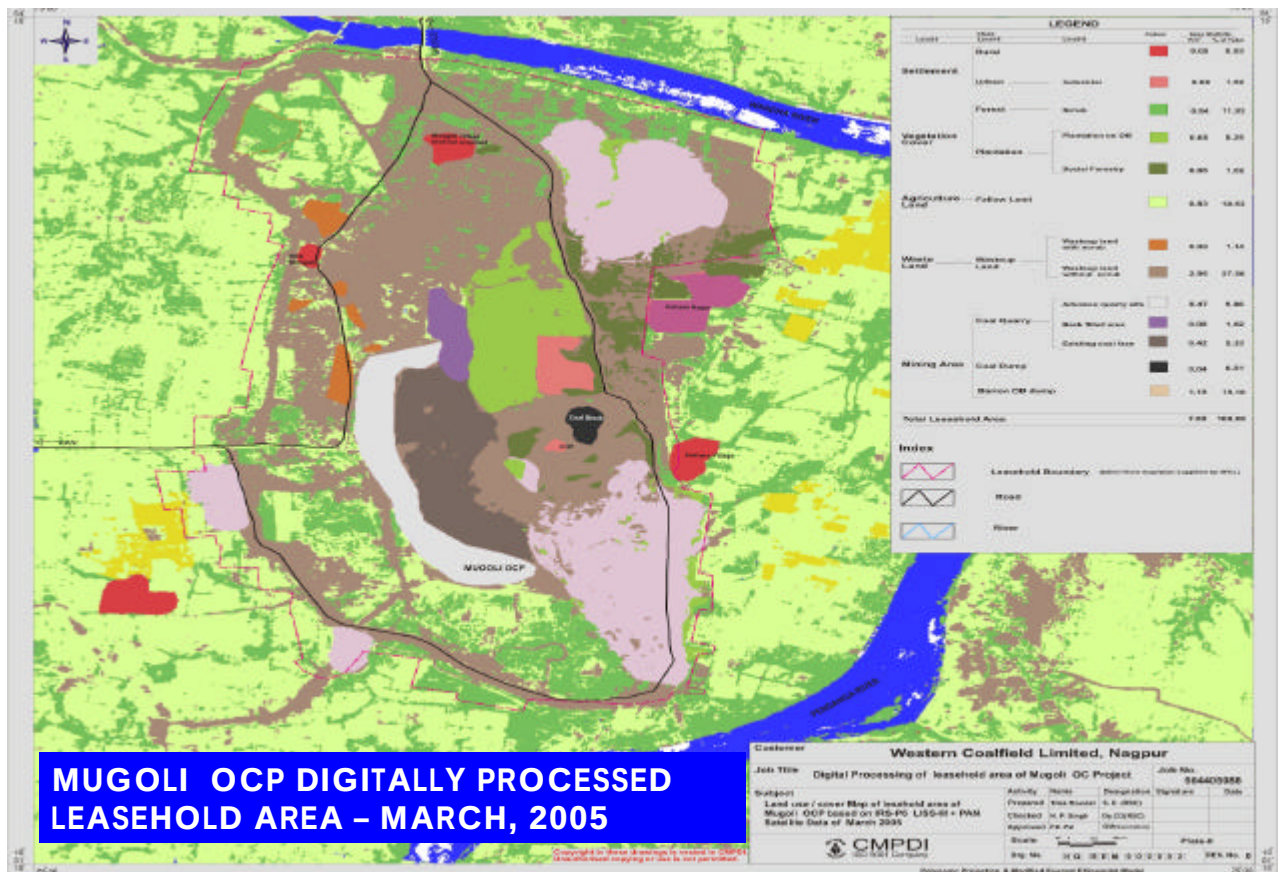
PRESENT OB RECLAMATION STATUS					
S.N.	PARTICULARS	Nos	AREA (ha)	PRESENT STATUS	
1	Existing External OB Dump & Embankment	10	163.39	i) Planted Area – 37.39 ha ii) Active Dump – 113.00 ha iii) Temp. T.S. Dump – 20.00 ha	
2	Internal Dump	--	37.29	Plantation started with 1000 trees, 0.40 ha. Reached upto GL.	
PRESENT PLANTATION STATUS					
S. N.	PARTICULARS	No. of Trees	AREA (ha)	PRESENT STATUS	TYPE OF SPECIES
1	External OB Dump, Backfilled Area & Embankment	124482	49.80	Partly Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
2	Avenue	35820	14.33	Planted	Cassia, Neem, Imli & Gulmohar
3	Rationalization Area & Blasting Zone	13629	5.45	Partly Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan

4	Around Infrastructure	10000	4.00	Partly Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
5	Around Workshop	13931	5.57	Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
6	Around CHP	8730	3.45	Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
TOTAL		2,06,592	82.60		

MINING LAND USE – PRESENT STATUS vis-à-vis EOM			
S.N.	PARTICULARS	PRESENT LAND USE IN ha	END OF MINE LIFE LAND USE IN ha
1	Quarry Area	165.89 (Active backfilling is going on in 37.29 ha. The depth is about 40 m)	207.00 (Void = 105.00 + Backfilled = 102.00)
2	External OB Dump	170.39 (Plantation = 37.39)	213.74 (Plantation = 71.90)
3	Danger zone for Blasting	167.00	167.00
4	Infrastructure & Roads	48.50	48.50
5	Embankment	33.42 (Plantation = 12.01)	33.42
6	Land for OB dumping in balance life	43.35	Nil
7	Land for Quarrying in balance life	41.11	Nil
8	Rationalization area	148.39 (Plantation = 32.80)	148.39 (Plantation = 32.80)
TOTAL		818.05	818.05

LAND USE COVER MAPS USING DIGITAL PROCESSING TECHNIQUES THROUGH SATELLITE IMAGERY

Objective of the land reclamation/restoration monitoring is to assess the area of backfilled, plantation, OB dumps, social forestry, active mining area, settlements and water bodies, distribution of wasteland, agricultural land and forest land in the leasehold area of the project. This is an important step taken up for assessing the progressive status of mined land reclamation and for taking up remedial measures, if any, required for environmental protection.



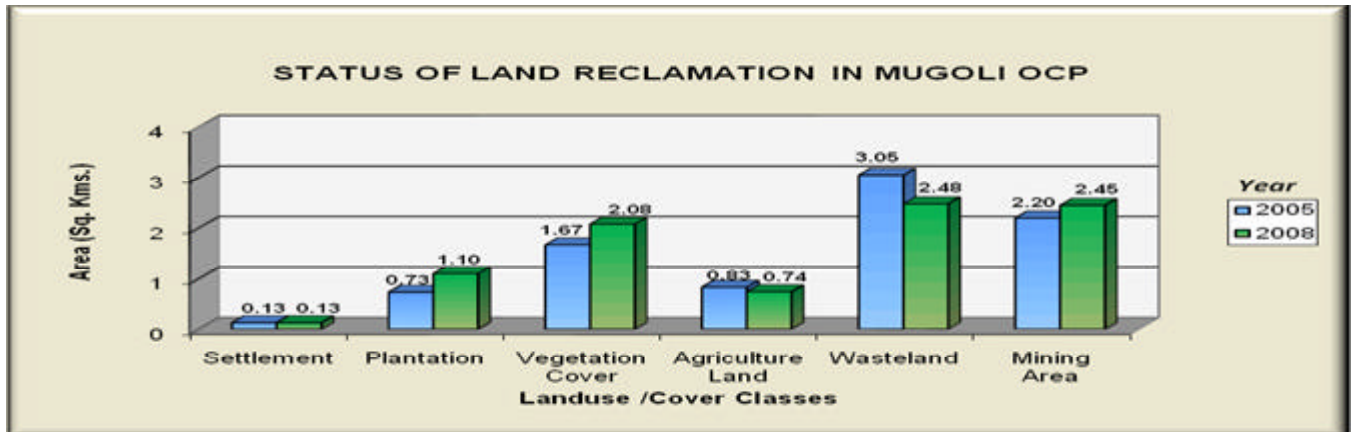
In addition to the above statutory Compliance, Opencast projects of WCL producing more than 5 million cubic m. (Coal + OB together) during the year 2008-09 have been taken up for land restoration / reclamation monitoring based on the *RESOURCESAT-1* satellite data using ERDAS Imaging digital image processing s/w on GIS platform. Land reclamation monitoring will be carried out **regularly on annual basis** to assess the progressive status of land restoration / reclamation in the above opencast mines. The report of this study has also been uploaded in the website of WCL in public domain.

Following 10 OC projects producing more than 5 million cubic m. (Coal + OB together) of Western Coalfields Ltd. have been taken up for land reclamation monitoring on annual basis:

- Sasti
- Padmapur
- Durgapur
- **Mugoli**
- Umrer
- Ukni
- Niljai
- New Majri + Kawadi
- Pimpalgaon
- Ghugus

Study reveals that 78.59% of mining area has already been reclaimed by WCL out of which 41.12% area has been revegetated and 37.47% area are backfilled.

After analyzing the satellite data of year 2008, it is evident that plantation, carried out on backfilled area, OB dumps as well as under social forestry in all the mines under study in WCL, has increased from 12.42 Sq. Km. to 17.18 Sq. Km. in span of last three years.



Further after analyzing the data of 2008 vs 2009, it is evident plantation in these mines of WCL has increased 17.18 sq. km to 22.73 sq.km

Plantation programme for the balance life is as follows :-

Sl.No	Year	Plantation in Nos.	Area to be covered in ha
1	2010 -11	8750	3.50
2	2011 -12	10000	4.00
3	2012 – 13	12500	5.00
4	2013 – 14	12500	5.00
5	2014 - 15	12500	5.00
	Total	56250	22.50

CHAPTER-III

DESCRIPTION OF ENVIRONMENT

3.0 INTRODUCTION:

Study area as framed in the approved TOR by MOEF has been indicated to be 10 km radius around the project. All the base line data have already been studied and assessed within the ambit of this defined study area and discussed in detail in subsequent paragraphs.

3.1 SOCIO – ECONOMIC STATUS:

Being a labour intensive industry the migration of skilled and semi-skilled labourer from the nearby area has taken place. Since this zone is having number of working coal mines, the local villagers have also got trained for various skilled and semi-skilled jobs. People in and around the working mines has been settled and this has resulted in thorough mixing of different cultures, customers etc. and justifies the term "Unity in Diversity".

3.1.1 Social Profile

For the purpose of understanding the socio-economic profile the studies have been undertaken with respect of following themes only for rural area.

- o Population composition
- o Population growth and migration
- o Literacy status and educational facilities
- o Health status and medical facilities
- o Occupational structure
- o Other civic amenities and infrastructure

These studies have been undertaken in two categories i.e. Core zone and Buffer zone.

The core zone comprises of actual leasehold area of the project. Buffer zone is the area within 10 km radius around the core zone.

Resettlement of 8 families of Bhimnagar Basti & 161 families of Kolgaon village completed and land losers have been suitably compensated as per norms.

In the core zone, there is no forestland.

The buffer zone has 42 numbers of villages.

In the buffer zone there are a number of working coalmines only and no other industries. So coal-mining activities have definite influence over the socio-economic status of the local population of this area.

3.2 Population composition

The population statistics are based on 2001 Census report updated to 2004, based on decadal growth rate. The break-up of population composition in buffer zone has been furnished below:

	Buffer zone
Total Population	40676
Males	20913
Females	19763
SC	3949
ST	5638
Others	31089

3.3 Literacy Status

The percentage of literacy in this area is around 53.42%.

	Buffer zone
Total Population	40676
Total Literates	21729
No. of Male Literates	12947
No. of Female Literates	8782

Here it will be seen that the literacy among female is low as compared with Male literacy.

3.4 Socio-economic Infrastructure

i) Educational facilities

There are few schools of primary, secondary & higher secondary standards run by WCL and State Govt. in the buffer zone.

ii) Medical facilities

The position of medical facilities in the buffer zone is not satisfactory. Few villages have primary health care centers. Better medical facilities are available at Wani, Ghugus and at nearby working coalmines.

iii) Water Supply and Electricity

Wells and tube wells are major sources of drinking water supply in the area. In some of the area hand pumps have been installed. Electric supply is better in the buffer zone. Most of the villages are electrified.

iv) Housing

Majority of houses in the area are having pucca buildings and they are electrified.

3.5 Economic Profile

To evaluate economic profile following parameters have been considered.

- i. Occupational Structure
- ii. Income Structure
- iii. Agricultural production
- iv. Animal husbandry

i. Occupational Structure:

The details about the occupation of the population of the buffer zone is given below :

- 50% - Main worker
- 10% - Industrial category
- 10% - Agriculture

Balance 30% fall under trade & commerce, marginal workers etc.

ii. Income Structure

With the opening of the coalmine, a number of local people have got employment in the coalmines, which has resulted in their economic upliftment.

By means of developmental activities in the field of various types of business and other trades in the area, a number of people are getting themselves engaged in different secondary and tertiary sectors of employment which came up till date and are still coming up in the area in order to support different types of industries and domestic demands of the market. The income level of the people in these villages has also been increased with the opening of the coalmines in this area in the past.

iii. Agriculture Production

The land is fertile & used currently for growing cash crops like cotton, chillies etc. apart from the usual food crops like rice, wheat, jowar & pulses.

iv. Animal Husbandary

There are cattles like Sheep, Goat, Buffallos, Cows, Oxes etc. in rural areas.

3.6 EXISTING LAND USE PATTERN

Land use pattern has been classified into four broad categories.

- Forest land;
- Agriculture (Irrigated & Un-irrigated) land
- Cultivable waste land;
- Not available for cultivation.

a) **Core Zone** - Total land requirement of the project is 818.05 Ha.

Tenancy Land - 758.54 Ha

Govt. Land - 59.51 Ha

There is no forestland involved in this project

b) Buffer Zone -

The details of land use pattern of the same has been shown below:

Sl.No.	Type of Land	Area (ha.)
1.	Forest area	1886.71
2.	Irrigated agricultural area	219.06
3.	Un-irrigated agricultural area	23573.63
4.	Cultivable waste land	1915.14
5.	Not available for cultivation	3764.25
Total		31358.79

3.7 Environmental quality:

SCOPE AND METHODOLOGY

The scope of the study and the present report covers the detailed characterisation of the existing environmental status in the study area for major environmental components viz. micrometeorology, ambient air quality, water/waste water quality, noise level and soil quality.

Micrometeorology

As a part of this study, micrometeorology and microclimatic parameters were recorded by installing a meteorological station at core-zone. Data of wind velocity, wind direction, ambient temperature, relative humidity and cloud cover were recorded at hourly intervals in a day throughout the study period. Further rainfall also has been recorded and reported.

Wind velocity and wind direction were recorded using cup anemometer and wind vane respectively. Ambient temperature was noted by wet and dry bulb thermometer. Relative humidity was measured from hygrometer and a self-recording rain gauge was used for rainfall data collection. Cloud cover data has been collected by visual inspection.

Ambient air quality

To assess the ambient air quality status, monitoring stations were identified on the basis of meteorology in the upwind and downwind direction as well as to represent the cross sectional scenario of the project site. Based on the production activities, the parameters chosen for assessment of air quality are Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulphur dioxide (SO₂) and Oxides of Nitrogen (NO_x).

Calibrated Respirable Dust sampler (with an average flow of 1.2 - 1.4 m³/min.) was used for monitoring of SPM & RPM and a tapping provided in the hopper of the same sampler was utilised for sampling of SO₂ and NO_x with proper flow controller (1 LPM).

A field laboratory for the purpose of calibration of equipment and standardisation of analytical procedures was also established. SPM & RPM were monitored on 24- hourly basis and gaseous pollutants on 8 hourly basis for 2 days in a week for 12 weeks as per the guidelines of CPCB / MOEF. Collected samples are analysed on the day of sample collection with the following procedure.

SPM & RPM

Ambient air laden with suspended particulates enters the Respirable Dust Sampler (RDS) through the inlet pipe of sampler by means of high flow rate blower (1.2 to 1.4 m³/min). As the air passes through the cyclone, coarse, non-respirable dust (size > 10 microns) is separated from the air stream by centrifugal forces acting on the solid particles. These separated particles fall through the cyclone's conical hopper and collect in the sampling bottle placed at bottom. The fine dust forming the respirable fraction (size <10 microns) of the Total Suspended Particulates passes through the cyclone and is carried by the air stream to the Glass Microfibre Filter Paper. The Respirable Particulate Matter (RPM) is retained by the filter and the carrier air exhausted from the system through the blower. The mass concentration (µg/m³) of Suspended Particulate Matter (non-respirable dust and respirable dust) and Respirable Particulate Matter in the ambient air is computed by measuring the mass of collected particulates and the volume of air sampled.

NO₂ (Jacob & Hocheiser modified method)

Ambient air is bubbled at the rate of 0.5-1.0 l/min in an Impinger containing a solution of Sodium Hydroxide and Sodium Arsenate. The resultant Nitrite Ion is reacted with Phosphoric acid, Sulphanilamide and N-ethylene di-amine di-hydro chloride to form a coloured complex. The absorbance is measured in a Spectrophotometer at a wavelength of 540 nm. The concentration of NO₂ is then calculated by using standard graph.

SO₂ (Modified West & Gaeke Spectrophotometer method)

Ambient air is bubbled at the rate of 0.5 -1.0 l/min in an Impinger containing a scrubbing solution of Sodium-Tetra Chloro Mercurate. The resultant complex is reacted with P-Rosaniline and Formaldehyde to form coloured Para-Rosaniline methyl sulphuric acid. The absorbance of the solution is measured in a Spectrophotometer at a wavelength of 560nm. The SO₂ is then calculated from standard graph.

Water quality

Water samples were collected and analyzed as per procedures outlined in IS-2488/ IS-3025 / AWWA / APHA. Sterilized bottles were used for collection of water sample for bacteriological analysis, stored in icebox and transported to the laboratory for the analysis. Parameters like pH, Temperature, Dissolved Oxygen, Residual Chlorine, Conductivity, Free Ammonia, Total Hardness, Calcium Hardness and Magnesium Hardness were analyzed in the field while collecting the samples.

MPN index of Coliforms are determined in the laboratory as per standard methods.

Noise levels

Ambient noise level measurements in four co-ordinal directions were carried out using CYGNET with windscreen during daytime as well as nighttime.

Noise measurements were made at 1.5 m above ground and about 3m away from walls, buildings or other sound reflecting sources. The readings were taken at an interval of one minute for 30 minutes and mean Leq. values has been reported. Ambient noise levels are compared with Air quality standards in respect of noise for residential area.

Soil quality

To assess the baseline soil quality, soil samples were collected from identified locations in core & buffer zones using augers at depths 30, 60 and 100 cms. The samples were analyzed for chemical parameters like pH, EC, N, P, K and engineering parameters like textural class, bulk density, liquid limit, field capacity, wilting coefficient and available water storage capacity.

BASE LINE AMBIENT AIR QUALITY

3.8 MICROMETEOROLOGICAL STATUS

3.8.1 Rationale Behind Sampling

Meteorological parameters are important factors in the study of air pollution. The transport and diffusion of the pollutants in the atmosphere are governed by meteorological factors. Factors like wind velocity, wind direction and atmospheric stability are known as primary / basic meteorological parameters since the dispersion and diffusion of pollutants depend mainly on these factors. Factors like ambient temperature, humidity, rainfall, atmospheric pressure, etc., are known as secondary meteorological parameters as these factors control the dispersion of the pollutants indirectly by affecting the primary factors. Thus, to assess the air pollution impact it becomes essential to collect the above-mentioned meteorological parameters in the project area.

Micrometeorological and microclimatic parameters were recorded by installing a meteorology station in corezone as it represents the prevailing micrometeorological aspects of the study area. During the study period, hourly reading of wind velocity, wind direction, temperature, humidity, cloud cover etc., were recorded and reported. Further daily rainfall has been recorded and reported.

3.8.2 Data Presentation

The seasonal wind distribution is given in the Table below.

3.8.3 Data Analysis

Meteorological data collected during the study reveal the following status:

Meteorological status

Meteorology station : Corezone	
Climatic conditions	Winter season (2009-10)
Predominant wind direction (from)	NE
Calm condition (%)	33.61
Predominant prevailing wind range (Kmph)	5 -11
Wind speed (m/sec)	
i) Minimum	0.4
ii) Maximum	13.8
Temperature (°C)	
i) Minimum	13.5
ii) Maximum	26.5
Relative humidity (%) (Mean)	65.0
Total rainfall (cm)	-

SEASONAL WIND DISTRIBUTION

Season : Winter 2009-10

Location : Corezone

Wind Direction	Wind Velocity, Kmph (% Duration)			
	< 1.0	1 – 5	5 – 11	11 – 19
N	33.61	2.96	1.71	0.05
NNE		5.14	2.22	0.09
NE		10.19	5.05	0.19
ENE		9.17	3.24	0.05
E		0.42	0.65	-
ESE		5.60	2.41	-
SE		3.70	1.71	-
SSE		1.71	0.37	-
S		1.25	0.51	-
SSW		0.97	0.51	-
SW		1.67	0.83	-
WSW		0.69	0.60	0.05
W		0.05	0.05	-
WNW		0.37	0.56	0.09
NW		0.32	0.32	-
NNW		0.46	0.46	-
Season	33.61	44.67	21.20	0.52

3.8.4 Summary

The wind velocity readings were ranging from 0.4 – 13.8 km/hr. Predominant wind was from Northeast (NE) direction. The maximum temperature recorded was 26.0°C and the minimum was 13.5°C. The mean relative humidity was found to 65.0% and no rainfall was recorded during the study period.

3.9 AMBIENT AIR QUALITY STATUS

3.9.1 Preamble

The principle objective of the ambient air quality monitoring is to assess the existing levels of air pollutants as well as the regional background concentration in and around the project area. Air pollution forms an important and critical factor to study the environmental issues in the mining areas. Air quality has to be frequently monitored to know the extent of pollution due to mining and allied activities. The ambient air quality monitoring was carried out at six stations.

The monitoring stations were identified on the basis of meteorology in the upwind and downwind direction as well as to represent the cross sectional scenario of the project site. The monitoring network was designed based on the available meteorological and climatologically norms of predominant wind direction and wind speed of the study region.

The parameters selected for analyzing the air quality status are Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulphur dioxide (SO₂) and Nitrogen oxides (NO_x). As per the existing norms, air quality monitoring was carried out on 24 hourly basis for SPM & RPM and 8 hourly basis for SO₂ and NO_x samples for two days in a week for twelve weeks in the season. s for SO₂, NO_x & CO samples for two days in a week for twelve weeks in the season.

3.9.2 Rationale Behind Sampling

AMBIENT AIR QUALITY MONITORING STATIONS (LOCATION & BEARING)

Project : Mugoli OCP

Season : Winter 2009 - 10

Sl. No.	Location Name	Location Code	Direction (from Site)	Distance (Km)	Height of the Sampling Point (m)
1.	Core Zone	A ₁	-	-	1.5
2.	Core Zone	A ₂			1.5
3.	Sakhara Village	A ₃	ESE (Down – Wind)	1.6	1.5
4.	Matholi Village	A ₄	NE (Up – Wind Control Station)	2.0	1.5
5.	Kolgaon Village	A ₅	SW (Down – Wind)	1.5	1.5
6.	Kolgaon Juna Village	A ₆	SE (Down-wind)	2.75	1.5

Core Zone (A₁, A₂): These locations are situated at the core zone and the same have been selected to assess the immediate effects of active mining and the present data will help to know the increase in pollution levels due to enhanced mining operation.

Sakhara Village (A₃): This location is situated at 1.60 km distance from site towards East – South - East(ESE) direction and it is selected for air quality monitoring to assess baseline status of the populated and sensitive area in the downwind direction which catches the existing pollution load of Mugoli OC.

Matholi Village (A₄): This location is situated at a distance of 2.0 km towards Northeast (NE) direction from mine area. It is selected to assess baseline status of the populated and sensitive area in the up – wind direction and is acting as Up – wind Control Station.

Kolgaon Navin village (A₅): This location is situated at a distance of 2.5 km towards South - West (SW) direction from mine area. it is selected for air quality monitoring to assess baseline status of the populated and sensitive area in the downwind direction which catches the existing pollution load of Mugoli OC.

Kolgaon Juna Village (A₆): This location is situated at a distance of 2.75 km towards South- East (SE) direction from mine area. it is selected for air quality monitoring to assess baseline status of the populated and sensitive area in the downwind direction which catches the existing pollution load of Mugoli OC.

3.9.3 Data Presentation

The ambient air quality data are given in the following Tables. The existing levels of air pollutants are shown in the tables in subsequent pages.

3.9.4 Data Analysis

Core zone

SPM and RPM values are ranging from 130 - 179 $\mu\text{g}/\text{m}^3$ and 36 $\mu\text{g}/\text{m}^3$ to 58 $\mu\text{g}/\text{m}^3$ respectively. SO_2 and NO_x values are varying between 5.3 to 11.1 $\mu\text{g}/\text{m}^3$ and 6.5 to 12.2 $\mu\text{g}/\text{m}^3$ respectively. ***All the values are found to be well within the Standards for Coalmines stipulated by Ministry of Environment & Forests (MoEF).***

Buffer zone

SPM and RPM values are ranging from 91 $\mu\text{g}/\text{m}^3$ to 161 $\mu\text{g}/\text{m}^3$ and 34 $\mu\text{g}/\text{m}^3$ to 75 $\mu\text{g}/\text{m}^3$ respectively. SO_2 and NO_x values are varying between 5.4 – 10.7 and 6.5 – 12.3 $\mu\text{g}/\text{m}^3$ respectively. ***All RPM, SO_2 and NO_x values are well within the CPCB norms.***

Summary

In general, all RPM, SO_2 and NO_x values are found to be well within the prescribed limits of CPCB.

3.9.5 Existing Ambient Air Quality

Ambient air quality monitoring is being carried out as per Env. (Protection Amendment Rule, 2000 at following locations.

Ambient Air Quality Monitoring locations :

S.No.	Location Details		Location Code
1.	Sub-station	-	WMOA-1
2.	Kailash Nagar township (Filter Plant)	-	WMOA-2
3.	Tube well near Sakhara village	-	WMOA-3
4.	SAM Office	-	WMOA-4

Sources of Air Pollution:

- i) Drilling;
- ii) Blasting;
- iii) Handling of OB and Coal;
- iv) Dump Formation;
- v) Dump and Coal Stock;
- vi) Coal transportation road;
- vii) Operation of HEMM

Air Sampling Procedure: Ambient air quality (SPM, RPM, SO₂, NO_x) at these station is monitored for 24 hours i.e. once in every fortnight as per Env. (Protection) Amendment Rule, 2000.

Methodology of Sampling and Analysis :

Air : 24 hourly air samples are collected once in a fortnight with Respirable Dust Sampler at selected locations to monitor ambient air quality w.r.t. Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulphur di-oxide (SO₂) and Oxides of Nitrogen (NO_x) etc.

SPM: Ambient air laden with suspended particulates enters the Respirable Dust Sampler through the inlet pipe of sampler by means of high flow rate blower (1.1 to 1.5 M³/min.). As the air passes through the cyclone, coarse, non-respirable dust (size >10 microns) is separated from the air stream by centrifugal forces acting on the solid particles. These separated particles fall through the cyclone's conical hopper and collect in the sampling bottle placed at bottom. The fine dust forming the respirable fraction (size <10 microns) of the Total Suspended Particulates passes through the cyclone and is carried by the air stream to the Glass Micro Fibre Filter Paper. The Respirable dust (RPM) is retained by the filter and the carrier air exhausted from the system through the blower. The mass concentration (micro gm/m³) of Suspended Particulate Matter (non-respirable dust and respirable dust) and Respirable Particulate Matter in the ambient air is computed by measuring the mass of collected particulates and the volume of air sampled.

NO_x: Determination of oxides of Nitrogen is based on the procedure of "Jacobs and Hochheiser method". In this method the air sample is collected 24 hourly in the field and analysed in the Laboratory using spectronic 20 D+ Spectrophotometer. Nitrogen oxides as Nitrogen di-oxide are collected by bubbling air through a Sodium hydroxide solution to form a stable solution of Sodium Nitrite.

The nitrite ion produced during sampling is determined colorimetrically (with the help of Spectrophotometer, measuring absorbance at 540 nm) by reacting the exposed absorbing reagent with Phosphoric acid, Sulphanilamide and N (1-napthyl) ethylenediamine dihydrochloride. The interference of Sulphur di-oxide is eliminated by converting it to Sulphuric acid with Hydrogen peroxide before analysis. Value of NO_x in air sample, below 6 micro gm/m³ has been reported as BDL.

SO₂: Determination of SO₂ is based on the procedure of West and Gaeke method. Sulphur di-oxide from the air stream is absorbed in a Sodium tetrachloromercurate solution to form a stable solution of Dichlorosulphitomercurate. The amount of Sulphur dioxide is then estimated by the colour produced when P-Rosaniline hydrochloride is added to the solution. The colour is estimated by a reading of absorbance at 560 nm in the Spectrophotometer.

Value of SO₂ in air sample, below 6 micro gm/m³ has been reported as BDL.

ANALYSIS RESULTS:

The analysis results of air quality monitoring for the period June 2009 to March 2010 are detailed out in subsequent chapter. The results indicate that the monitored parameters are well within the permissible limit.

3.10 BASE LINE WATER QUALITY STATUS

3.10.1 Rationale Behind Sampling

Any adverse impact or pollution consequence of water will have serious effect on the environment. Hence, it becomes important to assess the water quality periodically in the mining area. Thus, to assess the water quality, six locations are identified and samples (6 Nos.) were collected and analysed for physico-chemical and heavy metal parameters. Bacterial examination was also carried out to find out the Coliform contamination (if any) at water sources. The water quality assessment has been made from the following monitoring stations.

- | | | |
|-----------------------------------|---|----|
| • Handpump, Sakhara village | - | W1 |
| • Handpump, Matholi village | - | W2 |
| • Handpump, Kolgaon Navin village | - | W3 |
| • Handpump, Kolgaon Juna village | - | W4 |
| • Wardha river U/s | - | W5 |
| • Wardha river D/s | - | W6 |

Handpump, Sakhara village (W1): In order to assess the ground water quality in the immediate vicinity of the project area, this location is selected for the base line study.

Handpump, Matholi village (W2): In order to assess the ground water quality in the immediate vicinity of the project area, this location is selected for the base line study.

Handpump, Kolgaon Navin village (W3): In order to assess the ground water quality in the immediate vicinity of the project area, this location is selected for the base line study.

Handpump, Kolgaon Juna village (W4): In order to assess the ground water quality in the immediate vicinity of the project area, this location is selected for the base line study.

Wardha River U/S (W5): In order to assess the quality of surface water in the project site, this location is selected for the base line study.

Wardha River D/S (W6): In order to assess the quality of surface water in the project site, this location is selected for the base line study.

3.10.2 Data Presentation

The water quality data are given in Tables below.

3.10.3 Data Analysis

The detailed water quality data generated are given in Annexure-III. The abstract of water quality status is furnished in Table below.

Ground Water quality status

Source	pH		Turbidity (NTU)		TDS (mg/l)		Total Hardness (mg/l)		Iron (mg/l)		Chloride (mg/l)		Sulphate (mg/l)	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Ground Water	6.90	7.68	3	5	524	748	250	328	0.04	0.06	68	134	7	48
IS 105000 Norms	6.5-8.5		10		500-2000		300-600		0.3-1.0		250-1000		200-1000	

Surface water quality status

Source	pH		Colour (Hazen Units)		TDS (mg/l)		Iron (mg/l)		Chloride (mg/l)		Sulphate (mg/l)		Fluoride (mg/l)	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
River	7.87	7.94	7	8	398	434	0.02	0.02	55	68	4	8	0.14	0.14
IS:2296-1982	6.5-8.5		300		1500		50		600		400		1.5	

3.10.4 Summary

At all locations, Oil and grease, Phenolic compounds, cyanides, sulphides and insecticides are found to be absent and all heavy metal values except Iron and Zinc are found to be below the detectable limit. In general, the water quality at all five locations are found to be well within the permissible norms of IS: 10500 - 1991 and IS: 2296 - 1982.

3.10.5 WATER QUALITY

Mugoli OCP is an operating mine as such quality of mine pumped out water is being monitored as per Env. Protection (Amendment) Rule, 2000 round the year.

Methodology of Sampling

Five litres representative water sample at each sampling location was collected for chemical analysis as per the procedure laid down in IS: 2488. Sterilised bottles were used to collect samples for bacteriological analysis. The samples thus collected were transported from field to laboratory by proper storing in ice.

Methodology of Analysis

Samples of water were analysed for physical, chemical and bacteriological parameters as per IS: 2488 and compared the same with IS: 10500 and IS: 2296. pH, Temperature and Dissolved Oxygen values were measured at the site while collecting the samples. Presence of metals was also determined using Atomic Absorption Spectrophotometer (AAS). Water quality is found to be well within the Permissible limit respect to physico- chemical parameters. Analysis reports for Quarter Ending June 2009 to March 2010 are discussed in subsequent chapter.

3.11 HYDRO-GEOLOGY:

Coal mining is done by either underground or opencast method. Both these mining methods create dis-equilibrium in environmental scenario of the area and disturb the ground water conditions in particular. In view of this, Environmental Management Plan (EMP) and its clearance are pre-requisites for any kind of mining projects. As a part of EMP, pre – mining hydro-geological scenario / parameters are to be established as datum lines and these parameters are to be monitored periodically during active and post-mining stages to assess the impact on ground water regime / environment due to the mining activity and also to suggest suitable remedial measures to minimize the impact.

Hydro-geological regime of a geomorphic region is mostly controlled by three major aspects namely (i) geology (ii) topography and (iii) climate, besides the ground water and associated phenomena such as the occurrence and movement of water, the direction & velocity of water flow, the rate & magnitude of fluid potential fluctuation, water present in the formations i.e. conduit & storage function of aquifers, the recharge – discharge process, the inter-action/inter-relation of surface and ground water, the type and change of quality of water in space and time etc.

Generally, changes to hydro-geological regime occur temporarily at different phases of mining activity.

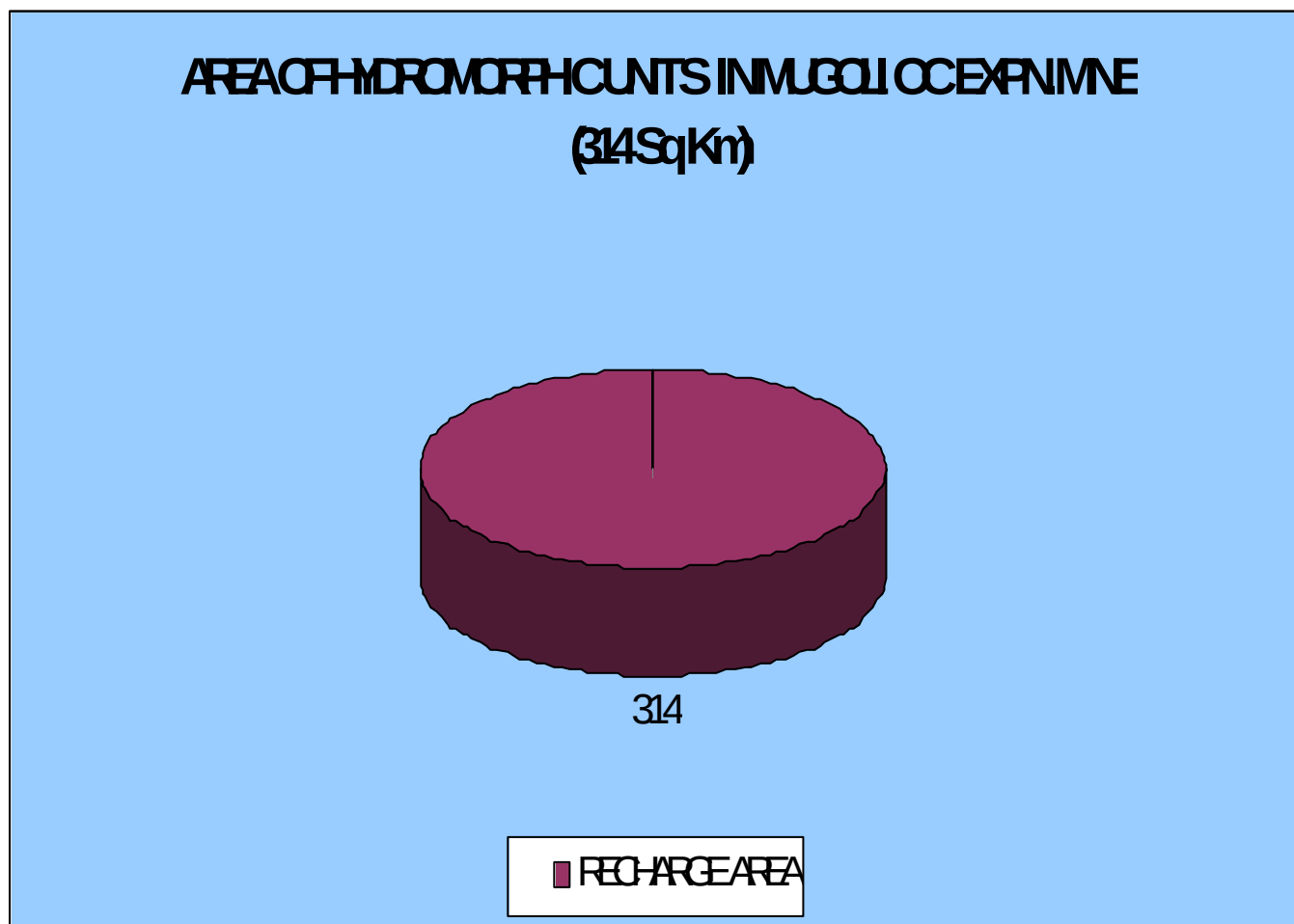
- a. The pre-mining phase represents a system that has evolved over a long period of time which is relatively unchanging set of hydrological and hydro-geochemical constituents existed.
- b. The active mining phase represents a period of continued disruption and dis-equilibrium of total hydro-geological regime.

- c. The reclamation phase represents a period in which the hydrological and hydro-chemical system starts to adjust to the newly created conditions of reclamation.
- d. The post-mining phase represents a period in which the system, to a major extent, has adjusted to the post –mining conditions so that the rate of change in the ground water system is small relative to phases 2 & 3.

Ground Water Conditions

Generally ground water occurs below the water table within the interconnected pore spaces of saturated sands and semiconsolidated sandstones, and their secondary porous structures. Kampti formations in Wardha Valley Coalfields are known for higher porosity than Barakars. The shales/carb shales and clay beds act as aquicludes and separate different aquifer zones, which comprise of mostly sand and sandstones formation.

Ground water exists under both confined/semiconfined and unconfined conditions in Kamthis while it is under semiconfined/confined condition in Barakars. The moturs generally serve as impervious horizon separating the Kamthi and Barakar aquifers. In view of this, the recharge to Barakars from the overlying formations may be insignificant.



Water table aquifer extending down to a depth of about 25 m. below ground level (bgl) occurs in alluvium/kamthis. Depth to water table varies from 8 m to 10 m bgl. In post-monsoon season while it ranges from 10 m to 12 m bgl in pre-monsoon period. The fluid potential fluctuation between the two extreme seasons is around 2 m.

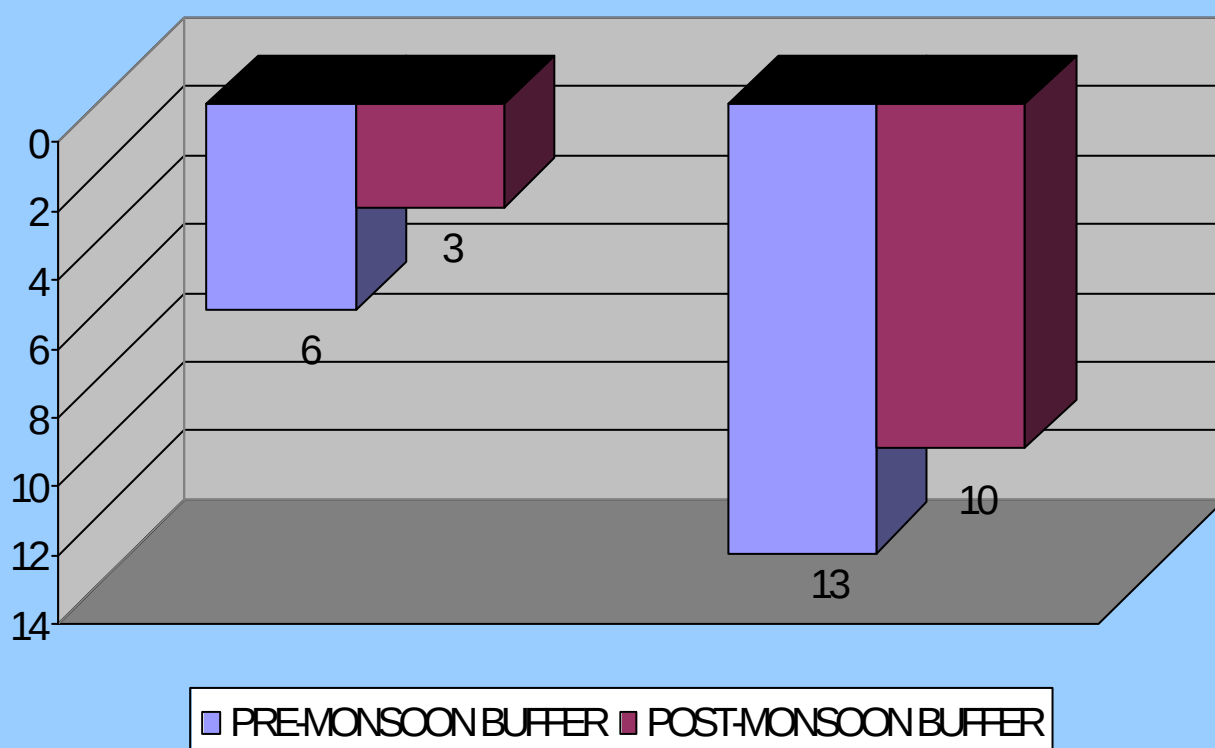
Water level data of Mugoli OCM Area

Sl.No.	Location	Pre-monsoon Water level (m bgl)	Post-monsoon water level (m bgl)	pH
1.	Sakhra	12.06	9.98	8.4
2.	Mugoli	10.70	8.85	8.0
3.	Matholi	12.03	-	-
4.	Kolgaon	11.68	9.30	8.2
5.	Shiwni	11.25	8.87	7.8
6.	Yenad	-	8.18	8.5

The groundwater movement under natural conditions is through the interconnected pore spaces and planes of fractures of saturated materials below phreatic surface as result of combined pressure and gravity fields and permeability contrast between the lithological units. Generally, ground water flows from recharge area to discharge belt.

The water table has a configuration similar to that of topography but with reduced relief and ranges between 168 m and 192 m above MSL in the pre-monsoon period. It is observed from the water table map that ground water divide is almost trending SW-NE and separates the major drainage basins of Wardha and Penganga rivers. Ground water flow direction is towards north-east, east and south-east.

RANGE OF WATER LEVELS (m bgl) IN BUFFER ZONE - MUGOLI OC EXPN MINE



The hydraulic gradient of water table in unconfined aquifer under natural conditions varies between 4.00 m/km and 9.5 /km. Gentle gradient indicates high hydraulic conductivity whereas steeper gradients suggestive of low hydraulic conductivity. The regional hydraulic conductivity of the unconfined aquifer in alluvium/kamthi ranges from 2.87 m/day to 11.54 m/day.

The piezometric level of the confined/semiconfined aquifer recorded from shallow tube wells are also in the same range of potentiometric levels inferring hydrological continuity or equal pressure heads in both the aquifers. The shallow tube wells in the area have registered a yield of 8 KLPD to 15 KLPD.

However, regional hydraulic conductivity of this aquifer in Kamthi and Barakars is about 5 to 7 m/day and 2 m/day respectively.

The water quality in general is alkaline in nature with pH 7.8 to 8.5 Further waters are of mixed quality with moderate concentration of total dissolved solids ranging from 445 mg/l to 900 mg/l and are judged to be potable and good quality.

Finally, it can be concluded that the study area is in discharge belt because of low to moderate depth of water levels, low fluid potential fluctuation, slightly mixed water quality etc.

Status of Ground Water:

It is essential to assess the ground water availability in the mining areas, which has direct impact on socio-economic development of the area. Therefore, the same is computed for Mugoli OCM area and its buffer zone with an area extent of 314 sq.km. (10km radius) which is also the area considered for socio-economic study. It may be relevant to mention here that the area between the river Wardha & Penganga is the probable area of influence by mining activity.

Out of the total area of 314 Sq.km. about 35% is covered by alluvium, kamthis and Barakars with infiltration factor of about 12% and the remaining 65% is with Talchir and Vindhyan formations possessing low infiltration rate (about 5%). The water falling on the study area of 314 Sq.km. due to an average annual rainfall of about 1200 mm works out to 376.8 MCM out of which about 28.07 MCM is the quantity of recharge to ground water through different formations in the area (15.82 MCM from Alluvium/Kamthis and 12.25 MCM from Talchir/Vindhyan) contributes to ground water from irrigation return flow is around 0.25 MCM. Therefore, net annual recharge to ground water is 28.32 MCM.

Ground water draft / withdrawal for various needs of the area except the pumping through the existing mines has been estimated and summarized in the following table.

Groundwater draft of Mugoli OCM area

Sl. No.	Utility	No. / Area	Per Capita Consumption	Quantity of Withdrawal (MCM)
1 a	Domestic (Human population)	40676	135 lit / person / day	2.00
1 b	Domestic (Animals)	24940	20 lit / day / one	0.18
2	Irrigation (For 120 days)	219.06 ha	40000 lit / ha / day	1.05
			Total	3.23

In addition to the above, ground water is being exploited through the existing mines in the area and it is to the tune of 7.33 MCM. As such, the total ground water draft / withdrawal for various purposes works out to 10.56 MCM.

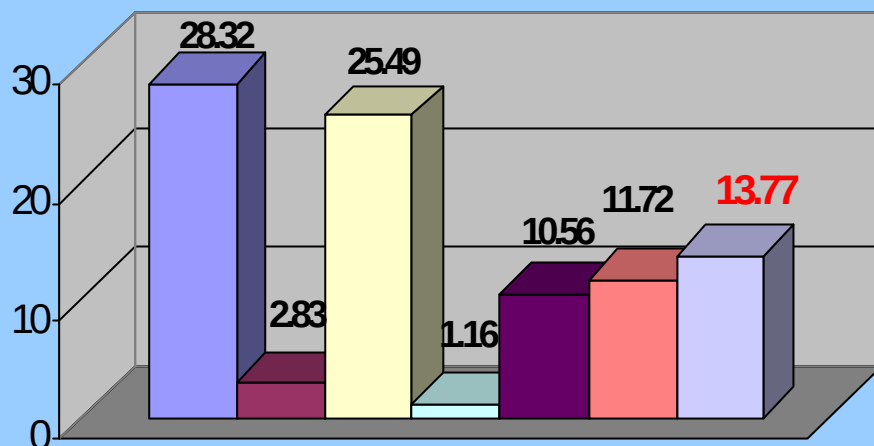
The total ground water recharge from all the sources is around 28.32 MCM, out of which 10% (2.83 MCM) goes as natural discharge and other losses thereby net annual ground water availability works out to 25.49 MCM. The total ground water draft in the area is around 10.56 MCM. While computing ground water balance, allocation up to next 25 years for domestic & industrial use has to be made since they are priority requirements.

Accordingly, it works out to 1.16 MCM. Thus, the total ground water draft of the area comes to 11.72 MCM.

Review of the net annual ground water availability and ground water draft figures, it is imperative that surplus ground water to the tune of 13.77 MCM is available for future development which has to be assessed from time to time during different stages of mining activities.

The allocation of 1.16 MCM is the surplus available ground water over and above the present utilization/withdrawal, and it is the lean season availability. However, static reserve of the area can be harnessed in emergency, which will be recharged during excessive rainfall years.

GROUND WATER BALANCE - **13.77** MCM MUGOLI OC EXPN. MINE



■ GROSS GW RECHARGE	■ NATURAL DISCHARGE	■ NET ANNUAL GW AVAILABLE
■ ALLOCATION FOR 25 Yrs	■ ANNUAL GW DRAFT	■ TOTAL DRAFT
■ GW BALANCE		

Stage of ground water development

$$\frac{\text{Existing gross ground water draft for purposes}}{\text{Net annual ground water availability}} \times 100$$

This relationship works out to 41.43% and it establishes that this area falls under the category of "Safe area" with potential for development.

3.12 BASE LINE NOISE LEVEL STATUS

3.12.1 Rationale Behind Sampling

To know the background ambient noise level of the proposed mines and surrounding environment six locations were selected. The locations were selected in such a way that it represents commercial & populated area and sensitive zones like Hospitals and Schools.

NOISE LEVEL MONITORING STATIONS

Sl.No.	Location Name	Location Code
1.	Core-zone	N1
2.	Cor Zone	N2
3.	Sakhara Village	N3
4.	Matholi Village	N4
5.	Kolgaon Navin Village	N5
6.	Kolgaon Juna village	N6

3.12.2 Data Presentation

The noise level data are given in Tables below.

Noise level status

S.No.	Zone	Leq. Noise level (mean)(dB(A))		Noise level Standards	
		Daytime	Nighttime	Daytime	Nighttime
1.	Core zone	47.6	39.8	75	70
2.	Buffer zone	40.6 – 45.4	35.4 – 38.2	55	45

Mean L_{eq} noise levels at day time and night time are ranging from 40.6 to 47.6 dB(A) and 35.4 to 39.8 dB(A) respectively in the study area. While comparing with IS: 4954 - 1986 norms for acceptable outdoor noise levels in residential area, these values are found to be within the limits.

Summary

While comparing with IS: 4954 -1986 norms for acceptable outdoor noise levels in residential area, the L_{eq} values are found to be within the limits.

NOISE LEVEL DATA

Project : Mugoli OCP

Season : Winter `09-10

S.NO.	Location name	Daytime Leq.	Nighttime Leq.
1	Core-zone (N1)	47.6	39.8
2	Core Zone (N2)	45.4	38.2
3	Sakhara Village(N3)	42.5	36.6
4	Matholi Village(N4)	43.8	37.5
5	Kolgaon Navin Village (N5)	40.6	35.4
6	Kolgaon Juna Village(N6)	41.7	36.6

3.12.4 NOISE LEVEL

In order to assess the noise levels being generated, monitoring is being carried out near workshop as per Env. Protection (Amendment) Rule, 2000. The results of monitoring from Quarter Ending June 2009 to March 2010 are discussed in subsequent chapter. Noise levels are well below the permissible limit.

3.13 SOIL QUALITY

3.13.1 Rationale Behind Sampling

Soil characteristics, erosion aspects, soil fertility etc., have direct bearing on the environment. Knowledge of soil parameters is essential for the planning and implementation of afforestation. Further, major mining activities affect the soil regime of the surrounding areas directly or indirectly. Hence, it becomes important to study the soil characteristics.

By keeping the above aspects in view, three locations are selected in the core zone. Locations are selected in such a way that different type of soils for supporting different species of vegetation is covered. The soil quality monitoring stations are given in the Table below..

SOIL QUALITY MONITORING STATIONS

Project : Mugoli OCP

Season : Winter 2009 - 10

Sl. No.	<u>Location Name</u>	Location Code
1.	<i>Barren land, Core Zone</i>	S ₁
2.	<i>Agricultural Land, Mugoli village</i>	S ₂
3.	<i>Agricultural Land, Juna Kolgaon village</i>	S ₃

3.13.2 Data Presentation

The soil quality data are given in the Tables

3.13.3 Data Analysis

Soil quality status

S.No.	Parameters	Range of Concentration
1.	pH	7.13 – 7.54
2.	Organic Carbon (%)	0.60 – 1.01
3.	Potassium (mg/kg)	72 – 128
4.	Nitrogen (mg/kg)	157 – 230
5.	Available magnesium (mg/kg)	1.1 – 2.6
6.	Texture Class	Clay Loam

Summary

The soil quality in the project area appears to be good and would support after suitable reclamation measures.

SOIL QUALITY DATA

Location : Barren land, Core Zone (S₁) Sampling Date : 15.01.2010

Sl. No.	Parameter	Depth, cm		
		0-30	30-60	60-100
1.	pH	7.47	7.51	7.54
2.	Electrical conductivity (m-mhos/cm at 20°C)	0.49	0.52	0.61
3.	Nitrogen,mg/kg	162	157	174
4.	Phosphorus, mg/kg	10.0	10.6	10.8
5.	Potassium, mg/kg	72	77	81
6.	Total Magnesium, mg/kg	1.2	1.4	1.26
7.	Organic carbon (%)	0.6	0.62	0.64
8.	Grain size distribution			
	Sand(%)	24	27	33
	Silt (%)	28	21	27
	Clay (%)	48	52	40
9.	Textural class	Clay Loam		
10.	Bulk density (g/cc)	0.86	0.92	0.94
11.	Liquid limit (%)	16.0	17.5	17.0
12.	Plastic limit (%)	14.0	14.5	15.0
13.	Infiltration rate (cm/hr)	-	3.3	-
14.	Field capacity (%)	5.4	5.6	5.7
15.	Wilting co-efficient (%)	0.5	0.4	0.4
16.	Available water storage capacity (%)	4.9	5.2	5.3

SOIL QUALITY DATA

Location : Agricultural Land, Mugoli village (S₂) Sampling Date : 15.01.2010

Sl. No.	Parameter	Depth, cm		
		0-30	30-60	60-100
1.	pH	7.26	7.29	7.32
2.	Electrical conductivity (m-mhos/cm at 20°C)	0.49	0.52	0.54
3.	Nitrogen, mg/kg	208	214	219
4.	Phosphorus, mg/kg	26.4	27.6	28.1
5.	Potassium, mg/kg	123	117	128
6.	Total Magnesium, mg/kg	1.1	1.15	1.21
7.	Organic carbon (%)	0.78	0.82	0.84
8.	Grain size distribution			
	Sand (%)	18	16	21
	Silt (%)	24	22	20
	Clay (%)	58	62	59
9.	Textural class	Clay Loam		
10.	Bulk density (g/cc)	1.23	1.27	1.31
11.	Liquid limit (%)	24.5	23.5	23.0
12.	Plastic limit (%)	12.0	11.5	11.0
13.	Infiltration rate (cm/hr)	-	3.4	-
14.	Field capacity (%)	6.4	6.6	6.7
15.	Wilting co-efficient (%)	0.5	0.4	0.4
16.	Available water storage capacity (%)	5.9	6.2	6.3

SOIL QUALITY DATA

Location : Agricultural Land, Juna Kolgaon Village (S₃)

Sampling Date : 15.01.2010

Sl. No.	Parameter	Depth, cm		
		0-30	30-60	60-100
1.	pH	7.13	7.22	7.26
2.	Electrical conductivity (m-mhos/cm at 20°C)	0.43	0.28	0.29
3.	Nitrogen, mg/kg	210	220	230
4.	Phosphorus, mg/kg	19.1	19.6	19.8
5.	Potassium, mg/kg	90	94	98
6.	Total magnesium, mg/kg	2.3	2.4	2.6
7.	Organic carbon (%)	0.83	0.92	1.01
8.	Grain size distribution			
	Sand (%)	10	12	11
	Silt (%)	30	30	28
	Clay (%)	60	58	61
9.	Textural class	Clay Loam		
10.	Bulk density (g/cc)	1.31	1.28	1.26
11.	Liquid limit (%)	18.0	19.0	19.5
12.	Plastic limit (%)	12.3	12.5	12.8
13.	Infiltration rate (cm/hr)	-	4.1	-
14.	Field capacity (%)	5.9	5.9	5.6
15.	Wilting co-efficient (%)	0.5	0.4	0.4
16.	Available water storage capacity (%)	5.4	5.5	5.2

3.14 FLORA & FAUNA

The flora and fauna existing in the study area are as under.

An Environmental Impact Assessment (EIA) study was conducted to generate baseline data of flora and fauna for Mugoli (OC) Mine Area during winter months. The project is situated in Wani area of Western Coalfields Limited (WCL) of Maharashtra State.

Topographically the areas are encompassed by undulating terrain of flat ridges with fragments of natural vegetation, which is characterized by tropical dry deciduous forest type. Mean annual temperatures are recorded between 25^oc to 40^oc. Average annual precipitation recorded from 800 to 1200mm mostly during south west monsoon period. Generally the soils are sandy loam but predominantly sandy brown at slopes of hilly terrain.

OBJECTIVE(S):

To generate baseline data on flora and fauna in core and buffer zone of the project.

To assess environmental impacts and potential damages to terrestrial flora, fauna and aquatic bodies

To suggest environment mitigation measures and conservation plan for the biodiversity, of the core and buffer zones.

METHODOLOGY:

The survey of flora and fauna was undertaken in core and buffer zones areas during winter months.

The study aspects covered by the EIA team under the following subtitles:

FLORA

1. Agriculture crops
2. Commercial crops
3. Plantations done by the WCL/Forest Department
4. Natural vegetation /Forest type
5. Grassland vegetation
6. Endangered species
7. Endemic species
8. Aquatic flora

FAUNA

1. Total listing of faunal elements
2. Endangered species (as per Indian Wildlife Act)
3. Endemic species
4. Migratory species
5. Migratory corridors or Paths
6. Breeding and spawning grounds
7. Aquatic fauna.

Floral analysis of the study areas of terrestrial origin was carried out based on physical verification of natural patches selected randomly and plant species associations of the core and buffer zones. The plant species were identified in the field itself based on their morphological features and reproductive materials and their identity was confirmed with the known herbarium collections in the dept. of Botany, Andhra University, Visakhapatnam.

The agriculture activities in relation to cropping patterns and seasonal crop varieties cultivated i.e. vegetables, cereals and pulses were assessed through field survey of the village crop lands, secondary information gathered from local inhabitants and personal interviews with the village level revenue officials.

All these observations of core and buffer zone areas were noted on data sheets and are presented in tabular formats.

Fauna was recorded neither from direct observations viz. pug marks, skeletal remains, animal droppings nor indirect evidences of gathered information by interviewing the local villagers about the presence or absence of the important wild life fauna.

Avian fauna (Bird's species) was observed through binoculars of focal length 8 x12^x and species identification has been done from ornithological notes and pictorial descriptions of various authors. The status assessment of faunal elements was determined based on their frequency of occurrence and as per the scheduled references of the Indian wildlife (Protection) Act, 1972

TERRESTRIAL FLORA

Terrestrial flora of the region was classified in to natural vegetation of forest origin, agro- ecosystems of agriculture crop varieties, cash crops of commercial importance, and agro-forestry plantations raised by the Western Coal Fields and Forest department in the vicinity of mining project areas.

Agricultural Crops

To a greater extent two times in a year the crops are cultivated during the south west monsoon months of July to October (Kharif) and winter months of November to January (Rabi). The cropping pattern is greatly varied from mixed crops in low lands to mono crop varieties of dry land areas. The crop varieties, which are cultivated in core and buffer zones of the project, are presented in Table below.

Commercial Crops

Commercial crops like pulses and oil seeds are cultivated in the crop lands of the project areas along with traditional crop varieties during the post-monsoon period of November, December and January for subsistence income generation and livelihood of local communities. The list of commercial crops grown in core and buffer zone of the project are presented in Table below.

Plantations/Agro forestry species:

The following Agro forestry species are raised at farm lands, in cultivable waste lands of the village outskirts, on the banks of streams and rivulets and at road side vacant areas. The agro forestry species of Core zone and Buffer zones are listed in Table below.

Natural Vegetation / Forest Types

The natural vegetation is classified as dry deciduous forest of trees, shrubs and herbaceous communities. The flora of the region succeeded in to three layer stratification of top storey of canopy layer, middle storey and lower story of ground level. Natural vegetation was found to be in degraded status in the mining areas of core zone with grassy slopes and discontinuous dry deciduous thickets of xerophytes.

A systematic list of plant species of the core and buffer Zones is presented in **Table below**.

Flora of Core Zone:

List of Agricultural crops in Core zone

<u>Crop variety</u>	Family name	Botanical name	Local/Trade name
Vegetables	Amaranthacea	<i>Abelmoschus esculentus</i>	Bhendi
	Cucurbiatacea	<i>Coccinia indica</i>	Kundru
	Solanaceae	<i>Capsicum annum</i>	Mirchi
		<i>Solanum melongena</i>	Brinjal

List of Cash (commercial) crops in Core Zone

Crop variety	Family name	Botanical name	Local /Trade name
Not Applicable	NA	NA	NA

List of Agro forestry species of Core Zone

Family name	Botanical name	Local/Trade name
Anacardiaceae	<i>Mangifera indica</i>	Amba/Mango
Caesalpinaceae	<i>Tamarindus indica</i>	limli/Tamarind Tree
Cemaruhiaceae	<i>Ailanthus excelsa</i>	Maharukh
Euphorbiaceae	<i>Phyllanthus emblica</i>	Awla/Indian goose berry
	<i>Pongamia pinnata</i>	Karanj/Beech tree
Graminae	<i>Bambusa arundinaceae</i>	Bamboo
Meliaceae	<i>Azadirachta indica</i>	Neem
Mimosaceae	<i>Acacia catechu</i>	Khair
	<i>A. auaculiformis</i>	Babool
	<i>Albizia lebeck</i>	Shirish
Myrtaceae	<i>Syzygium cumini</i>	Amrud
Rhamnaceae	<i>Zyzyphus jujube</i>	Bhor

List of Natural (vegetation) Flora Core Zone Area

(a) Canopy /Upper layer – Tree flora

Family name	Botanical name	Local/Trade name
Anacardiaceae	<i>Semecarpus anacardium</i>	Bibba
Annonaceae	<i>Annona squamosa</i>	Sitaphal
Caesalpinaceae	<i>Bahunia racemosa</i>	Apta
	<i>Cassia fistula</i>	Bahawa
	<i>Tamarindus indica</i>	Chunch
Cemaruhiaceae	<i>Ailanthus excelsa</i>	Maharukh
Combretaceae	<i>Anogiessus latifolia</i>	Dhawda
Ebenaceae	<i>Diospyros melanoxylon</i>	Tendu
Euphorbiaceae	<i>Phyllanthus emblica</i>	Awla
Fabaceae	<i>Butea monosperma</i>	Palas
	<i>Dalbergia paniculata</i>	Dhobin
	<i>D. sisso</i>	Sisam
	<i>Erythrina variegata</i>	Kasai
	<i>Pongamia pinnata</i>	Karanj
	<i>Pterocarpus marsupium</i>	Bija
Graminae	<i>Bambusa arundinaceae</i>	Katang bamboo
Lecythidaceae	<i>Careya arborea</i>	Kunbhi
Lytheraceae	<i>Lagerstroemia parviflora</i>	Lendia/lenda
Meliaceae	<i>Azadirachta indica</i>	Neem
Mimosaceae	<i>Acacia araculiformis</i>	Babul
	<i>A. catechu</i>	Khair
	<i>A. nilotica</i>	Babul
	<i>Albizia lebbeck</i>	Sirish
	<i>Cassia siamea</i>	Kashid
	<i>Leucaena leucocephala</i>	Subabul
Moraceae	<i>Ficus bengalensis</i>	Vad
	<i>F. religiosa</i>	Pipal
Moringaceae	<i>Moringa critifolia</i>	Aal
Myrtaceae	<i>Syzygium cumini</i>	Jamun
Palmae	<i>Borassus flabellifer</i>	Sindhi
Rhamnaceae	<i>Zizyphus mauritiana</i>	Ber
Rutaceae	<i>Chloroxylon swietenia</i>	Behura
Sapindaceae	<i>Schleichera oleosa</i>	Kusumb
Sterculiaceae	<i>Sterculia urnes</i>	Karaj
Tiliaceae	<i>Grewia tilifolia</i>	Dhaman
Verbenaceae	<i>Tectona grandis</i>	Sagwan

(b) Middle layer – Tress & Climbers

Family name	Botanical name	Local/ Trade name
Celastraceae	<i>Maytenus emarginata</i>	Bharati
Combretaceae	<i>Calycopteris floribunda</i>	Gilibuli
	<i>Combretum ovilifolium</i>	Piwarvel
Convolvulaceae	<i>Argyria nervosa</i>	Rakath vel
	<i>Ipomoea quiomequit</i>	Ganesh vel
	<i>I. eriocarpa</i>	Boota
	<i>I. palmata</i>	Ghiabato
Euphorbiaceae	<i>Ricinus communis</i>	Arandi
Fabaceae	<i>Abrus precartorious</i>	Gunj
Flocourtiaceae	<i>Flacourtia indica</i>	Kakai
Minispermaceae	<i>Cocculus hirsutus</i>	Vasan vel
Periplocaceae	<i>Cryptolepis buechanani</i>	Dhdhi
Rhamnaceae	<i>Ventilago denticulate</i>	Lokhandi
	<i>Zizypus juzuba</i>	Bhor
	<i>Z. oenoplia</i>	Eroni
Tiliaceae	<i>Grewia hirsute</i>	Gaturli
Verbenaceae	<i>Lantana camara</i>	Raimunia
	<i>Vitex nigunda</i>	Nirgundi

(a) Ground layer – Shrubs & Herbs

Family name	Botanical name	Local/ Trade name
Acanthaceae	<i>Andropogon pumilus</i>	Diwartan
	<i>Barleria prionitis</i>	Katekoranti
	<i>Amaranthus spinosus</i>	Kate chawli
Asclepidaceae	<i>Hygrophylla sculli</i>	Na
Compositae	<i>Tridax procumbens</i>	Kamarmodi
	<i>Parthenium hysterophorus</i>	Gajar gawat
	<i>Spilanthus acmella</i>	Na
	<i>E. nummularis</i>	Na
	<i>Merremia emarginata</i>	Undir khani
Euphorbiaceae	<i>Euphorbia hirta</i>	Dhudhi
Fabaceae	<i>Alysicarpus monilifer</i>	Na
	<i>Desmodium dichotomum</i>	Na
	<i>I. cordifolia</i>	Na
	<i>Tephrosia hamiltonii</i>	Divali
	<i>Lavendula bipinnata</i>	Na
	<i>Leucas biflora</i>	Na
Malvaceae	<i>Hibiscus lobatus</i>	Na
	<i>H. ovalifolius</i>	Na
	<i>Sida acuta</i>	Na
Mimosaceae	<i>Mimosa pudica</i>	Lajavanti
Myrtaceae	<i>Rotala tenuis</i>	Na
Nyctaginaceae	<i>Boerhavia diffusa</i>	Na
Ranunculaceae	<i>Cleome viscosa</i>	Pivili tilwan
Rubiaceae	<i>Borreria articularis</i>	Na
	<i>Physalis minima</i>	Na
Zygophyllaceae	<i>Tribulus terrestris</i>	Goakru

Grass Lands:

No prominent grass land ecosystem has been found in the Core zone area. However the grasslands are mixed with natural vegetation of low lands and in cultivated fields. The grasses and sedges of core zone are listed in **Table below**.

List of Grasses and Sedges of Core Zone

Family name	Botanical name	Local /Trade name
Cyperaceae	<i>Kyllina tenuifolia</i>	Na
Graminae	<i>Aristida hystrix</i>	Na
	<i>Chloris barbata</i>	Na
	<i>Dactylocten aegyptiaca</i>	Na
	<i>Digitaria ternate</i>	Na
	<i>Eragrostiella bifaria</i>	Na
	<i>Eragrostis ciliaris</i>	Na
	<i>Eragrostis ciliaris</i>	Na

Endangered Flora: No endangered plant species in Core zone.

List of Endangered Flora of Core Zone

Family name	Botanical name	Local /Trade name
Not Applicable	NA	NA

Endemic Flora: No endemic plantspecies have been found in Core zone.

List of Endemic Flora of Core Zone

Family name	Botanical name	Local /Trade name
Not Applicable	NA	NA

Aquatic Flora:

No perennial aquatic bodies are present in the Core zone. The following aquatic flora observed in the village ditches and small ponds.

Aquatic plants of Core zone of Project areas

Family name	Botanical name	Local/Trade name
Not Applicable	NA	NA

Flora of Buffer Zone

List of Agricultural crops in Buffer Zone

Crop variety	Family name	Botanical name	Local/Trade name
Cereals	Poaceae	<i>Zey mays</i>	Makkha/Maize
		<i>Triticum aestivum</i>	Wheat
Pulses	Fabaceae	<i>Cajanus cajan</i>	Arhar/Tuar
		<i>Cicer arietinum</i>	Channa
		<i>Phaseolus mungo</i>	Mung
		<i>Phaseolus aconitifolius</i>	Moth
Vegetables	Amaranthaceae	<i>Abelmoschus esculentus</i>	Bhendi
	Cucurbitaceae	<i>Coccinia indica</i>	Kundru
	Solanaceae	<i>Capsicum annum</i>	Mirchi
		<i>Lycopersicon lycopersicum</i>	Tomato
		<i>Solanum melongena</i>	Brinjal

List of Cash (commercial) crops in Buffer Zone

Crop variety	Family name	Botanical name	Local /Trade name
Pulses	Fabaceae	<i>Cajanus cajan</i>	Tuar
		<i>Phaseolus mungo</i>	Mung
		<i>Dolichos lablab</i>	Sem
	Solanaceae	<i>Lycopersicon lycopersicum</i>	Tomato
	Linaceae	<i>Linum usitatissimum</i>	Alsi/Linseed

List of Agro forestry species in Buffer Zone

Family name	Botanical name	Local/Trade name
Anacardiaceae	<i>Mangifera indica</i>	Amba/Mango
Caesalpinaceae	<i>Tamarindus indica</i>	limli/Tamarind Tree
Cecropiaceae	<i>Ailanthus excelsa</i>	Maharukh
Combretaceae	<i>Terminalia arjuna</i>	Arjun
Euphorbiaceae	<i>Phyllanthus emblica</i>	Awla/Indian goose berry
Fabaceae	<i>Dalbergia sisso</i>	Shesam/Rose wood
	<i>Pongamia pinnata</i>	Karanj/Beech tree
Graminae	<i>Bambusa arundinaceae</i>	Bamboo
Meliaceae	<i>Azadirachta indica</i>	Neem
Mimosaceae	<i>Acacia catechu</i>	Khair
	<i>A. auaculiformis</i>	Babool
	<i>Albizia lebeck</i>	Shirish
Myrtaceae	<i>Syzygium cumini</i>	Amrud
Rhamnaceae	<i>Zyzyphus jujube</i>	Bhor
Verbenaceae	<i>Tectona grandis</i>	Sagwan

List of Flora (Natural Vegetation) of Buffer Zone

(a) Canopy /Upper layer – Tree flora

Family name	Botanical name	Local/Trade name
Anacardiaceae	<i>Semecarpus anacardium</i>	Bibba
Annonaceae	<i>Annona squamosa</i>	Sitaphal
Caesalpinaceae	<i>Bahunia racemosa</i>	Apta
	<i>Cassia fistula</i>	Bahawa
	<i>Hardwickia binnata</i>	Anjan
	<i>Parkinsonia aculeate</i>	Vedi-babul
	<i>Tamarindus indica</i>	Chunch
Cemaruhiaceae	<i>Ailanthus excelsa</i>	Maharukh
Combretaceae	<i>Anogiessus latifolia</i>	Dhawda
	<i>Terminalia alata</i>	Ain
	<i>T. arjuna</i>	Arjun/Kahu
	<i>T. chebula</i>	Hirda
Ebenaceae	<i>Diospyros melanoxylon</i>	Tendu
Euphorbiaceae	<i>Phyllanthus emblica</i>	Awla
Fabaceae	<i>Butea monosperma</i>	Palas
	<i>Dalbergia paniculata</i>	Dhobin
	<i>D. sisso</i>	Sisam
	<i>Erythrina variegata</i>	Kasai
	<i>Pongamia pinnata</i>	Karanj
	<i>Pterocarpus marsupium</i>	Bija
Graminae	<i>Bambusa arundinaceae</i>	Katang bamboo
Lecythidaceae	<i>Careya arborea</i>	Kunbhi
Leeaceae	<i>Leea crispa</i>	Kuram
Lytheraceae	<i>Lagerstroemia parviflora</i>	Lendia/lenda
Meliaceae	<i>Azadirachta indica</i>	Neem
Mimosaceae	<i>Acacia araculiformis</i>	Babul
	<i>A. catechu</i>	Khair
	<i>A. nilotica</i>	Babul
	<i>Albizia lebbek</i>	Sirish
	<i>A. odoratisima</i>	Shinchuva
	<i>A. procera</i>	Pandra
	<i>Cassia siamea</i>	Kashid
	<i>Leucaena leucocephala</i>	Subabul
Moraceae	<i>Ficus bengalensis</i>	Vad
	<i>F. racemosa</i>	Umber
	<i>F. religiosa</i>	Pipal
Moringaceae	<i>Moringa critifolia</i>	Aal
Myrtaceae	<i>Syzygium cumini</i>	Jamun
	<i>Eugenia jambolana</i>	Jambhul
Palmae	<i>Borassus flabellifer</i>	Sindhi
Rhamnaceae	<i>Zizyphus mauritiana</i>	Ber
Rutaceae	<i>Chloroxylon swietenia</i>	Behura
Sapindaceae	<i>Schleichera oleosa</i>	Kusumb
Sterculiaceae	<i>Sterculia urnes</i>	Karaj
	<i>Waltheria americana</i>	Safed bendi
Tiliaceae	<i>Grewia tilifolia</i>	Dhaman
Verbenaceae	<i>Tectona grandis</i>	Sagwan

(b)Middle layer – Tress & Climbers

Family name	Botanical name	Local/ Trade name
Asclepidaceae	<i>Damia extensa</i>	Utaranvel
Celastraceae	<i>Maytenus emarginata</i>	Bharati
Combretaceae	<i>Calycopteris floribunda</i>	Gilibuli
	<i>Combretum ovilifolium</i>	Piwarvel
Convolvulaceae	<i>Argyria nervosa</i>	Rakath vel
	<i>Cuscuta reflexa</i>	Amar vel
	<i>Ipomoea quionequit</i>	Ganesh vel
	<i>I. eriocarpa</i>	Boota
	<i>I. palmata</i>	Ghiabato
	<i>I. absucura</i>	Dopateluta
Discoreaceae	<i>Dioscorea bulbifera</i>	Akas vel
Euphorbiaceae	<i>Kirganelia reticulate</i>	Pitundi
	<i>Securengia virosa</i>	Dhani
Fabaceae	<i>Abrus precartorious</i>	Gunj
	<i>Butea superba</i>	Palas vel
Flocourtiaceae	<i>Flacourtia indica</i>	Kakai
Minispermaceae	<i>Cocculus hirsutus</i>	Vasan vel
Nyctaginaceae	<i>Nyctanthus arbortristis</i>	Kharasi
Periplocaceae	<i>Cryptolepis buchanani</i>	Dhdhi
Rhamnaceae	<i>Ventilago denticulate</i>	Lokhandi
	<i>Zizypus juzuba</i>	Bhor
	<i>Z. oenoplia</i>	Eroni
	<i>Z. glaberrima</i>	Ghoti
Tiliaceae	<i>Grewia hirsute</i>	Gaturli
Verbenaceae	<i>Lantana camara</i>	Raimunia
	<i>Vitex nigunda</i>	Nirgundi

(d) Ground layer – Shrubs & Herbs

Family name	Botanical name	Local/ Trade name
Acanthaceae	<i>Andropogon pumilus</i>	Diwartan
	<i>Barleria prionitis</i>	Katekoranti
Amaranthaceae	<i>Achyranthus aspera</i>	Chirchitta
	<i>Amaranthus spinosus</i>	Kate chawli
Caesalpiniaceae	<i>Cassia absus</i>	Kan kuti
Compositae	<i>Tridax procumbens</i>	Kamarmodi
	<i>Parthenium hysterophorum</i>	Gajar gawat
	<i>Spilanthus acmella</i>	Na
Convolvulaceae	<i>Evolvulus alsinoides</i>	Na
	<i>E.nummularis</i>	Na
	<i>Merremia emarginata</i>	Undir khani
Euphorbiaceae	<i>Euphorbia hirta</i>	Dhudhi
	<i>E.rosea</i>	Na
Fabaceae	<i>Alysicarpus monilifer</i>	Na
	<i>Indigofera linifolia</i>	Na
	<i>I.cordifolia</i>	Na
	<i>Tephrosia hamiltonii</i>	Divali
Labiataeae	<i>Hyptis suaveolens</i>	Na
	<i>Ocimum sanctum</i>	Tulsi
	<i>Ocimum basilicum</i>	Rantulsi
	<i>Leucas biflora</i>	Na
Liliaceae	<i>Gloriosa superba</i>	Khadyanag
Malvaceae	<i>Hibiscus lobatus</i>	Na
	<i>H.ovalifolius</i>	Na
	<i>Sida acuta</i>	Na
Martinaceae	<i>Martynia annua</i>	Waghnakhi
Mimosaceae	<i>Mimosa pudica</i>	Lajavanti
Myrtaceae	<i>Rotala tenuis</i>	Na
Nyctaginaceae	<i>Boerhavia diffusa</i>	Na
Oxalidaceae	<i>Oxalis corniculata</i>	Tipani
Ranunculaceae	<i>Cleome viscosa</i>	Pivili tilwan
Rubiaceae	<i>Borreria articularis</i>	Na
Solanaceae	<i>Datura metel</i>	Kala dhotra
	<i>Physalis minima</i>	Na
Zygophyllaceae	<i>Tribulus terrestris</i>	Goakru

Grass Lands:

No prominent grass land ecosystem has been found in the core zone area. However the grasslands are mixed with natural vegetation of low lands and in cultivated fields. The grasses and sedges of Buffer zone are listed in Table below.

List of Grasses and Sedges of Buffer Zone

Family name	Botanical name	Local /Trade name
Cyperaceae	<i>Kyllina tenuifolia</i>	Na
	<i>Scleria annularis</i>	Na
Graminae	<i>Apluda mutica</i>	Phulkia
	<i>Aristida hystrix</i>	Na
	<i>Chloris barbata</i>	Na
	<i>Cymbapogon martini</i>	Tikhadi
	<i>Dactylocten aegyptiaca</i>	Na
	<i>Digitaria ternate</i>	Na
	<i>Eleusine indica</i>	Na
	<i>Eragrostiella bifaria</i>	Na
	<i>Eragrostis ciliaris</i>	Na

Endangered Flora: No endangered plant species in Core zone.

List of Endangered Flora of Buffer Zone

Family name	Botanical name	Local /Trade name
Not Applicable	NA	NA

Endemic Flora: No endemic plant species have been found in Core zone.

List of Endemic Flora of Buffer Zone

Family name	Botanical name	Local /Trade name
Not Applicable	NA	NA

Aquatic Flora:

No perennial aquatic bodies are present in the Core zone. The following aquatic flora observed in the village ditches and small ponds.

Aquatic plants of Buffer zone

Family name	Botanical name	Local/Trade name
Convolvulaceae	<i>Ipomoea aquatica</i>	Water spinach
Gentianaceae	<i>Nymphoides indica</i>	Floating Leaf
Nelumbonaceae	<i>Nelumbo nucifera</i>	Lotus

TERRESTRIAL FAUNA

Fauna of Core Zone

Faunal diversity is very negligible in project areas of the core zone as the habitat conditions are not being suitable for the distribution of important wildlife fauna. The Check lists of faunal groups of the Core zone are presented in **Table below**.

Checklist of Terrestrial Fauna of Core zone

(a) Mammals

Zoological name	Common name	Status in Wild life (Protection) Act
<i>Rousettus leschenaulti</i>	Indian Fulvous Fruit - Bat	Schedule-V, Section 3
<i>Mus booduga</i>	Indian Field Mouse	Schedule-V, Section, 5
<i>Mus rattus rattus</i>	Common House Rat	Schedule-V, Section, 6
<i>Bandicota bengalensis</i>	Bandicoot Rat	Schedule-V, Section, 6
<i>Herpestes edwardsi</i>	Indian Grey Mongoose	Schedule-IV, Section, 6A

(b) Birds

Zoological name	Common name	Status in Wild life (Protection) Act
<i>Bubulcus ibis</i>	Cattle egret	Schedule-IV, Section,11
<i>Ardeola grayii</i>	Indian pond heron	Schedule-IV, Section,11
<i>Milvus migrans</i>	Black kite	Schedule-IV, Section,11
<i>Streptopelia chinensis</i>	Spotted dove	Schedule-IV, Section,11
<i>Alcedo atthis</i>	Small blue kingfisher	Schedule-IV, Section,11
<i>Halcyon smyrensis</i>	White-breasted kingfisher	Schedule-IV, Section,11
<i>Merops orientalis</i>	Small bee-eater	Schedule-IV, Section,11
<i>Acridotheres tristis</i>	Common myna	Schedule-IV, Section,11
<i>Sturnus contra</i>	Asian pied starling	Schedule-IV, Section,11
<i>Venellus indicus</i>	Red-wattled lapwing	Schedule-IV, Section,11
<i>Chardrius dubius</i>	Little ringed flover	Schedule-IV, Section,11
<i>Psittakula krameri</i>	Rose ringed parakeet	Schedule-IV, Section,11
<i>Pycnonotus cafer</i>	Red-vented bulbul	Schedule-IV, Section,11
<i>Coracias benghalensis</i>	Indian roller	Schedule-IV, Section,11
<i>Turdoides caudatus</i>	Common babbler	Schedule-IV, Section,11
<i>Centropus sinensis</i>	Crow pheasant	Schedule-IV, Section,11
<i>Dicrurus adsimilis</i>	Black Drango	Schedule-IV, Section,11
<i>Carvus splendens</i>	House crow	Schedule—V, Section,1
<i>Passer domesticus</i>	House sparrow	Schedule-IV, Section,11

(c) Reptiles

Zoological name	Common name	Status in Wild life (Protection) Act
Not Applicable	NA	NA

(d) Amphibians

Zoological name	Common name	Status in wildlife (Protection) Act
Not Applicable	NA	NA

(e) Butter flies

Zoological name	Common name	Status in wildlife (Protection) Act
Not Applicable	NA	NA

Endangered Species (as per Wildlife (Protection) Act): No Endangered fauna was recorded in Core Zone.

Checklist of Endangered species of Core zone

Zoological name	Common name	Status in Wild life (Protection) Act
Not Applicable	NA	NA

Endemic Species of the Project areas: No endemic species were observed in Core Zone

Checklist of Endemic species of Core zone

Zoological name	Common name	Status in Wild life (Protection) Act
Not Applicable	NA	NA

Migratory species of the Project areas: No migratory fauna was observed in Core Zone

Checklist of Migratory species of Core zone

Zoological name	Common name	Status in Wild life (Protection) Act
Not Applicable	NA	NA

Migratory corridors and Flight paths: No migratory corridors and Flight paths were present in Core Zone.

Migratory corridors of Core zone

Name of the area	Location	Protected status
Not Applicable	NA	NA

Breeding and Spawning grounds: No breeding and spawning grounds were earmarked for the wildlife fauna in Core zone.

Breeding and spawning grounds of Core zone

Name of the area	Location	Protected status
Not Applicable	NA	NA

Aquatic Fauna:

Aquatic fauna belong to Fin-fish (Fishes), Shell- fish (Mollusc) and Crustaceans (Prawns) of non-commercial species. The checklist of aquatic fauna of Core Zone is presented in **Table below**

Checklist of Aquatic fauna of Core Zone

(a) Fishes:

Zoological name	Common name	Status in Wild life (Protection) Act
<i>Clarias batrachus</i>	Magur	Not Applicable
<i>Mugil cephalous</i>	Mullet	Not Applicable
<i>Catla catla</i>	Catla	Not Applicable

(b) Crustaceans

Zoological name	Common name	Status in Wild life (Protection) Act
<i>Macrobrachium rosenbergi</i>	Freshwater Prawn	Not Applicable

(c) Mollusc

Zoological name	Common name	Status in Wild life (Protection) Act
<i>Littorina</i> sp.	Common snail	Not Applicable

Fauna of Buffer Zone:

The buffer zone areas of the project are providing with suitable habitats for the distribution of wildlife fauna like mammals. The bird's fauna is conspicuous in the buffer zone areas. The fauna of the buffer zone areas are listed in **Table below**.

Checklist of Terrestrial Fauna of Buffer zone

(a) Mammals

Zoological name	Common name	Status in Wild life (Protection) Act
<i>Rousettus leschenaulti</i>	Indian Fulvous Fruit - Bat	Schedule-V, Section 3
<i>Presbytis entellus</i>	The Common Langur	Schedule-II, Part-I, Section, 4A
<i>Mus booduga</i>	Indian Field Mouse	Schedule-V, Section, 5
<i>Mus rattus rattus</i>	Common House Rat	Schedule-V, Section, 6
<i>Bandicota bengalensis</i>	Bandicoot Rat	Schedule-V, Section, 6
<i>Herpestes edwardsi</i>	Indian Grey Mongoose	Schedule-IV, Section, 6A
<i>Lepus nigricollis nigricollis</i>	Black napped Hare	Schedule-IV, Section, 3A
<i>Felis chaus</i>	Jungle Cat	Schedule-II, Part-II, Section, 2C
<i>Vulpes bengalensis</i>	Indian Fox	Schedule-II, Part-I, Section, 1B
<i>Canis aureus</i>	Jackal	Schedule-II, Part-I, Section, 2B

(b) Birds

Zoological name	Common name	Status in wild life (Protection) Act
<i>Egretta alba</i>	Larger egret	Schedule-IV, Section,11
<i>Bubulcus ibis</i>	Cattle egret	Schedule-IV, Section,11
<i>Ardeola grayii</i>	Indian pond heron	Schedule-IV, Section,11
<i>Milvus migrans</i>	Black kite	Schedule-IV, Section,11
<i>Haliastur Indus</i>	Brahminy kite	Schedule-IV, Section,11
<i>Streptopelia chinensis</i>	Spotted dove	Schedule-IV, Section,11
<i>Alcedo atthis</i>	Small blue kingfisher	Schedule-IV, Section,11
<i>Halcyon smyrensis</i>	White-breasted kingfisher	Schedule-IV, Section,11
<i>Merops orientalis</i>	Small bee-eater	Schedule-IV, Section,11
<i>Dinopium benghalensis</i>	Common wood pecker	Schedule-IV, Section,11
<i>Acridotheres tristis</i>	Common myna	Schedule-IV, Section,11
<i>Upupa epops</i>	Common hoopoe	Schedule-IV, Section,11
<i>Sturnus contra</i>	Asian pied starling	Schedule-IV, Section,11
<i>Dendrocitta vagabond</i>	Indian tree pie	Schedule-IV, Section,11
<i>Venellus indicus</i>	Red-wattled lapwing	Schedule-IV, Section,11
<i>Chardrius dubius</i>	Little ringed flover	Schedule-IV, Section,11
<i>Psittakula krameri</i>	Rose ringed parakeet	Schedule-IV, Section,11
<i>Pycnonotus cafer</i>	Red-vented bulbul	Schedule-IV, Section,11
<i>Coracias benghalensis</i>	Indian roller	Schedule-IV, Section,11
<i>Turdoides caudatus</i>	Common babbler	Schedule-IV, Section,11
<i>Centropus sinensis</i>	Crow pheasant	Schedule-IV, Section,11
<i>Dicrurus adsimilis</i>	Black Drango	Schedule-IV, Section,11
<i>Carvus macrorhynchos</i>	Jungle crow	Schedule-IV, Section,1
<i>Carvus splendens</i>	House crow	Schedule—V, Section,1
<i>Passer domesticus</i>	House sparrow	Schedule-IV, Section,11
<i>Ploceus philippinus</i>	Baya weaver	Schedule-IV, Section,11

(c) Reptiles

Zoological name	Common name	Status in Wild life (Protection) Act
<i>Varanus benghalensis</i>	Indian monitor lizard	Schedule-II, Part-II
<i>Enhydryis enhydryis</i>	Smooth water snake	Schedule-IV, Section,12
<i>Natrix piscator</i>	Olive keel back snake	Schedule-IV, Section,12

(d) Amphibians

Zoological name	Common name	Status in Wild life (Protection) Act
<i>Bufo melanostictus</i>	Common toad	Schedule-IV, section,13
<i>Euphlyctis hexadactyla</i>	Common frog	Schedule-IV, section,13

(e) Butter flies

Zoological name	Common name	Status in Wild life (Protection) Act
<i>Danaus genutia</i>	Striped tiger	Schedule-IV, Section,18
<i>Antheria mylita</i>	Moth	Schedule-IV, Section,18

Endangered Species (as per Wildlife (Protection) Act: No Endangered fauna was recorded in Buffer Zone.

Checklist of Endangered species of Buffer zone

Zoological name	Common name	Status in Wild life (Protection) Act
Not Applicable	NA	NA

Endemic Species of the Project areas: No endemic species were observed in the Buffer Zone areas

Checklist of Endemic species of Buffer zone

Zoological name	Common name	Status in Wild life (Protection) Act
Not Applicable	NA	NA

Migratory species of the Project areas: No migratory fauna observed in Buffer Zone

Checklist of Migratory species of Buffer zone

Zoological name	Common name	Status in Wild life (Protection) Act
Not Applicable	NA	NA

Migratory corridors and Flight paths: No migratory corridors and Flight paths were observed in Buffer Zone.

Migratory corridors of Buffer zone

Name of the area	Location	Protected status
Not Applicable	NA	NA

Breeding and Spawning grounds: No breeding and spawning grounds were earmarked for the wildlife fauna in Buffer zone.

Breeding and spawning grounds of Buffer zone

Name of the area	Location	Protected status
Not Applicable	NA	NA

Aquatic Fauna:

Aquatic faunal groups are of Fin- fish (Fishes) and Shell- fish (Mollusc) and Crustaceans (Prawns) of non-commercial species.

Checklist of Aquatic Fauna of Buffer Zone

(a) Fishes:

Zoological name	Common name	Status in Wild life (Protection) Act
<i>Channa punctatus</i>	Spotted murrel	Not Applicable
<i>Clarias batrachus</i>	Magur	Not Applicable
<i>Mugil cephalous</i>	Mullet	Not Applicable
<i>Labeo rohita</i>	Rohu	Not Applicable
<i>Labeo gonious</i>	Minor carp	Not Applicable
<i>Catla catla</i>	Catla	Not Applicable

(b) Crustaceans

Zoological name	Common name	Status in Wild life(Protection) Act
<i>Macrobrachium rosenbergi</i>	Freshwater Prawn	Not Applicable
<i>Macrobrachium malcolmsoni</i>	Small Prawn	Not Applicable

(c) Mollusc

Zoological name	Common name	Status in Wild life(Protection) Act
<i>Planaxis sulcatus</i>	Ground snail	Not Applicable
<i>Littorina</i> sp.	Common snail	Not Applicable

CHAPTER- IV

ANTICIPATED ENVIRONMENTAL IMPACTS

&

MITIGATION MEASURES

4.0 AIR POLLUTION IMPACT ASSESSMENT

Air pollution impact activities are divided into following components:

- (A) Inventory of emission sources;
- (B) Source strength;
- (C) Micro-meteorological conditions;
- (D) Quantification of impact at various geographical locations within the study area.

(A)&(B). Inventory of Emission Sources & Source Strength

The project life may be divided into two stages namely Operational stage and Post-operational stage for identifying the sources of emission. Activities associated with each project stage having impact on ambient air quality is as follows.

(a) Operational Stage

During this stage, activities necessary for mining of coal, its processing and transport are taken up. For prediction of fugitive emission of dust, studies were conducted in Singrauli Coalfield under Northern Coalfields Limited. Based on the Singrauli study, emission factors in respect of following activities of an opencast mine have been determined. Such activities having impact on air quality is described as follows:

(i) Drilling

Blast holes are drilled in OB/parting and coal seams with help of Drills. In dry condition, this operation generates dust. Diesel operated drills release noxious gases also. This may be treated as low-level point source. The emission factor worked out comes to 2.2×10^{-4} t/hole in coal and 1.5×10^{-3} t/hole in overburden.

(ii) Blasting

The OB and coal has been tested to determine the quantity of explosives for blasting. On an average, about 6969 t of coal and 21604 Cu.m. of OB would be removed by blasting. The emission factor as determined in Singrauli comes to 0.025 t/blast in coal and 0.03 t/blast in OB.

This may be treated as instantaneous high-level source for SPM and noxious gases.

(iii) Handling of Coal

Once coal mass has been loosened by blasting, it is loaded by Shovel on Rear Discharge Dumpers which transports them to receiving pit of the CHP. On an average, 6969 t of coal is transported every day, using Rear Discharge Dumpers at Mugoli OCP. The emission factor worked out to 6×10^{-5} t/t of coal.

(iv) Coal Processing

Coal is available in a raw form, and needs to be crushed into different sizes –100 mm to +100 mm. This is done in CHP, which includes crushers; picking conveyors, transfer points, screen house and loading arrangement. Each of these activities is potential source of dust generation.

(v) Coal Transportation

Coal from the quarry is transported to the receiving pit of the CHP by belt conveyors. At loading point and discharge point of different conveyors used in CHP, dust is generated..

(vi) OB Excavation, Transportation/Handling

This operation is also a potential source of air pollution. The emission factor as determined comes to $2.8 \times 10^{-6} \text{ t/m}^3$ for OB excavation and $1.95 \times 10^{-5} \text{ t/m}^3$ for truck loading and unloading.

(vii) Dump Formation

The OB dump formed in the area with help of HEMM. Lot of dust is generated during formation of dump due to movement of HEMM, unloading and dozing of OB etc. Noxious gases are also liberated from the HEMM.

(viii) Dump

All efforts being made to reclaim the dump and put vegetative growth on them. This may take time. Till then, the dump surface would generate dust due to wind erosion.

(b) Post Operational Stage

During this stage of the project, mining operations will be completed and operations related to closure of mining will be carried out. They are as follows:

(i) Movement of HEMMs

Most of the HEMMs would be moved out of the project site.

(ii) Clearing the Site

After the mining is over, the site would be cleared off, coal stocks and debris removed, and site would be dozed and graded before abandonment. All these activities are likely to cause air pollution.

C. Micro-Meteorological Features

The wind velocity readings were ranging from 0.4 – 13.8 km/hr. Predominant wind was from Northeast (NE) direction. The maximum temperature recorded was 26.0°C and the minimum was 13.5°C. The mean relative humidity was found to 65.0% and no rainfall was recorded during the study period.

D. IMPACT ASSESSMENT

From the above-mentioned details of activities it has been considered that during the operational stage of mining operations, blasting and overburden dumping operations have been identified as an instantaneous high-level point source contributing to air pollution. However, considering all these sources of dust generation acting together and their respective locations distantly spread over within the core zone, entire activities result in a low-level area source of pollution. In respect of concentration levels of SPM, SO₂, & NO_x observed in the ambient air in case of buffer zone, keeping in view the available sinking capacity of the ambient air, it could be seen that all such attributes of air pollution are remain within their respective threshold values.

As already indicated, Mugoli OCP is working since October 1993. In order to assess the impact of enhanced / increased production the environmental data generated in the core zone and in the surrounding as base line data during 2009 – 10 have been considered. The impact on the ambient air will be mainly due to enhanced coal production resulting into enhanced coal handling coupled with OB and resulting out of increased drilling and blasting. The details are being discussed in subsequent paragraphs.

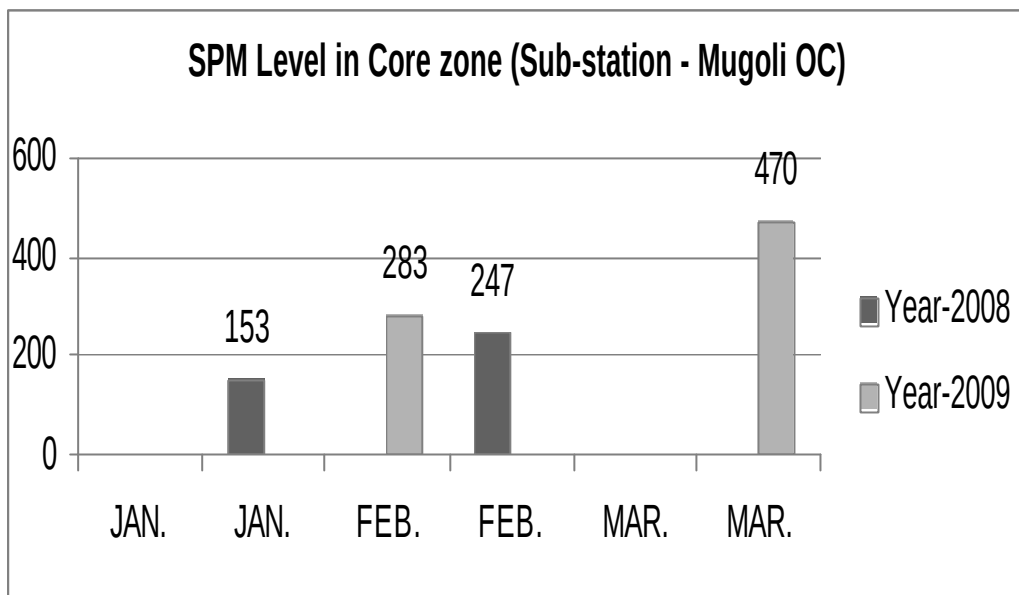
4.1 AMBIENT AIR QUALITY

The existing ambient air quality scenario in and around the mine for the period of quarter ending March 2009 to March 2010 is being discussed in the subsequent paragraphs. Here, in the subsequent paragraphs, the anticipated impact on ambient air quality due to proposed expansion has been discussed.

NAME OF THE COMPANY : WCL YEAR : 2009
NAME OF THE AREA : WANI Q.E. : MAR.
NAME OF THE PROJECT : MUGOLI OCP

1. Sub-station					: WMOA-1 (24 hourly values in µg/m ³)		
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
FEB. 2009	11.02.09	-	12.02.09	283	99	<6	<6
MAR. 2009	27.03.09	-	28.03.09	470	203	<6	<6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120
2. Kailashnagar township near Filter Plant					: WMOA-2 (24 hourly values in µg/m ³)		
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2009	12.01.09	-	13.01.09	100	39	< 6	< 6
JAN. 2009	24.01.09	-	25.01.09	183	88	< 6	< 6
FEB. 2009	11.02.09	-	12.02.09	196	87	< 6	< 6
FEB. 2009	25.02.09	-	26.02.09	182	60	< 6	< 6
MAR. 2009	08.03.09	-	09.03.09	188	84	< 6	< 6
MAR. 2009	28.03.09	-	29.03.09	163	70	< 6	< 6
Permissible Limits				200	100	80	80

3. Tubewell near Sakhara village : WMOA-3							
(24 hourly values in µg/m³)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2009	11.01.09	-	12.01.09	131	30	< 6	< 6
JAN. 2009	24.01.09	-	25.01.09	182	81	< 6	< 6
FEB. 2009	12.02.09	-	13.02.09	189	79	< 6	< 6
FEB. 2009	25.02.09	-	26.02.09	185	83	< 6	< 6
MAR. 2009	08.03.09	-	09.03.09	174	63	< 6	< 6
MAR. 2009	28.03.09	-	29.03.09	184	82	< 6	< 6
Permissible Limits				200	100	80	80
4. SAM Office : WMOA-4							
(24 hourly values in µg/m³)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2009	24.01.09	-	25.01.09	179	84	< 6	< 6
MAR. 2009	27.03.09	-	28.03.09	209	72	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120



FUGITIVE DUST MONITORING DATA

1. Security Check Post

(24 hourly values in $\mu\text{g}/\text{m}^3$)

Month	Dates of Sampling		Parameters
	From	To	SPM
FEB. 2009	26.02.09	27.02.09	994

CO MONITORING DATA

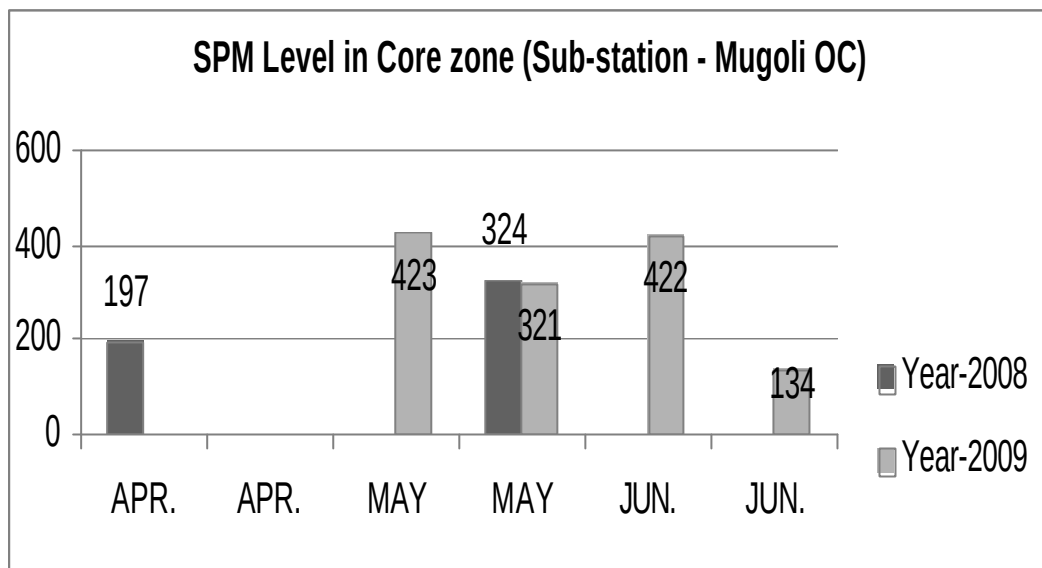
(All values are given in $\mu\text{g}/\text{m}^3$)

Sl. No.	Monitoring Location	Monitoring Date	Observed Value	NAAQ Standards (1 hour)
1.	Substation	12.02.09	< 114.3	10000
2.	Kailashnagar township	12.02.09	< 114.3	4000
3.	Sakhara village	12.02.09	< 114.3	4000
4.	SAM office	12.02.09	< 114.3	10000

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2009
 NAME OF THE AREA : WANI Q.E. : JUN.
 NAME OF THE PROJECT : MUGOLI OCP

1. Sub-station : WMOA-1 (24 hourly values in $\mu\text{g}/\text{m}^3$)						
Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NO _x	SO ₂
MAY 2009	13.05.09	14.05.09	423	194	< 6	< 6
MAY 2009	27.05.09	28.05.09	321	140	< 6	< 6
JUN. 2009	13.06.09	14.06.09	422	163	< 6	< 6
JUN. 2009	27.06.09	28.06.09	134	51	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000			600	300	120	120
2. Kailashnagar township near Filter Plant : WMOA-2 (24 hourly values in $\mu\text{g}/\text{m}^3$)						
Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NO _x	SO ₂
APR. 2009	13.04.09	14.04.09	138	54	< 6	< 6
APR. 2009	28.04.09	29.04.09	97	47	< 6	< 6
MAY 2009	13.05.09	14.05.09	189	63	< 6	< 6
MAY 2009	27.05.09	28.05.09	186	86	< 6	< 6
JUN. 2009	13.06.09	14.06.09	190	87	< 6	< 6
JUN. 2009	26.06.09	27.06.09	193	85	< 6	< 6
Permissible Limits			200	100	80	80
3. Tubewell near Sakhara village : WMOA-3 (24 hourly values in $\mu\text{g}/\text{m}^3$)						
Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NO _x	SO ₂
APR. 2009	13.04.09	14.04.09	179	56	< 6	< 6
APR. 2009	27.04.09	28.04.09	178	83	< 6	< 6
MAY 2009	13.05.09	14.05.09	162	75	< 6	< 6
MAY 2009	27.05.09	28.05.09	146	63	< 6	< 6
JUN. 2009	13.06.09	14.06.09	192	85	< 6	< 6
JUN. 2009	26.06.09	27.06.09	158	63	< 6	< 6
Permissible Limits			200	100	80	80
4. SAM Office : WMOA-4 (24 hourly values in $\mu\text{g}/\text{m}^3$)						
Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NO _x	SO ₂
APR. 2009	27.04.09	28.04.09	152	67	< 6	< 6
MAY 2009	28.05.09	29.05.09	267	108	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000			600	300	120	120



FUGITIVE DUST MONITORING DATA

1. Security Check Post

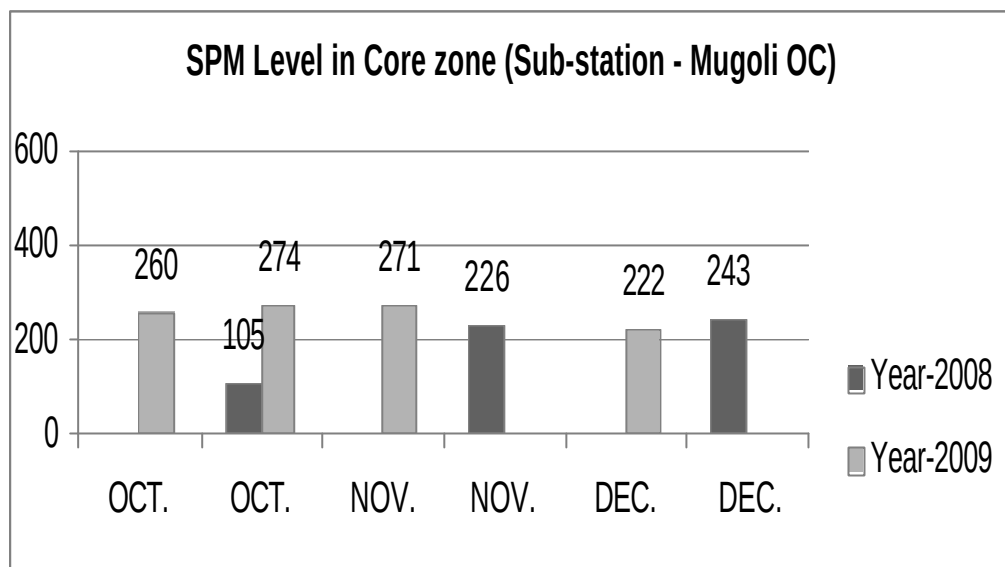
Month	Dates of Sampling		(24 hourly values in $\mu\text{g}/\text{m}^3$)
	From	To	Parameters
MAY 2009	13.05.09	14.05.09	SPM 659

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2009
 NAME OF THE AREA : WANI Q.E. : DEC.
 NAME OF THE PROJECT : MUGOLI OCP

1. Sub-station : WMOA-1 (24 hourly values in $\mu\text{g}/\text{m}^3$)						
Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NO _x	SO ₂
OCT. 2009	13.10.09	14.10.09	260	102	< 6	< 6
OCT. 2009	27.10.09	28.10.09	274	119	< 6	< 6
NOV. 2009	10.11.09	11.11.09	271	123	< 6	< 6
DEC. 2009	11.12.09	12.12.09	222	105	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000			600	300	120	120
2. Kailashnagar township near Filter Plant : WMOA-2 (24 hourly values in $\mu\text{g}/\text{m}^3$)						
Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NO _x	SO ₂
OCT. 2009	27.10.09	28.10.09	183	87	< 6	< 6
NOV. 2009	11.11.09	12.11.09	182	84	< 6	< 6
NOV. 2009	25.11.09	26.11.09	181	81	< 6	< 6
DEC. 2009	11.12.09	12.12.09	76	16	< 6	< 6
Permissible Limits			200	100	80	80

3. Tubewell near Sakhara village : WMOA-3 (24 hourly values in $\mu\text{g}/\text{m}^3$)						
Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NO _x	SO ₂
OCT. 2009	27.10.09	28.10.09	193	86	< 6	< 6
NOV. 2009	11.11.09	12.11.09	108	47	< 6	< 6
NOV. 2009	25.11.09	26.11.09	96	38	< 6	< 6
DEC. 2009	11.12.09	12.12.09	80	19	< 6	< 6
DEC. 2009	24.12.09	25.12.09	91	41	< 6	< 6
Permissible Limits			200	100	80	80
4. SAM Office : WMOA-4 (24 hourly values in $\mu\text{g}/\text{m}^3$)						
Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NO _x	SO ₂
OCT. 2009	12.10.09	13.10.09	226	104	< 6	< 6
DEC. 2009	11.12.09	12.12.09	208	92	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000			600	300	120	120



FUGITIVE DUST MONITORING DATA

1. Security Check Post

(24 hourly values in $\mu\text{g}/\text{m}^3$)

Month	Dates of Sampling		Parameters
	From	To	SPM
OCT. 2009	27.10.09	28.10.09	263

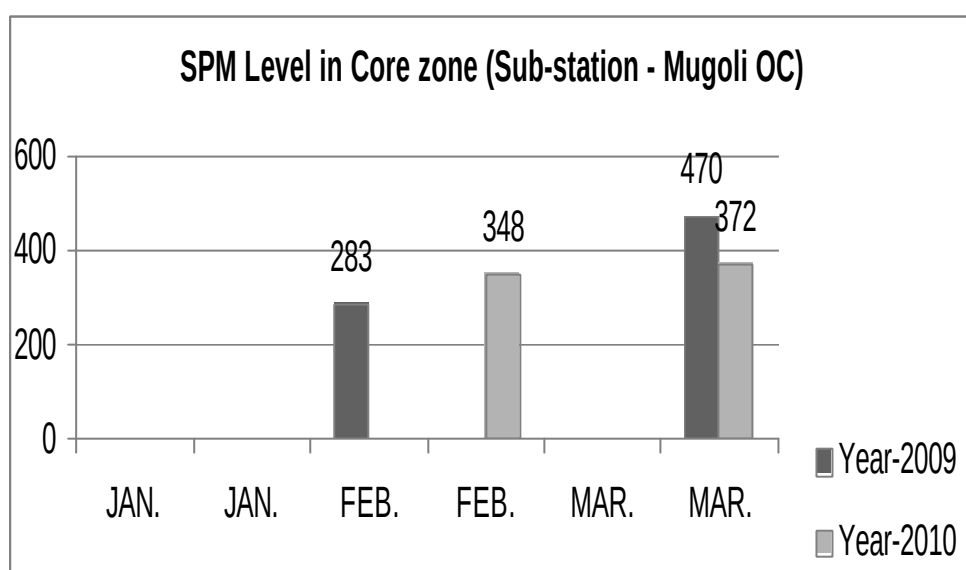
AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
 NAME OF THE AREA : WANI
 NAME OF THE PROJECT : MUGOLI OCP

YEAR : 2010
 Q.E. : MAR.

1. Sub-station			: WMOA-1				
(24 hourly values in $\mu\text{g}/\text{m}^3$)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2010	23.01.10	-	24.01.10	305	131	< 6	< 6
MAR. 2010	11.03.10	-	12.03.10	315	139	< 6	< 6
MAR. 2010	24.03.10	-	25.03.10	412	181	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				600	300	120	120
2. Kailashnagar township near Filter Plant			: WMOA-2				
(24 hourly values in $\mu\text{g}/\text{m}^3$)							
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2010	11.01.10	-	12.01.10	190	82	< 6	< 6
JAN. 2010	24.01.10	-	25.01.10	175	84	< 6	< 6
FEB. 2010	11.02.10	-	12.02.10	180	76	< 6	< 6
FEB. 2010	23.02.10	-	24.02.10	190	86	< 6	< 6
MAR. 2010	10.03.10	-	11.03.10	146	42	< 6	< 6
MAR. 2010	25.03.10	-	26.03.10	176	87	< 6	< 6
Permissible Limits				200	100	80	80

3. Tubewell near Sakhara village		: WMOA-3 (24 hourly values in $\mu\text{g}/\text{m}^3$)			
Month	Dates of Sampling	Parameters			
	From - To	SPM	RPM	NO _x	SO ₂
JAN. 2010	11.01.10 - 12.01.10	150	60	< 6	< 6
JAN. 2010	23.01.10 - 24.01.10	111	44	< 6	< 6
FEB. 2010	11.02.10 - 12.02.10	177	68	< 6	< 6
MAR. 2010	25.03.10 - 26.03.10	185	87	< 6	< 6
Permissible Limits		200	100	80	80
4. SAM Office		: WMOA-4 (24 hourly values in $\mu\text{g}/\text{m}^3$)			
Month	Dates of Sampling	Parameters			
	From - To	SPM	RPM	NO _x	SO ₂
FEB. 2010	23.02.10 - 24.02.10	348	159	< 6	< 6
MAR. 2010	24.03.10 - 25.03.10	372	174	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000		600	300	120	120



FUGITIVE DUST MONITORING DATA

1. Security Check Post

			(24 hourly values in $\mu\text{g}/\text{m}^3$)
Month	Dates of Sampling	Parameters	
	From - To	SPM	
FEB. 2010	23.02.10 - 24.02.10	386	

CO MONITORING DATA

(All values are given in $\mu\text{g}/\text{m}^3$)

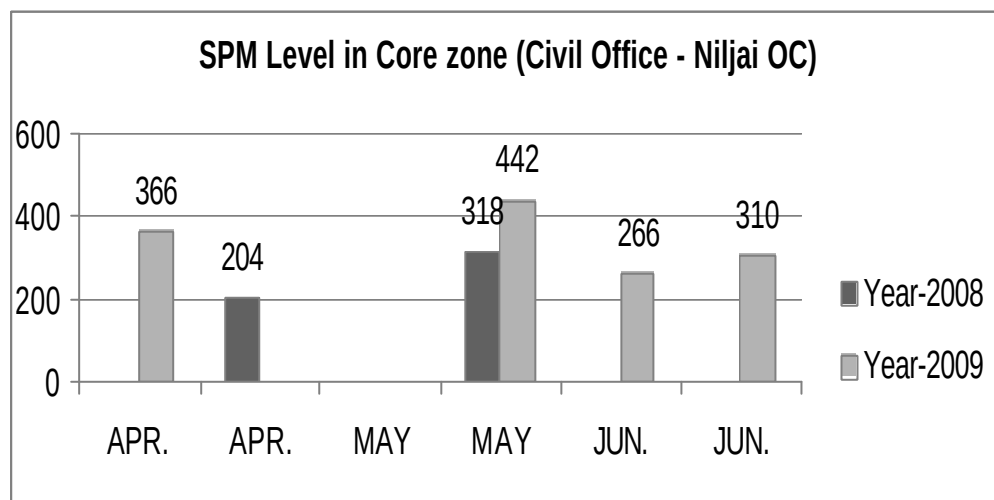
Sl. No.	Monitoring Location	Monitoring Date	Observed Value	NAAQ Standards (1 hour)
1.	Substation	11.02.10	< 114.3	10000
2.	Kailashnagar township	11.02.10	< 114.3	4000
3.	Sakhara village	11.02.10	< 114.3	4000
4.	SAM office	11.02.10	< 114.3	10000

So it may be predicted that the ambient air quality will have no harmful effect on human being, flora and fauna, soil quality, surface structures and aesthetic value of the surrounding environment as suitable mitigative measures will continue to be taken during the further enhancement production up to 4.00 MTPA to make the operations eco-friendly. This fact has been further corroborated by the interpretation of regular monitoring results in respect of Niljai OC (Production capacity 3.50 MTPA operating in the same coalfield, with similar geo- mining conditions, topographical features and climatological features).

Month	Dates of Sampling	Parameters			
	From - To	SPM	RPM	NO _x	SO ₂
APR. 2009	03.04.09 - 04.04.09	188	84	< 6	< 6
APR. 2009	17.04.09 - 18.04.09	107	46	< 6	< 6
MAY 2009	04.05.09 - 05.05.09	167	61	< 6	< 6
MAY 2009	17.05.09 - 18.05.09	183	85	< 6	< 6
JUN. 2009	02.06.09 - 03.06.09	167	78	< 6	< 6
JUN. 2009	17.06.09 - 18.06.09	142	55	< 6	< 6
Permissible Limits		200	100	80	80

3. Civil Office : WNOA-3				(24 hourly values in mg/m^3)			
Month	Dates of Sampling		Parameters				
	From	To	SPM	RPM	NO _x	SO ₂	
APR. 2009	18.04.09	- 19.04.09	366	183	< 6	< 6	
MAY 2009	16.05.09	- 17.05.09	442	212	< 6	< 6	
JUN. 2009	03.06.09	- 04.06.09	266	127	< 6	< 6	
JUN. 2009	28.06.09	- 29.06.09	310	150	< 6	< 6	
TLV as per Env.(Protection) Amendment rule 2000			600	300	120	120	

4. Workshop (ETP) of NOCM - I : WNOA-4				(24 hourly values in mg/m^3)			
Month	Dates of Sampling		Parameters				
	From	To	SPM	RPM	NO _x	SO ₂	
APR. 2009	04.04.09	- 05.04.09	346	166	< 6	< 6	
APR. 2009	17.04.09	- 18.04.09	428	157	< 6	< 6	
MAY 2009	04.05.09	- 05.05.09	383	115	< 6	< 6	
MAY 2009	16.05.09	- 17.05.09	440	186	< 6	< 6	
JUN. 2009	03.06.09	- 04.06.09	339	148	< 6	< 6	
JUN. 2009	17.06.09	- 18.06.09	261	124	< 6	< 6	
TLV as per Env.(Protection) Amendment rule 2000			600	300	120	120	



FUGITIVE DUST MONITORING DATA

1. Weigh Bridge

(24 hourly values in $\mu\text{g}/\text{m}^3$)			
Month	Dates of Sampling		Parameters
	From	To	SPM
APR. 2009	04.04.09	- 05.04.09	605

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2009
NAME OF THE AREA : WANI Q.E. : DEC.
NAME OF THE PROJECT : NILJAI OCP

1. Niljai colony : WNOA-1

(24 hourly values in mg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
OCT. 2009	20.10.09	-	21.10.09	162	72	< 6	< 6
NOV. 2009	02.11.09	-	03.11.09	188	83	< 6	< 6
NOV. 2009	18.11.09	-	19.11.09	172	86	< 6	< 6
DEC. 2009	03.12.09	-	04.12.09	81	31	< 6	< 6
DEC. 2009	17.12.09	-	18.12.09	162	73	< 6	< 6
Permissible Limits				200	100	80	80

2. Taroda village : WNOA-2

(24 hourly values in mg/m^3)

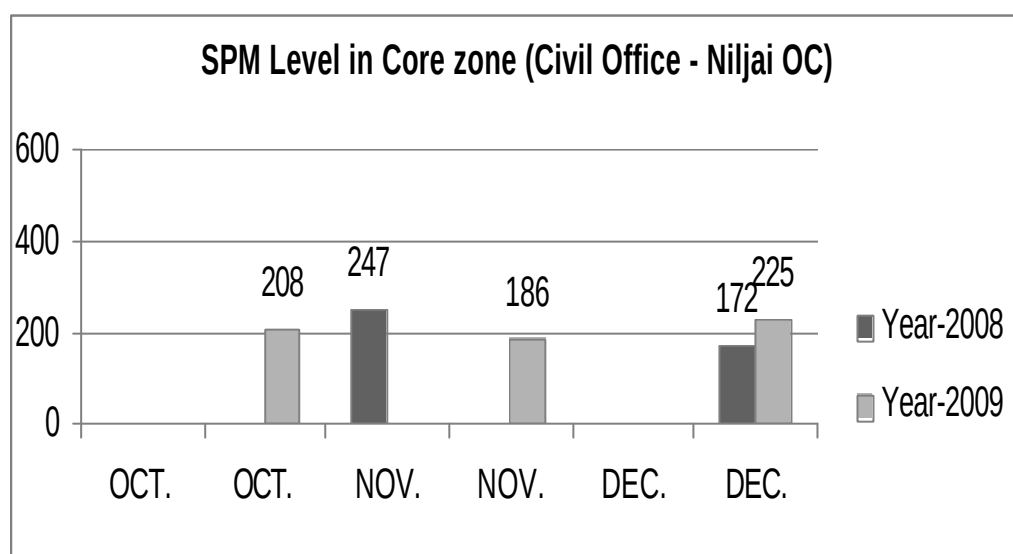
Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
OCT. 2009	20.10.09	-	21.10.09	119	43	< 6	< 6
NOV. 2009	02.11.09	-	03.11.09	112	54	< 6	< 6
NOV. 2009	18.11.09	-	19.11.09	179	80	< 6	< 6
DEC. 2009	03.12.09	-	04.12.09	109	38	< 6	< 6
DEC. 2009	17.12.09	-	18.12.09	77	36	< 6	< 6
Permissible Limits				200	100	80	80

3. Civil Office : WNOA-3

(24 hourly values in mg/m^3)

Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NOx	SO2
OCT. 2009	20.10.09	- 21.10.09	208	89	< 6	< 6
NOV. 2009	17.11.09	- 18.11.09	186	90	< 6	< 6
DEC. 2009	17.12.09	- 18.12.09	225	84	< 6	< 6
TLV as per Env.(Protection) Amendment rule 2000			600	300	120	120

4. Workshop (ETP) of NOCM - I				: WNOA-4			
(24 hourly values in mg/m ³)							
Month	Dates of Sampling			Parameters			
	From		To	SPM	RPM	NO _x	SO ₂
OCT. 2009	05.10.09	-	06.10.09	266	125	< 6	< 6
NOV. 2009	02.11.09	-	03.11.09	296	132	< 6	< 6
NOV. 2009	17.11.09	-	18.11.09	411	166	< 6	< 6
DEC. 2009	04.12.09	-	05.12.09	272	115	< 6	< 6
DEC. 2009	17.12.09	-	18.12.09	280	129	< 6	< 6
TLV as per Env.(Protection) Amendment rule 2000				600	300	120	120



FUGITIVE DUST MONITORING DATA

1. Weigh Bridge

(24 hourly values in $\mu\text{g}/\text{m}^3$)			
Month	Dates of Sampling		
	From	-	To
Parameters			
SPM			
OCT. 2009	05.10.09	-	06.10.09
529			

2. CHP

(24 hourly values in $\mu\text{g}/\text{m}^3$)			
Month	Dates of Sampling		
	From	-	To
Parameters			
SPM			
OCT. 2009	05.10.09	-	06.10.09
522			

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2010
NAME OF THE AREA : WANI Q.E. : MAR.
NAME OF THE PROJECT : NILJAI OCP

1. Niljai colony : WNOA-1

(24 hourly values in mg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NO _x	SO ₂
JAN. 2010	04.01.10	-	05.01.10	185	86	< 6	< 6
JAN. 2010	16.01.10	-	17.01.10	177	85	< 6	< 6
FEB. 2010	03.02.10	-	04.02.10	191	81	< 6	< 6
FEB. 2010	15.02.10	-	16.02.10	112	43	< 6	< 6
MAR. 2010	03.03.10	-	04.03.10	190	82	< 6	< 6
MAR. 2010	16.03.10	-	17.03.10	184	74	< 6	< 6
Permissible Limits				200	100	80	80

2. Taroda village : WNOA-2

(24 hourly values in mg/m^3)

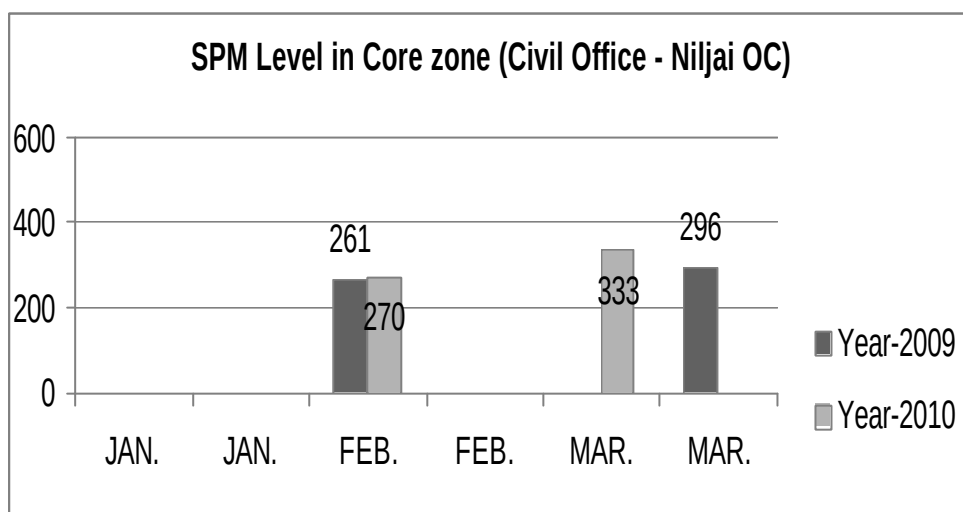
Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NO _x	SO ₂
JAN. 2010	04.01.10	- 05.01.10	157	70	< 6	< 6
JAN. 2010	17.01.10	- 18.01.10	164	64	< 6	< 6
FEB. 2010	02.02.10	- 03.02.10	185	83	< 6	< 6
FEB. 2010	15.02.10	- 16.02.10	151	60	< 6	< 6
MAR. 2010	03.03.10	- 04.03.10	115	46	< 6	< 6
MAR. 2010	16.03.10	- 17.03.10	186	79	< 6	< 6
Permissible Limits			200	100	80	80

3. Civil Office : WNOA-3

(24 hourly values in mg/m^3)

Month	Dates of Sampling		Parameters			
	From	To	SPM	RPM	NOx	SO2
FEB. 2010	02.02.10	- 03.02.10	270	122	< 6	< 6
MAR. 2010	03.03.10	- 04.03.10	333	145	< 6	< 6
TLV as per Env.(Protection) Amendment rule 2000			600	300	120	120

4. Workshop (ETP) of NOCM - I : WNOA-4				(24 hourly values in mg/m^3)			
Month	Dates of Sampling		Parameters				
	From	To	SPM	RPM	NO _x	SO ₂	
JAN. 2010	04.01.10	- 05.01.10	351	141	< 6	< 6	
JAN. 2010	16.01.10	- 17.01.10	360	148	< 6	< 6	
FEB. 2010	02.02.10	- 03.02.10	368	165	< 6	< 6	
FEB. 2010	15.02.10	- 16.02.10	355	158	< 6	< 6	
MAR. 2010	16.03.10	- 17.03.10	408	190	< 6	< 6	
TLV as per Env.(Protection) Amendment rule 2000			600	300	120	120	



FUGITIVE DUST MONITORING DATA

1. Weigh Bridge

(24 hourly values in $\mu\text{g}/\text{m}^3$)			
Month	Dates of Sampling		Parameters
	From	To	SPM
FEB. 2010	24.02.10	- 25.02.10	595

CO MONITORING DATA

(All values are given in $\mu\text{g}/\text{m}^3$)

Sl. No.	Monitoring Location	Monitoring Date	Observed Value	NAAQ Standards (1 hour)
1.	Niljai Colony	03.02.10	< 114.3	4000
2.	Taroda village	03.02.10	< 114.3	4000
3.	Civil office	03.02.10	< 114.3	10000
4.	Workshop ETP of NOCM - I	03.02.10	< 114.3	10000

The existing practice of fortnightly monitoring of ambient air quality will continue with the expansion project also and the results will be examined critically so as to identify the affected area and mine authorities will thereafter be able to take appropriate control measures to minimize the adverse effects, if any, as far as possible.

Further, to assess the anticipated impact due to enhanced coal production, Impact Prediction through numerical modeling ISCST – 3 has been done and the resultant incremental values have been arrived at. The exercise in the case of Base line data has been done and it is seen from the data that all the values of SPM & RPM are well within the permissible limits with due control measures. There is sufficient sinking capacity available and as such is not anticipated to reach anywhere near to the permissible limit value even after achieving the peak production capacity of 4.00 MTPA which has been corroborated by the numerical modeling results. The details of baseline data and results of ISCST – 3 modeling is placed below and locations of baseline stations along with wind rose have been shown in Plate – attached herewith.

Therefore, it can be safely concluded that even after substantial increase in the production (resulting in increase in traffic density), the impact on one of the physical environmental attribute; i.e. ambient air is insignificant.

Further, it can be inferred that the various pollution control measures already undertaken have been proved to be effective, which has arrested the deterioration of the ambient air quality in the mine activity area even after substantial increase in the production level.

It can be safely concluded that in the future years, the ambient air quality is not likely to get deteriorated further, mainly because, continuous and sustained efforts are being taken to control air pollution in and around the mine site.

4.8 AIR POLLUTION CONTROL MEASURES

Since Mugoli OC is a working mine, the environmental monitoring data generation being done on regular basis as per the Env (Protection) Amendment Rule published Vide Gazette of dated 25.9.2000. In addition to data generation, following abatement measures have been taken in order to suppress the dust and noxious gases generation to the maximum possible extent.

4.2.1 Drilling Operations

In order to reduce dust generated by drilling operation, Wet drilling arrangements in drills have been fitted.

4.2.2 Blasting Operation

In order to minimize the generation of dust during blasting, the following measures have been adopted and will continue to be maintained:

- (a) Blast holes are properly placed/spaced/positioned.
- (b) Blast is properly designed in respect of hole-spacing. Hole placing and blast design are looked into as a fresh case every time, by a competent Blasting Officer who takes into consideration the actual geo-mining conditions of the site.

- (c) Blasting is being done between shifts or during the rest interval when the minimum number of persons is present around the blast area. In order to quickly disperse the dust generated in blasting operations, blasting is avoided when there is wind. Blasting is avoided in the mornings and during cloudy situations.
- (d) Adaptation of Controlled Blasting Technique as permitted by DGMS.

4.2.3 Loading & Transport

The loosened overburden material as well as coal, as far as possible is being wetted first with help of water spray arrangements before the start of loading operations.

Movement of vehicles and HEMM on haul roads, particularly when they are unmetalled, is another major source of dust generation. To minimize dust generation due to this operation, the following abatement measures are being taken.

- (a) All long-life haul roads and service roads have been properly constructed and metalled. Unmetalled roads are being kept free of ruts, potholes etc.
- (b) All haul-roads are being regularly sprayed with water. Water sprinklers are regularly used in the project.
- (c) Overloading of vehicles will be avoided.
- (d) Covering of loaded trucks by tarpauline.
- (e) Regular cleaning of transportation roads.
- (f) Adequate green belt has already been developed all along the coal transportation road on both sides.

All the above-mentioned control measures will be continued during the balance period of the project.

4.2.4 OB Dumps

On the dump slopes and top surface, plantation of grass and trees has already been done and around the dump areas a green belt have been already created. The same

4.2.5 Coal Handling Plant

Lot of dust is generated in coal handling plant during operations like coal crushing, transfer and conveying. Following abatement measures have already been adopted for Coal Handling Plant.

- i) Enclosure of the crusher house where maximum dust is generated. Also installation of dust suppression system in the crusher house (specially above the hopper in such a way that air borne dust is suppressed without adding much water to the coal).

- ii) Minimising the height of coal-fall at transfer points (to reduce dust formation) and, if necessary, installing dust suppression measures.
- iii) Enclosure of the belt conveyor to reduce the generation of dust due to blowing wind.
- iv) Creation of a green belt on both sides of belt conveyors and around coal stocks and the CHP building.

Noxious gasses are emitted through exhaust fumes during the operation of diesel / petrol operated equipment. In order to reduce such emission, regular maintenance of the diesel / petrol operated vehicles is being carried out so that the emissions from these vehicles are under control. However, wherever, the condition will permit, petrol / diesel operated HEMM will be replaced by electrically operated ones.

Water sprinkling on coal stock/face, blanketing of exposed surface is being carried out to avoid spontaneous heating and minimize air pollution.

4.2.6 Ambient Air Quality Monitoring

The ambient air quality monitoring is being carried out on regular basis as per the Env (Protection) Amendment Rule, 2000 so as to ascertain the likely load of various air pollutants and thereby suitably modifying the various control measures.

4.2.7 Plantation to Check Air Pollution

Plantation has been under taken in the mine area as mitigatives measure against air pollution, noise pollution and to increase the aesthetic value. The plantation has already been taken place at suitable places like overburden dump, along the road sides, unused land etc is being done to arrest as well as reduce the rate of dispersion of dust generated due to various mining operations viz. quarrying, coal and OB transportation, OB dumping, CHP operation.

Species being planted (recommended by Forest Department) in the area are as follow.

- a) Ornamental trees viz Gulmohar, Eucalyptus and fruit trees like Mango, Guava, Jamun and medicinal plant like Neem etc. have been planted in colony area, schools, dispensary, community buildings, play ground etc.
- b) Ornamental shady trees have been planted e.g. around colony along roads, haul roads, and around industrial buildings etc.
- c) The fast growing varieties of trees like Eucalyptus act as sound barriers where as ornamental shady trees e.g. Subabul, Kikar and karanj will add to the aesthetic look of the area.
- d) The Species being planted on OB dumps etc are: Gravalia, Robusia, Punis, Vanetis, Semal, Karanj, Babul, etc

Plantation (206592 Trees) has been done around infrastructure, colony, along road and on OB dump to guard against dust pollution.

Air Pollution Control Measures can be summarized as below :-

S.N.	PARTICULARS	DETAILS
1	COAL STOCK YARD, CHP & WEIGH BRIDGE	
	Water Spraying By	30 nos. of fixed Rain Guns
		1 no. of Mobile Rain Gun
		1 no. 12 KL Mobile Water Tanker
	Plantation around the periphery	8730 Trees
	Enclosed Crusher House & Dry Dust Exhaust System	
	Continuous water spraying on Belt Conveyor & Mist Water Spraying system in Crusher House	
2	HAUL ROADS	
	Water Spraying By	1 no. 12 KL Mobile Water Sprinkler (6 trips per shift in three shifts)
		11 nos. of fixed Rain Guns (Access Trench)
3	TRANSPORTATION	
	Black Topping Roads	8 km
	Avoiding overloading & coal transportation in trucks covered with tarpaulin	
	Avenue plantation	35820 Trees
	Regular Manual Brooming	
4	OVERBURDEN DUMPS	
	Plantation	123482 nos.
5	DRILLING & BLASTING	
	Wet Drilling	
	Controlled Blasting as per DGMS permission. Monitoring. Maintaining & Evaluation of records	
6	AAQ MONITORING	
	Fortnightly Monitoring & Annual Statement	
	Quarterly submission of Report to MPCB	
7	EC COMPLIANCE	
	Submission of six monthly compliance report to MOEF	

WATER QUALITY

As indicated earlier, the quality of mine pumped out water has also been assessed over this time horizon; wherein it has been found that there is no change in the water quality. However, monitoring is continuously being done as per Environment Protection (Amendment Rule, 2000) and in case, any undesirable element noticed, immediate corrective action will be taken. There is no change in the mine lease area, the quality of ground water is not likely to change as corroborated from the regular monitoring results of the mine under consideration as well as one of the neighbouring operating OCP of almost same capacity (as that of the proposed). The details of monitoring results of mine pumped out water from Mugoli OCP nad neighbouring Niljai OCP for the period of March 2009 to March 2010 are furnished below:-

A. MUGOLI OCP

EFFLUENT WATER QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2009
NAME OF THE AREA : **WANI** Q.E. : MAR.
NAME OF THE PROJECT : MUGOLI OCP

Name of the Location : Mine water discharge - WMOW-1

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
JAN. 2009	12.01.09	8.4	58	80	BDL
JAN. 2009	24.01.09	7.5	40	60	BDL
FEB. 2009	11.02.09	7.9	46	40	BDL
FEB. 2009	26.02.09	7.7	64	120	BDL
MAR. 2009	08.03.09	7.8	42	40	BDL
MAR. 2009	28.03.09	8.4	30	50	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

Name of the Location : WETP water discharge - WMOW-2

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
JAN. 2009	12.01.09	8.4	38	40	BDL
JAN. 2009	24.01.09	7.4	38	60	BDL
FEB. 2009	11.02.09	7.4	54	70	BDL
FEB. 2009	26.02.09	6.9	34	60	BDL
MAR. 2009	09.03.09	7.7	40	40	BDL
MAR. 2009	28.03.09	8.1	50	80	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

(BDL - Below Detectable Level- Value < 1.0 mg/l)

Name of the Location : DETP water discharge - WMOW-3

Month	Date of Sample collection	Analysis Results	
		TSS (mg/l)	BOD (mg/l) (3 days 27°C)
JAN. 2009	13.01.09	50	14
JAN. 2009	24.01.09	44	12
FEB. 2009	11.02.09	56	16
FEB. 2009	26.02.09	48	16
MAR. 2009	09.03.09	64	15
MAR. 2009	28.03.09	40	14
PERMISSIBLE LIMIT		100	30

EFFLUENT WATER QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2009
NAME OF THE AREA : WANI Q.E. : JUN.
NAME OF THE PROJECT : MUGOLI OCP

Name of the Location : Mine water discharge - WMOW-1

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
APR. 2009	13.04.09	8.6	34	40	BDL
APR. 2009	28.04.09	8.3	22	30	BDL
MAY 2009	13.05.09	8.2	36	44	BDL
MAY 2009	27.05.09	8.3	28	38	BDL
JUN. 2009	13.06.09	8.5	52	60	BDL
JUN. 2009	26.06.09	8.1	36	40	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

Name of the Location : WETP water discharge - WMOW-2

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
APR. 2009	13.04.09	8.4	38	50	BDL
APR. 2009	28.04.09	8.1	26	40	BDL
MAY 2009	13.05.09	7.6	40	52	BDL
MAY 2009	28.05.09	8.1	50	80	BDL
JUN. 2009	13.06.09	8.3	56	82	BDL
JUN. 2009	26.06.09	7.6	44	50	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

(BDL - Below Detectable Level- Value < 1.0 mg/l)

Name of the Location : DETP water discharge - WMOW-3

Month	Date of Sample collection	Analysis Results	
		TSS (mg/l)	BOD (mg/l) (3 days 27°C)
APR. 2009	13.04.09	62	20
APR. 2009	28.04.09	24	10
MAY 2009	13.05.09	48	12
MAY 2009	27.05.09	56	14
JUN. 2009	13.06.09	64	20
JUN. 2009	26.06.09	60	16
PERMISSIBLE LIMIT		100	30

EFFLUENT WATER QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2009
NAME OF THE AREA : **WANI** Q.E. : DEC.
NAME OF THE PROJECT : MUGOLI OCP

Name of the Location : Mine water discharge - WMOW-1

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
OCT. 2009	12.10.09	7.6	44	80	BDL
NOV. 2009	11.11.09	8.1	18	30	BDL
NOV. 2009	25.11.09	8.3	24	40	BDL
DEC. 2009	11.12.09	8.0	18	30	BDL
DEC. 2009	25.12.09	8.2	28	50	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

Name of the Location : WETP water discharge - WMOW-2

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
OCT. 2009	12.10.09	7.5	26	40	BDL
OCT. 2009	28.10.09	8.3	18	30	BDL
NOV. 2009	11.11.09	8.3	28	40	BDL
NOV. 2009	25.11.09	8.2	38	60	BDL
DEC. 2009	11.12.09	7.7	18	30	BDL
DEC. 2009	25.12.09	8.2	60	100	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

(BDL - Below Detectable Level- Value < 1.0 mg/l)

Name of the Location : DETP water discharge - WMOW-3

Month	Date of Sample collection	Analysis Results	
		TSS (mg/l)	BOD (mg/l) (3 days 27°C)
OCT. 2009	12.10.09	60	18
OCT. 2009	28.10.09	40	12
NOV. 2009	11.11.09	40	10
NOV. 2009	25.11.09	58	16
DEC. 2009	11.12.09	52	14
DEC. 2009	25.12.09	48	12
PERMISSIBLE LIMIT		100	30

EFFLUENT WATER QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2009
NAME OF THE AREA : WANI DATE : 28.10.09
NAME OF THE PROJECT : MUGOLI OCP
Name of the Location : Mine water discharge - WMOW-1

Sl. No.	Parameters	Analysis Results	Standards for discharge Part A, Schedule VI
1	pH	8.5	5.5 – 9.0
2	Temperature (°C)	29.6	Te<Ts+5°C
3	Colour (Hz)	2	*
4	Odour	Unobject.	Unobjectionable
5	Turbidity (NTU)	BDL	*
6	Conductivity (µs/cm)	1400	*
7	Total Suspended Solids (mg/l)	14	100
8	Oil & Grease (mg/l)	BDL	10
9	Dissolved Oxygen (mg/l)	4.4	*
10	C.O.D. (mg/l)	30	250
11	B.O.D. 3 days at 27°C (mg/l)	< 5	30
12	Total Residual Chlorine (mg/l)	BDL	1 (Max.)
13	Free Ammonia (mg/l)	BDL	5.0
14	Arsenic (mg/l)	BDL	0.2
15	Lead (mg/l)	BDL	0.1
16	Hexavalent Chromium (mg/l)	BDL	0.1
17	Total Chromium (mg/l)	BDL	2
18	Copper (mg/l)	BDL	3
19	Zinc (mg/l)	0.46	5
20	Selenium (mg/l)	BDL	0.05
21	Nickel (mg/l)	BDL	3
22	Fluoride (mg/l)	0.17	2
23	Dissolved Phosphate (mg/l)	0.26	5
24	Sulphate (mg/l)	140	*
25	Chloride (mg/l)	60	*
26	Iron (mg/l)	BDL	3
27	Sulphide (mg/l)	BDL	2
28	Manganese (mg/l)	BDL	2
29	Vanadium (mg/l)	BDL	0.2
30	Nitrate Nitrogen (mg/l)	1.8	10
31	Phenolics Compounds (mg/l)	BDL	1

1. BDL - Below Detectable Level, 2. * - Limit not specified.

EFFLUENT WATER QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2010
 NAME OF THE AREA : WANI Q.E. : MAR.
 NAME OF THE PROJECT : MUGOLI OCP

Name of the Location : Mine water discharge - WMOW-1

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
JAN. 2010	11.01.10	8.3	16	30	BDL
JAN. 2010	24.01.10	8.0	36	60	BDL
FEB. 2010	12.02.10	8.1	24	50	BDL
FEB. 2010	23.02.10	7.9	22	40	BDL
MAR. 2010	10.03.10	8.0	24	50	BDL
MAR. 2010	24.03.10	7.7	28	60	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

Name of the Location : WETP water discharge - WMOW-2

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
JAN. 2010	11.01.10	6.5	88	120	BDL
JAN. 2010	24.01.10	7.9	60	100	BDL
FEB. 2010	12.02.10	7.8	34	60	BDL
FEB. 2010	23.02.10	7.9	44	80	BDL
MAR. 2010	10.03.10	7.8	38	70	BDL
MAR. 2010	24.03.10	7.5	48	90	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

(BDL - Below Detectable Level- Value < 1.0 mg/l)

Name of the Location : DETP water discharge - WMOW-3

Month	Date of Sample collection	Analysis Results	
		TSS (mg/l)	BOD (mg/l) (3 days 27°C)
JAN. 2010	11.01.10	48	12
JAN. 2010	24.01.10	58	14
FEB. 2010	12.02.10	44	12
FEB. 2010	23.02.10	34	10
MAR. 2010	10.03.10	36	11
MAR. 2010	24.03.10	50	14
PERMISSIBLE LIMIT		100	30

B. NILJAI OCP**EFFLUENT WATER QUALITY REPORT**

NAME OF THE COMPANY : WCL YEAR : 2009
 NAME OF THE AREA : WANI Q.E. : JUN.
 NAME OF THE PROJECT : NILJAI OCP

1. Mine water discharge - Niljai - I OC : WNOW-1

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
APR. 2009	04.04.09	8.6	46	60	BDL
APR. 2009	18.04.09	8.3	88	140	BDL
MAY 2009	05.05.09	7.7	34	40	BDL
MAY 2009	17.05.09	8.5	20	30	BDL
JUN. 2009	03.06.09	8.2	36	40	BDL
JUN. 2009	18.06.09	8.3	48	60	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

2. Mine water discharge - Niljai - II OC : WNOW-2

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
APR. 2009	04.04.09	8.6	44	60	BDL
APR. 2009	18.04.09	8.4	24	40	BDL
MAY 2009	05.05.09	7.9	40	50	BDL
MAY 2009	17.05.09	8.4	24	30	BDL
JUN. 2009	03.06.09	8.2	46	50	BDL
JUN. 2009	18.06.09	8.3	50	60	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

3. E.T.P. (Niljai)Treated Water**: WN(ETP)W-3**

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
APR. 2009	04.04.09	8.4	46	60	BDL
APR. 2009	18.04.09	8.1	30	50	BDL
MAY 2009	05.05.09	7.9	44	60	BDL
MAY 2009	17.05.09	8.0	48	80	BDL
JUN. 2009	03.06.09	8.2	70	100	1.2
JUN. 2009	18.06.09	7.6	54	40	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

4. E.T.P. (Niljai -S)Treated Water**: WN(ETP)W-4**

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
APR. 2009	04.04.09	7.8	54	80	BDL
APR. 2009	18.04.09	8.1	28	50	BDL
MAY 2009	05.05.09	7.6	62	70	BDL
MAY 2009	17.05.09	7.9	36	60	BDL
JUN. 2009	03.06.09	8.3	74	140	1.2
JUN. 2009	18.06.09	8.2	58	60	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

(BDL - Below Detectable Level- Value < 1.0 mg/l)**5. S.T.P(Domestic Effluent) - Treated Water : WN(STP)W-5**

Month	Date of Sample collection	Analysis Results	
		TSS (mg/l)	BOD (mg/l) (3 days 27°C)
APR. 2009	04.04.09	56	18
APR. 2009	18.04.09	32	10
MAY 2009	04.05.09	60	18
MAY 2009	17.05.09	52	12
JUN. 2009	03.06.09	56	14
JUN. 2009	18.06.09	44	12
PERMISSIBLE LIMIT		100	30

EFFLUENT WATER QUALITY REPORT

NAME OF THE COMPANY : WCL YEAR : 2009
NAME OF THE AREA : WANI Q.E. : DEC.
NAME OF THE PROJECT : NILJAI OCP

1. Mine water discharge - Niljai - I OC : WNOW-1

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
OCT. 2009	06.10.09	7.8	28	40	BDL
NOV. 2009	03.11.09	8.7	36	60	BDL
NOV. 2009	18.11.09	8.5	34	50	BDL
DEC. 2009	04.12.09	8.1	28	40	BDL
DEC. 2009	18.12.09	8.2	20	30	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

2. Mine water discharge - Niljai - II OC : WNOW-2

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
OCT. 2009	06.10.09	7.7	24	40	BDL
NOV. 2009	03.11.09	8.6	44	80	BDL
NOV. 2009	18.11.09	8.5	38	60	BDL
DEC. 2009	04.12.09	8.3	24	40	BDL
DEC. 2009	18.12.09	8.6	34	50	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

3. E.T.P. (Niljai)Treated Water**: WN(ETP)W-3**

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
OCT. 2009	06.10.09	7.7	50	90	BDL
OCT. 2009	21.10.09	8.0	48	80	BDL
NOV. 2009	03.11.09	8.5	34	60	BDL
NOV. 2009	18.11.09	8.3	28	40	BDL
DEC. 2009	04.12.09	8.4	44	80	BDL
DEC. 2009	18.12.09	8.2	54	100	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

4. E.T.P. (Niljai -S)Treated Water**: WN(ETP)W-4**

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
OCT. 2009	06.10.09	7.7	78	140	BDL
OCT. 2009	21.10.09	8.2	84	160	BDL
NOV. 2009	03.11.09	8.4	60	100	BDL
NOV. 2009	18.11.09	8.2	40	60	BDL
DEC. 2009	04.12.09	8.5	52	80	BDL
DEC. 2009	18.12.09	8.4	36	60	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

(BDL - Below Detectable Level- Value < 1.0 mg/l)**5. S.T.P(Domestic Effluent) - Treated Water : WN(STP)W-5**

Month	Date of Sample collection	Analysis Results	
		TSS (mg/l)	BOD (mg/l) (3 days 27°C)
OCT. 2009	06.10.09	36	10
OCT. 2009	21.10.09	42	11
NOV. 2009	03.11.09	52	16
NOV. 2009	18.11.09	44	12
DEC. 2009	03.12.09	40	10
DEC. 2009	18.12.09	44	12
PERMISSIBLE LIMIT		100	30

EFFLUENT WATER QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
 NAME OF THE AREA : WANI
 NAME OF THE PROJECT : NILJAI OCP

YEAR : 2009
 DATE : 21.10.09

1. Name of the Location : Mine water discharge

Sl. No	Parameters	Analysis Results Niljai - I OC WNOW-1	Analysis Results Niljai - II OC WNOW-2	Standards for discharge Part A, Schedule VI
1	pH	8.0	8.0	5.5 – 9.0
2	Temperature ($^{\circ}$ C)	28.6	28.7	Te<Ts+5 $^{\circ}$ C
3	Colour (Hz)	3	4	*
4	Odour	Unobject.	Unobject.	Unobjectionable
5	Turbidity (NTU)	1	2	*
6	Conductivity (μ s/cm)	1350	1352	*
7	Total Suspended Solids (mg/l)	16	18	100
8	Oil & Grease (mg/l)	BDL	BDL	10
9	Dissolved Oxygen (mg/l)	4.4	4.3	*
10	C.O.D. (mg/l)	30	30	250
11	B.O.D. 3 days at 27 $^{\circ}$ C (mg/l)	< 5	< 5	30
12	Total Residual Chlorine (mg/l)	BDL	BDL	1 (Max.)
13	Free Ammonia (mg/l)	BDL	BDL	5.0
14	Arsenic (mg/l)	BDL	BDL	0.2
15	Lead (mg/l)	BDL	BDL	0.1
16	Hexavalent Chromium (mg/l)	BDL	BDL	0.1
17	Total Chromium (mg/l)	BDL	BDL	2
18	Copper (mg/l)	BDL	BDL	3
19	Zinc (mg/l)	0.11	0.17	5
20	Selenium (mg/l)	BDL	BDL	0.05
21	Nickel (mg/l)	BDL	BDL	3
22	Fluoride (mg/l)	0.19	0.18	2
23	Dissolved Phosphate (mg/l)	0.24	0.26	5
24	Sulphate (mg/l)	100	125	*
25	Chloride (mg/l)	146	144	*
26	Iron (mg/l)	BDL	BDL	3
27	Sulphide (mg/l)	BDL	BDL	2
28	Manganese (mg/l)	BDL	BDL	2
29	Vanadium (mg/l)	BDL	BDL	0.2
30	Nitrate Nitrogen (mg/l)	1.8	1.7	10
31	Phenolics Compounds (mg/l)	BDL	BDL	1

1. BDL - Below Detectable Level, 2. * - Limit not specified.

EFFLUENT WATER QUALITY REPORT

NAME OF THE COMPANY : WCL YEAR : 2010
 NAME OF THE AREA : WANI Q.E. : MAR.
 NAME OF THE PROJECT : NILJAI OCP

1. Mine water discharge - Niljai - I OC : WNOW-1

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
JAN. 2010	05.01.10	8.4	40	60	BDL
JAN. 2010	17.01.10	7.9	48	90	BDL
FEB. 2010	03.02.10	7.8	42	80	BDL
FEB. 2010	16.02.10	6.7	18	30	BDL
MAR. 2010	04.03.10	7.9	28	50	BDL
MAR. 2010	17.03.10	7.1	24	40	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

2. Mine water discharge - Niljai - II OC : WNOW-2

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
JAN. 2010	05.01.10	8.6	44	60	BDL
JAN. 2010	17.01.10	8.2	54	80	BDL
FEB. 2010	03.02.10	7.8	36	50	BDL
FEB. 2010	16.02.10	7.2	20	30	BDL
MAR. 2010	04.03.10	8.1	18	30	BDL
MAR. 2010	17.03.10	7.4	26	40	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

3. E.T.P. (Niljai)Treated Water**: WN(ETP)W-3**

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
JAN. 2010	05.01.10	8.3	22	40	BDL
JAN. 2010	17.01.10	7.8	42	60	BDL
FEB. 2010	03.02.10	8.1	36	70	BDL
FEB. 2010	16.02.10	7.3	26	40	BDL
MAR. 2010	04.03.10	8.0	24	30	BDL
MAR. 2010	17.03.10	7.6	36	60	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

4. E.T.P. (Niljai -S)Treated Water**: WN(ETP)W-4**

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
JAN. 2010	05.01.10	8.2	18	30	BDL
JAN. 2010	17.01.10	7.9	46	80	BDL
FEB. 2010	03.02.10	8.1	42	60	BDL
FEB. 2010	16.02.10	7.3	44	80	BDL
MAR. 2010	04.03.10	8.0	26	40	BDL
MAR. 2010	17.03.10	7.6	34	60	BDL
TLV as per Env.(Protection) Amendment rule 2000		5.5 - 9.0	100	250	10

(BDL - Below Detectable Level- Value < 1.0 mg/l)**5. S.T.P(Domestic Effluent) - Treated Water : WN(STP)W-5**

Month	Date of Sample collection	Analysis Results	
		TSS (mg/l)	BOD (mg/l) (3 days 27°C)
JAN. 2010	05.01.10	28	8
JAN. 2010	17.01.10	50	12
FEB. 2010	03.02.10	36	10
FEB. 2010	16.02.10	40	12
MAR. 2010	04.03.10	28	10
MAR. 2010	17.03.10	24	8
PERMISSIBLE LIMIT		100	30

Therefore, it can be concluded that the impact on mine water is insignificant so far as the increase in production is concerned for the last four years. For the balance period of the project/mine life with the enhanced coal production, scenario is not likely to change.

4.3.1 WATER POLLUTION CONTROL MEASURES

Salient controls measures have been taken are as follows:

i) Industrial Effluent

The wastewater from workshop and CHP, which normally remain laden with oil and grease, suspended and dissolved solids etc. is being treated in the Effluent Treatment Plant (ETP). Clear water coming out from the treatment plant is taken into the closed water circuit and recycled for its reuse. All parameter of ETP waste discharge are being monitored regularly as per Env. (Protection) Amendment Rule, 2000 and have been found within permissible limits.

ii) Mine Water

Most of the suspended particles are settled in the sump and the supernatant water is pumped out. This water is passed through sedimentation pond, before being discharged in to natural drain.

iii) Surface Run-off

Adequate numbers of vegetation is already grown on the top surface and slopes of the dumps in order to arrest the erosion of soil and it also reduces surface run-off, which helps averting siltation of natural watercourses.

Catch drains of size 3.5m X 2m has been provided around periphery of the OB dump as well as soil dumps to arrest site and sediment flows from the respective dump sites. In case of OB benches in the quarry, cross drainage has been provided which carries silt and sediments into main sump made at the floor of the seam 860000 cum (as per area), which accumulates all the silts and act as first stage settling pond. The water is then pumped out through pumps on to the surface and discharged in to surface settling tank/sedimentation pond of size 2 X 20 X 3.5 X 1.00m. The clear water from the surface sedimentation tank is used for watering the mine area, roads and green belt development. The catch drains mentioned above are regularly desilted and maintained properly. In addition, garland drains of size 1.5 X 1.0 m have also been provided around the periphery of the excavated area, which carries surface run off and the drains are regularly desilted before onset of monsoon. Similarly garland drains of 1.5 m X 1.0 m have also been constructed around the periphery of active dumps (A1 & A2), which are also desilted before the onset of monsoon. In addition garland drain of same size will also be constructed around the temporary topsoil dump A3 before onset of next monsoon. These drains will allow accumulation of silt materials and sufficient retention time for settling of silt materials.

An integrated sewage disposal arrangement (STP) exists of capacity 0.40 MLD in the township.

Water Pollution Control Measures can be summarized as below: -

S.N.	PARTICULARS	DETAILS
1	MINE WATER : TWO STAGE SEDIMENTATION	
	Initial Sedimentation	At Mine Sump (190 MG)
	Final Sedimentation	Sedimentation Tank at Surface (2 X 20 X 3.5 X 0.8 m)
		In addition 2 nos. of 1,00,000 litre capacity water reservoirs (for operation of Rain Guns)
		Cross Drainages provided in Coal & OB Benches for entire silt & Sediments to mine sump
2	DOMESTIC SEWAGE EFFLUENT	
	Domestic Sewage Plant	0.40 MLD for 461 Qtrs. at Kailash Nagar Township
3	INDUSTRIAL / WORKSHOP EFFLUENT	
	Washing Ramp	HEMM Washing
	WETP	0.15 MLD with zero discharge
	Used Oil	Disposed through MPCB approved recyclers
	ETP Sludge	CHWTSDF

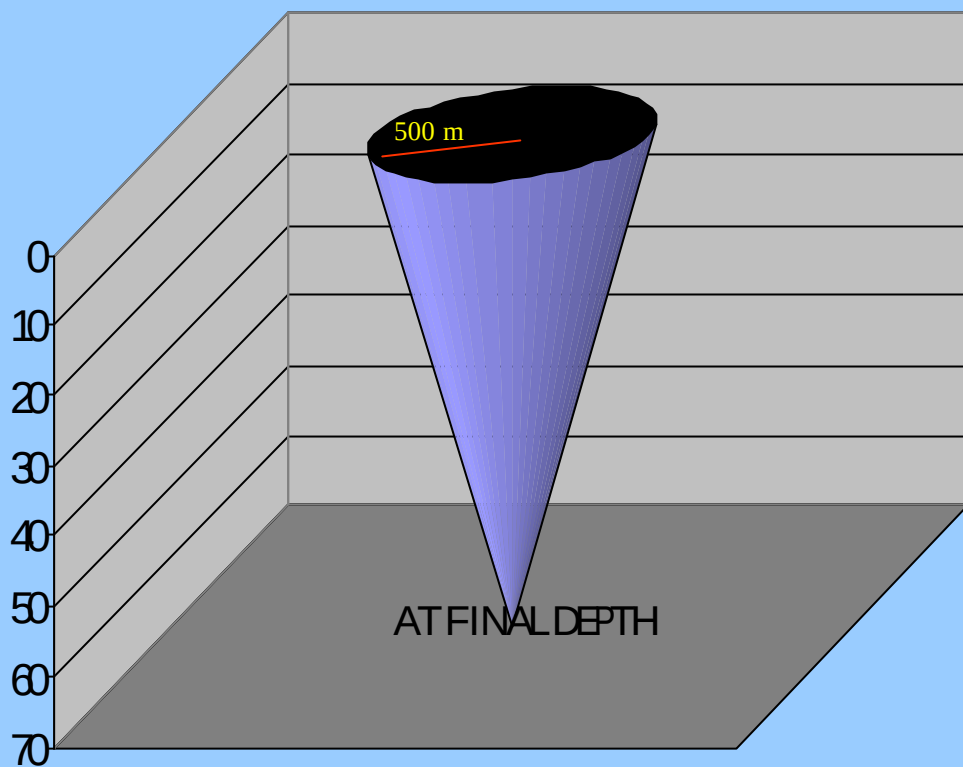
4.3.2 Water/Effluent Quality Monitoring

Regular water quality/effluent quality monitoring is being carried out so as to ascertain the likely load of pollutants and thereby suitably modifying the control measures. The same will be continued in the balance life also.

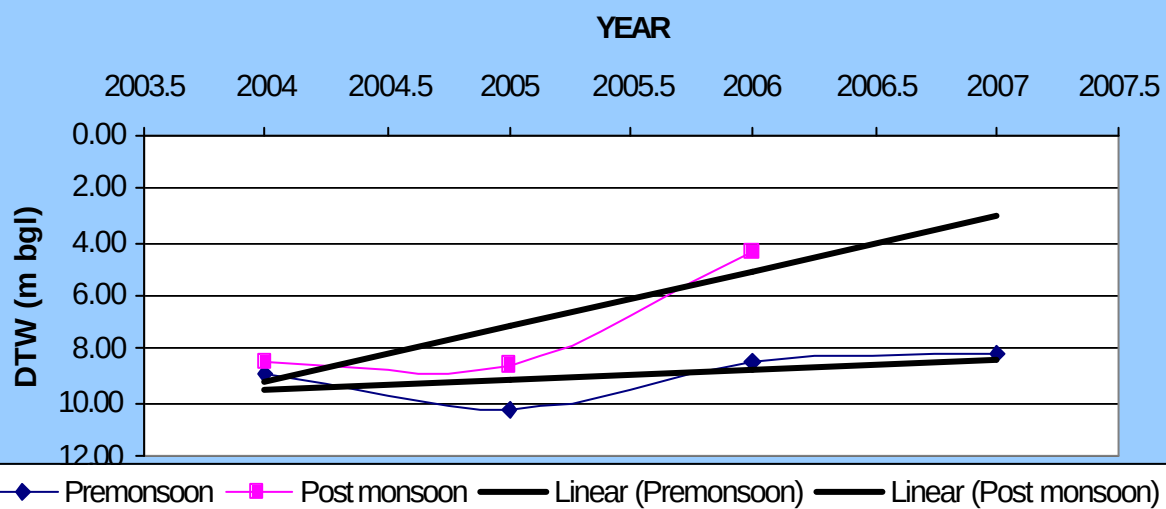
4.9 IMPACT ON HYDRO-GEOLOGICAL REGIME

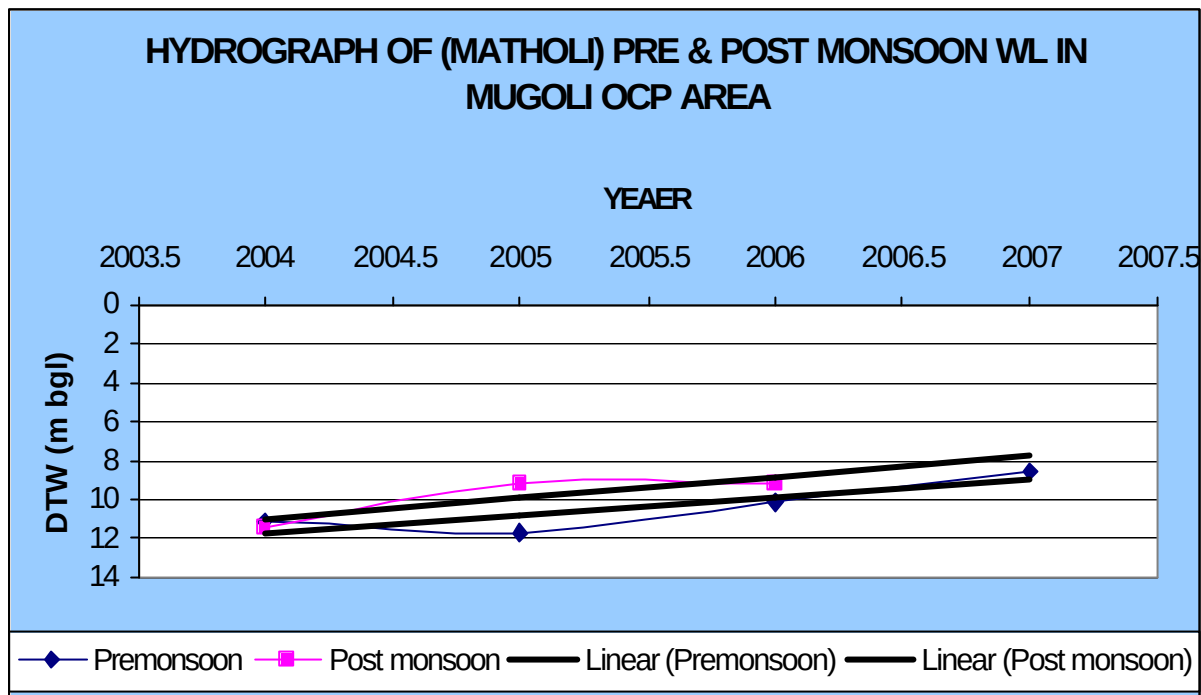
The projections on ground water inflow to the mine and the mine influence on ground water table are for the final stage of the quarry. Therefore, change in mine production during intermittent stage will not effect the assessment except for some local variation within the predicted influence area.

RADIUS OF INFLUENCE - 500m AT MUGOLI OCEPN MINE **(MINE WATER INFLOW- 7671 Cum/day)**



HYDROGRAPH OF (MUNGOLI) PRE & POST MONSOON WL **IN MUGOLI OCP AREA**





4.4.1 Remedial measures to control ground water depletion

The following methodology and remedial measures have been taken to minimize the mine-induced impact on ground water levels and also adverse effects in the area.

- (i) Artificial recharge to ground water system at the periphery of the anticipated influence area by local stagnation in low lying areas/drains by providing low height dams/bunds or by injection of mine water discharge. Surface water through tubewells / percolation structures.
- (ii) The water shortage in the villages, if any, in the influence area can be supplemented by supply of water from outside source or from the mine water after treatment.
- (iii) While reclamation of the mined area, void at the deepest portion of the pit has to be left. This residual pit void would initially serve as access for future expansion and subsequently it could be backfilled.
- (iv) Regular well water monitoring in nearby villages is being carried out quarterly as per MOEF's guidelines. No adverse remarks have so far been observed.

ARTIFICIAL RAINWATER HARVESTING MEASURES

Regarding artificial rainwater harvesting, following works have already been undertaken by the project both in – house and outside the mine lease in nearby villages.

1. Digging of pond in Sakhara village.
2. Digging of pond in Jugad village.
3. Roof-top rainwater harvesting at Mugoli Sub Area Manager's office.
4. Roof – top Rainwater harvesting in Community hall and School of Matholi village.

4.10 NOISE QUALITY

The noise levels are being monitored regularly as per Env. Protection Amendment Rule, 2000 at existing OC Mine and the results show that the ambient noise levels in the mine activity areas and in the immediate surrounding are well within the permissible limit level. The base line data generated in the villages around the 10 km radius also reveals that the ambient noise levels are well within the permissible limits which also corroborate the fact that opencast mining activity at the said mine has not affected the ambient noise quality in the surrounding adversely and it has been achieved by

implementing various pollution control measures effectively. It may be worthwhile to mention here that during the balance life (5 years) of the mine with a maximum projected production of 4.00 Mty , the existing pollution abatement measures will continue to be taken with necessary augmentation/ strengthening so that the ambient noise quality level remain well within the permissible limits.

NOISE LEVEL ANALYSIS – CHP

DATE	NOISE LEVEL IN dB(A)		DATE	NOISE LEVEL IN dB(A)	
	DAY TIME	NIGHT TIME		DAY TIME	NIGHT TIME
27.05.2006	67.8	54.3	13.02.2007	65.2	57.5
12.06.2006	61.8	56.6	26.02.2007	64.7	57.6
23.06.2006	74.2	72.6	13.03.2007	63.6	56.4
09.10.2006	68.5	63.2	22.03.2007	67.3	56.3
28.10.2006	68.4	63.5	06.04.2007	67.4	58.1
05.11.2006	73.8	70.0	26.04.2007	63.7	58.1
27.11.2006	72.1	70.0	14.05.2007	65.1	57.5
11.12.2006	62.5	56.8	27.05.2007	66.0	57.9
21.12.2006	74.1	67.2	12.06.2007	65.0	56.0
12.01.2007	66.9	56.4	28.06.2007	65.6	56.7
23.01.2007	65.3	57.6			

NOISE LEVEL ANALYSIS – CHP

DATE	NOISE LEVEL IN dB(A)		DATE	NOISE LEVEL IN dB(A)	
	DAY TIME	NIGHT TIME		DAY TIME	NIGHT TIME
11.07.2007	63.5	58.8	26.12.2007	66.0	62.0
28.07.2007	64.2	61.6	10.01.2008	66.8	63.5
09.08.2007	65.1	55.8	24.01.2008	68.0	59.0
27.08.2007	68.3	63.7	12.02.2008	65.8	62.7
14.09.2007	65.8	57.3	26.02.2008	66.0	62.5
29.09.2007	68.3	65.9	14.03.2008	67.7	60.0
05.10.2007	64.8	56.7	25.03.2008	66.8	58.6
29.10.2007	64.3	55.0			
06.11.2007	65.0	58.0			
28.11.2007	66.9	61.8			
10.12.2007	68.4	63.2			

NOISE LEVEL ANALYSIS – COLONY

DATE	NOISE LEVEL IN dB(A)		DATE	NOISE LEVEL IN dB(A)	
	DAY TIME	NIGHT TIME		DAY TIME	NIGHT TIME
27.05.2006	51.2	40.2	13.02.2007	51.1	45.5
12.06.2006	54.8	42.9	26.02.2007	54.6	49.7
23.06.2006	54.7	43.4	13.03.2007	51.8	44.1
09.10.2006	53.8	44.1	22.03.2007	51.6	47.3
28.10.2006	53.7	44.3	06.04.2007	50.1	42.3
05.11.2006	54.6	48.0	26.04.2007	53.2	42.6
27.11.2006	55.0	48.6	14.05.2007	51.2	43.4
11.12.2006	51.3	41.8	27.05.2007	51.4	42.3
21.12.2006	54.8	46.3	12.06.2007	52.0	43.0
12.01.2007	51.3	42.8	28.06.2007	51.7	42.0
23.01.2007	51.2	45.6			

NOISE LEVEL ANALYSIS – CHP

DATE	NOISE LEVEL IN dB(A)		DATE	NOISE LEVEL IN dB(A)	
	DAY TIME	NIGHT TIME		DAY TIME	NIGHT TIME
11.07.2007	52.6	41.7	26.12.2007	52.8	42.0
28.07.2007	54.0	44.0	10.01.2008	53.9	43.7
09.08.2007	50.3	41.6	24.01.2008	52.0	41.0
27.08.2007	51.7	43.3	12.02.2008	53.6	43.1
14.09.2007	53.2	44.1	26.02.2008	51.8	42.0
29.09.2007	53.1	44.8	14.03.2008	52.0	41.8
05.10.2007	54.1	43.7	25.03.2008	54.1	43.8
29.10.2007	54.1	44.1			
06.11.2007	53.0	43.0			
28.11.2007	52.6	43.7			
10.12.2007	54.0	43.2			

NOISE LEVEL DATA

NAME OF THE COMPANY : WCL
 NAME OF THE AREA : WANI
 NAME OF THE PROJECT : MUGOLI OCP

YEAR : 2009
 Q.E. : MAR.

Name of the Location : CHP - WMON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JAN. 2009	12.01.09	64.8	56.3	
JAN. 2009	24.01.09	65.0	57.4	
FEB. 2009	11.02.09	65.8	59.2	
FEB. 2009	26.02.09	63.6	58.1	
MAR. 2009	08.03.09	67.3	57.3	
MAR. 2009	28.03.09	68.2	60.1	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		75	70	

Name of the Location

: Colony -

WMON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JAN. 2009	12.01.09	51.7	41.2	
JAN. 2009	24.01.09	52.6	41.8	
FEB. 2009	11.02.09	53.8	43.1	
FEB. 2009	26.02.09	52.1	41.9	
MAR. 2009	08.03.09	51.1	41.8	
MAR. 2009	28.03.09	52.3	42.7	
Permissible Limit		55	45	

NOISE LEVEL DATA

NAME OF THE COMPANY

: WCL

YEAR : 2009

NAME OF THE AREA

: WANI

Q.E. : JUN.

NAME OF THE PROJECT

: MUGOLI OCP

Name of the Location

: CHP

- WMON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
APR. 2009	13.04.09	65.6	59.1	
APR. 2009	20.04.09	67.8	60.6	
MAY 2009	13.05.09	68.6	61.8	
MAY 2009	27.05.09	66.3	59.7	
JUN. 2009	13.06.09	67.2	61.4	
JUN. 2009	26.06.09	69.0	64.7	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		75	70	

Name of the Location

: Colony -

WMON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
APR. 2009	13.04.09	50.1	40.9	
APR. 2009	20.04.09	51.4	42.0	
MAY 2009	13.05.09	52.3	42.1	
MAY 2009	27.05.09	49.9	40.3	
JUN. 2009	13.06.09	51.2	40.8	
JUN. 2009	26.06.09	52.6	41.9	
Permissible Limit		55	45	

NOISE LEVEL DATA

NAME OF THE COMPANY : WCL YEAR : 2009
 NAME OF THE AREA : WANI Q.E. : DEC.
 NAME OF THE PROJECT : MUGOLI OCP

Name of the Location : CHP - WMON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
OCT. 2009	12.10.09	64.7	59.2	
OCT. 2009	28.10.09	63.1	57.8	
NOV. 2009	11.11.09	62.1	56.3	
NOV. 2009	25.11.09	64.5	58.5	
DEC. 2009	11.12.09	67.1	60.2	
DEC. 2009	25.12.09	65.6	58.0	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		75	70	

Name of the Location : Colony - WMON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
OCT. 2009	12.10.09	48.2	39.9	
OCT. 2009	28.10.09	50.9	41.6	
NOV. 2009	11.11.09	50.3	41.0	
NOV. 2009	25.11.09	49.7	40.3	
DEC. 2009	11.12.09	52.1	42.3	
DEC. 2009	25.12.09	49.5	40.0	
Permissible Limit		55	45	

NOISE LEVEL DATA

NAME OF THE COMPANY : WCL YEAR : 2010
 NAME OF THE AREA : WANI Q.E. : MAR.
 NAME OF THE PROJECT : MUGOLI OCP

Name of the Location : CHP - WMON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JAN. 2010 JAN. 2010	11.01.10 24.01.10	68.3 69.1	63.2 64.8	
FEB. 2010 FEB. 2010	12.02.10 23.02.10	66.8 68.9	61.9 64.0	
MAR. 2010 MAR. 2010	10.03.10 24.03.10	67.8 65.6	63.7 61.1	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		75	70	

Name of the Location : Colony - WMON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JAN. 2010 JAN. 2010	11.01.10 24.01.10	49.3 51.9	40.1 42.3	
FEB. 2010 FEB. 2010	12.02.10 23.02.10	51.7 52.9	42.0 43.2	
MAR. 2010 MAR. 2010	10.03.10 24.03.10	53.1 51.8	42.8 41.9	
Permissible Limit		55	45	

Further, in order to assess the likely level of ambient noise levels with the enhanced production capacity, the existing ambient noise levels recorded at the neighbouring mine of the same area viz Nilaji OCP operating at similar capacity (3.50 MTPA) have been considered and placed below. It can be seen from the data that the noise levels are within the permissible limits. It also proves that both at Mugoli OC mine and at Niljai OC mine noise control measures are effective enough to arrest the increase in noise levels.

NOISE LEVEL DATA

NAME OF THE COMPANY : WCL YEAR : 2009
NAME OF THE AREA : WANI Q.E. : JUN.
NAME OF THE PROJECT : NILJAI OC

Name of the Location : CHP – Niljai OC - WNON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
APR. 2009	04.04.09	66.2	60.0	
APR. 2009	18.04.09	69.6	61.6	
MAY 2009	05.05.09	68.7	61.4	
MAY 2009	17.05.09	65.4	59.8	
JUN. 2009	03.06.09	67.1	60.8	
JUN. 2009	18.06.09	69.2	62.6	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		75	70	

Name of the Location : CHP – Niljai (S) OC - WNON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
APR. 2009	04.04.09	66.9	59.3	
APR. 2009	18.04.09	68.0	61.4	
MAY 2009	05.05.09	67.6	63.2	
MAY 2009	17.05.09	65.4	59.0	
JUN. 2009	03.06.09	66.2	60.8	
JUN. 2009	18.06.09	68.4	63.0	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		75	70	

Name of the Location : Colony - WNON-3

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
APR. 2009	04.04.09	50.0	40.3	
APR. 2009	18.04.09	51.4	42.6	
MAY 2009	05.05.09	52.3	41.8	
MAY 2009	17.05.09	49.8	39.9	
JUN. 2009	03.06.09	50.7	41.0	
JUN. 2009	18.06.09	52.1	42.1	
Permissible Limit		55	45	

NOISE LEVEL DATA

NAME OF THE COMPANY : WCL YEAR : 2009
NAME OF THE AREA : WANI Q.E. : DEC.
NAME OF THE PROJECT : NILJAI OC

Name of the Location : CHP – Niljai OC - WNON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
OCT. 2009	06.10.09	64.6	57.5	
OCT. 2009	21.10.09	62.7	55.9	
NOV. 2009	03.11.09	63.9	56.3	
NOV. 2009	18.11.09	65.1	58.2	
DEC. 2009	03.12.09	66.7	60.4	
DEC. 2009	18.12.09	64.8	57.0	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		75	70	

Name of the Location : CHP – Niljai (S) OC - WNON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
OCT. 2009	06.10.09	66.5	61.2	
OCT. 2009	21.10.09	62.9	59.6	
NOV. 2009	03.11.09	60.8	55.3	
NOV. 2009	18.11.09	63.7	60.5	
DEC. 2009	04.12.09	67.1	63.6	
DEC. 2009	18.12.09	65.2	61.7	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		75	70	

Name of the Location : Colony - WNON-3

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
OCT. 2009	06.10.09	50.4	41.8	
OCT. 2009	21.10.09	48.6	40.9	
NOV. 2009	03.11.09	49.9	41.1	
NOV. 2009	18.11.09	51.7	42.0	
DEC. 2009	04.12.09	52.3	42.5	
DEC. 2009	18.12.09	50.9	41.3	
Permissible Limit		55	45	

NOISE LEVEL DATA

NAME OF THE COMPANY : WCL YEAR : 2010
 NAME OF THE AREA : WANI Q.E. : MAR.
 NAME OF THE PROJECT : NILJAI OC

Name of the Location : CHP – Niljai OC - WNON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JAN. 2010	05.01.10	68.2	63.1	
JAN. 2010	17.01.10	66.7	62.5	
FEB. 2010	03.02.10	71.6	67.8	
FEB. 2010	16.02.10	69.7	65.4	
MAR. 2010	04.03.10	68.7	64.9	
MAR. 2010	17.03.10	67.3	62.8	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		75	70	

Name of the Location : CHP – Niljai (S) OC - WNON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JAN. 2010	05.01.10	68.7	65.4	
JAN. 2010	17.01.10	66.3	62.9	
FEB. 2010	03.02.10	68.9	65.5	
FEB. 2010	16.02.10	70.1	66.7	
MAR. 2010	04.03.10	67.8	63.6	
MAR. 2010	17.03.10	66.4	62.8	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		75	70	

Name of the Location : Colony - WNON-3

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JAN. 2010	05.01.10	51.7	41.9	
JAN. 2010	17.01.10	53.6	42.8	
FEB. 2010	03.02.10	52.1	42.4	
FEB. 2010	16.02.10	50.3	41.1	
MAR. 2010	04.03.10	52.6	42.7	
MAR. 2010	17.03.10	50.7	41.6	
Permissible Limit		55	45	

Therefore, it can be concluded that due to increase in production in this mine, the impact on ambient noise level is insignificant. As such, for balance period of mine life with enhanced coal production, this impact is likely to remain insignificant.

4.5.1 NOISE POLLUTION CONTROL MEASURES

Monitoring of the noise control is being carried out on regular basis as per the Environment (Protection) Amendment Rule 2000. It has been seen that the noise levels at the mine site are all below TLV. While planning for an effective noise attenuation measures, the concept of source, path and receiver has been considered.

(A) Noise Control at Source

There are two areas where the noise generation is being checked at source.

(i) Proper Design

Since the generation of noise can be reduced by reducing the vibration amplitude, the area of vibrating part and frequency of vibration is being taken care that all loose contact between metal parts are avoided.

Shock absorbing pads are being fixed in the foundation of vibrating equipment / machines. In case of aerodynamic noise producing sources, mufflers are provided with the machines.

(ii) Proper Maintenance

All machines and equipment is being properly maintained. Sound muffler system and bearing lubricating system etc. of equipment is being kept in proper condition.

(B) Noise control in Transmission Path

The measures are being taken for control of noise along the transmission path has been put in following two categories:

- (i) Air borne path
- (ii) Ground borne path

(i) Air Borne Path

The control in air – borne path has been planned in a number of ways as:

- (a) The crusher house, screen house etc., which are source of high level noise generation are enclosed.
- (b) Planting of furrows of trees along the thick foliage around the compound and wall of CHP, workshop and other industrial buildings. This reduces the spread of noise. It is also used as an acoustic enclosure to reduce ambient noise.

(ii) Ground Borne Path

In order control ambient noise in ground borne path, vibration isolators in the form of vibration absorbing pads placed at the base of vibrating equipment.

(C) Noise Control at Receiver End

Even after adopting above measures, if desired noise level is not achieved at receiver end, in that case, following measures are adopted:

- (a) The workers exposed to high noise level are provided with earplugs.
- (b) Provision of enclosed booths at the worksite to protect worker from noisy environment.
- (c) The workers are subjected to Periodic Medical Examination once in every five years.

4.6 IMPACT ON LAND

The during-mining land use is as follows: -

S.N.	PARTICULARS	PRESENT LAND USE IN ha
1	Quarry Area	165.89 (Active backfilling is going on in 37.29 ha. The depth is about 40 m)
2	External OB Dump	170.39 (Plantation = 37.39)
3	Danger Zone for Blasting	167.00
4	Infrastructure & Roads	48.50
5	Embankment	33.42 (Plantation = 12.01)
6	Land for OB Dumping in balance life	43.35
7	Land for Quarrying in balance life	41.11
8	Rationalization Area	148.39 (Plantation = 32.80)
TOTAL		818.05

4.6.1 LAND RECLAMATION / LAND MANAGEMENT

The following activities have been proposed for reclamation of land.

1. Backfilling of the excavated area to the extent possible.
2. Leveling of the backfilled area and carpeting with the topsoil.
3. Creation of garland drains in order to arrest the silt load, due to erosion, to enter into natural watercourses during surface run-off.
4. Grass, legumes and different types of plants etc. will be planted on such reclaimed land in order to make it, as far as possible, conducive to agricultural growth.
5. Technical and biological reclamation of external OB dump.

It is being developed regularly in the mine lease area covering various infrastructures, along haul road (permanent type), coal transportation road, embankments and OB dump with various native species through State Forest Departments.

The density of trees is around 2000 – 2500 plants/Ha.

PRESENT OB RECLAMATION STATUS					
S.N.	PARTICULARS	Nos	AREA (ha)	PRESENT STATUS	
1	Existing External OB Dump & Embankment	10	163.39	i) Planted Area – 37.39 ha ii) Active Dump – 113.00 ha iii) Temp. T.S. Dump – 20.00 ha	
2	Internal Dump	--	37.29	Plantation started with 1000 trees, 0.40 ha. Reached upto GL.	
PRESENT PLANTATION STATUS					
S. N.	PARTICULARS	No. of Trees	AREA (ha)	PRERSENT STATUS	TYPE OF SPECIES
1	External OB Dump, Backfilled Area & Embankment	124482	49.80	Partly Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
2	Avenue	35820	14.33	Planted	Cassia, Neem, Imli & Gulmohar
3	Rationalization Area & Blasting Zone	13629	5.45	Partly Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
4	Around Infrastructure	10000	4.00	Partly Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
5	Around Workshop	13931	5.57	Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
6	Around CHP	8730	3.45	Planted	Mixed native species e.g. Teak, Bamboos, Khair, Neem, Shisam, Bija, Karanj, Siwan
TOTAL		2,06,592	82.60		

MINING LAND USE – PRESENT STATUS vis-à-vis EOM			
S.N.	PARTICULARS	PRESENT LAND USE IN ha	END OF MINE LIFE LAND USE IN ha
1	Quarry Area	165.89 (Active backfilling is going on in 37.29 ha. The depth is about 40 m)	207.00 (Void = 105.00 + Backfilled = 102.00)
2	External OB Dump	170.39 (Plantation = 37.39)	213.74 (Plantation = 71.90)
3	Danger zone for Blasting	167.00	167.00
4	Infrastructure & Roads	48.50	48.50
5	Embankment	33.42 (Plantation = 12.01)	33.42
6	Land for OB dumping in balance life	43.35	Nil
7	Land for Quarrying in balance life	41.11	Nil
8	Rationalization area	148.39 (Plantation = 32.80)	148.39 (Plantation = 32.80)
TOTAL		818.05	818.05

LAND USE COVER MAPS USING DIGITAL PROCESSING TECHNIQUES THROUGH SATELLITE IMAGERY

Objective of the land reclamation/restoration monitoring is to assess the area of backfilled, plantation, OB dumps, social forestry, active mining area, settlements and water bodies, distribution of wasteland, agricultural land and forest land in the leasehold area of the project. This is an important step taken up for assessing the progressive status of mined land reclamation and for taking up remedial measures, if any, required for environmental protection.

INTERPRETATION OF LAND USE COVER MAPS		
S.N.	PARTICULARS	DETAILS AT MARCH 2005
1	LEASEHOLD AREA	818.05 Ha.
2	SETTLEMENT	1.65 %
	a) RURAL	0.63 %
	b) URBAN	1.02 %
3	VEGETATION COVER	21.20 %
	a) PLANTATION ON OB DUMP	8.25 %
	b) BLOCK PLANTATION	1.02 %
	c) SHRUBS	11.93 %
4	AGRICULTURAL LAND	10.53 % (entirely fallow land)
5	MINING AREA	27.92 %
	a) ADVANCED QUARRY	5.96 %
	b) BACKFILLED AREA	1.02 %
	c) EXISTING COAL FACE	5.33 %
	d) COAL DUMP	0.51 %
	e) BARREN OB DUMP	15.10 %

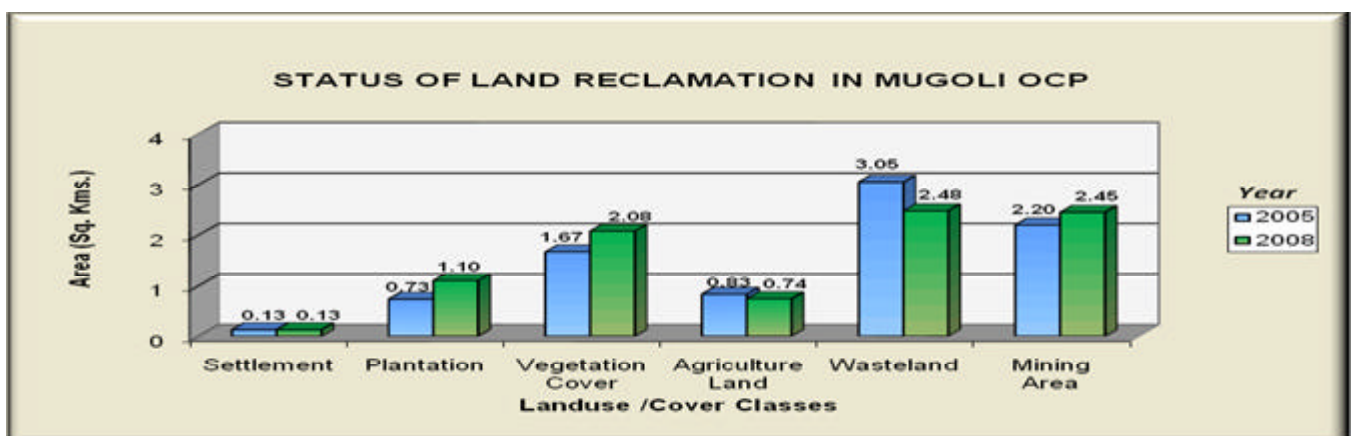
In addition to the above statutory Compliance, Opencast projects of WCL producing more than 5 million cubic m. (Coal + OB together) during the year 2008-09 have been taken up for land restoration / reclamation monitoring based on the *RESOURCESAT-1* satellite data using ERDAS Imaging digital image processing s/w on GIS platform. Land reclamation monitoring will be carried out **regularly on annual basis** to assess the progressive status of land restoration / reclamation in the above opencast mines. The report of this study has also been uploaded in the website of WCL in public domain.

Following 10 OC projects producing more than 5 million cubic m. (Coal + OB together) of Western Coalfields Ltd. have been taken up for land reclamation monitoring on annual basis:

- Sasti
- Padmapur
- Durgapur
- **Mugoli**
- Umrer
- Ukni
- Niljai
- New Majri + Kawadi
- Pimpalgaon
- Ghugus

Study reveals that 78.59% of mining area has already been reclaimed by WCL out of which 41.12% area has been revegetated and 37.47% area are backfilled.

After analyzing the satellite data of year 2008, it is evident that plantation, carried out on backfilled area, OB dumps as well as under social forestry in all the mines under study in WCL, has increased from 12.42 Sq. Km. to 17.18 Sq. Km. in span of last three years.



Further after analyzing the data of 2008 vs 2009, it is evident plantation in these mines of WCL has increased 17.18 sq. km to 22.73 sq.km

Plantation programme for the balance life is as follows:-

Sl.No	Year	Plantation in Nos.	Area to be covered in ha
1	2010 -11	8750	3.50
2	2011 -12	10000	4.00
3	2012 – 13	12500	5.00
4	2013 – 14	12500	5.00
5	2014 - 15	12500	5.00
	Total	56250	22.50

4.6.2 PROGRESSIVE & FINAL MINE CLOSURE PLAN

A. OBJECTIVES OF CLOSURE PLANNING

Mine closure planning has to be carried out at the starting of the mine and needs periodic reviewing and revision during its life cycle to cope with the geo-technical constraints, safety and economic risks, social and environmental challenges. Various other objectives are as follows:

- (a) To allow a productive and sustainable after-use of the site which is acceptable to the mine owner and the regulatory authority;
- (b) To protect public health and safety;
- (c) To alleviate or eliminate environmental damage and thereby encourage environmental sustainability;
- (d) To minimize adverse socio-economic impacts.

B. DIFFERENT ASPECTS OF MINE CLOSURE PLANNING

The mine closure planning broadly involves the following aspects:

- (a) Technical aspects;
- (b) Environmental aspects
- (c) Social aspects;
- (d) Financial aspects.

C. MINE CLOSURE OBLIGATIONS

There is need to define the liabilities, responsibilities and authorities of the mine management, other regulatory bodies, Central and State Governments after mine closure. Some obligations relating to the Mine Management Companies are as follows:

- (a) **Health & Safety:** Regulation Nos. 6, 61, 106, 112 of Coal Mines Regulations, 1957 and its related DGMS Circulars;
- (b) **Environment**
 - (i) Water (Prevention & Control of Pollution) Act, 1974;
 - (ii) Air (Prevention & Control of Pollution) Act, 1981;
 - (iii) Environmental (Protection) Act, 1986 and Environmental Protection (Amendment) Rule , 2000;
 - (iv) DGMS Directives on Noise & Ground Vibration;

(c) **Forest :**

Forest (Conservation) Act, 1980 – Not applicable in this case.

(d) **Rehabilitation :**

CIL's policy, however, applicable for land oustees only and has been successfully completed..

(e) Decommissioning/asset disposal, etc.

D. CLOSURE ACTION PLAN

Closure planning is a whole-of-life exercise that begins at the start of a mine and continues till post-closure. The dynamic nature of closure planning requires regular and critical review to reflect changing circumstances as a result of any operational change, new regulation, new technology and remain flexible enough to cope with unexpected events.

The following steps have to be undertaken in relation to Mine Closure Planning:

- (a) Prior to the surface demolition/restoration a surface audit should be undertaken on all surface structures, spoil heaps, lagoons, etc. to assess whether there are any hazardous materials that could cause problems; viz. explosives, chemicals, etc. A list of surface assets should be prepared and made available to potential purchasers, prospective purchasers could be invited and asked to submit sealed bids, this could ensure that the sale of assets give better financial gain.
- (b) In order to identify potential impact, necessary hydro-geological studies into post-mining ground water recharge has to be done. The void of the mine can be proposed as a water resource to be utilized for aqua-culture.
- (c) Work force on roll of WCL may be re-deployed for gainful utilization of employees of WCL.
- (d) As a detailed component of the Closure Plan, a Decommissioning Plan is to be developed towards the final stages preferably 5 years prior to tentative closure of the mine. Once established, it may be updated annually.

E. PROTECTIVE MEASURES TO BE TAKEN

Protective measures must include the following:

- (a) The protection of mine boundary, building and other structure on the project site against access by unauthorized persons;
- (b) The maintenance of all mechanical, hydraulic and waste management system;
- (c) The continuation of all monitoring programmes;
- (d) The control of all contaminated effluents;
- (e) The securing of all petroleum products, chemicals and waste;
- (f) The rendering of all tailings, dams and piles of earth, rock and waste resulting from work done on the project site in a stable and safe condition.

F. CLOSURE COSTS

Although no statutory guidelines exists on financial provisioning for mine closure activities as yet, financial provision of Rs. 1.00/t has been provided throughout balance period of mine life in order to undertake mine closure activities (for plantation in slope of dumps & quarry, for protection of mine boundary and continuation of monitoring programme and control of contaminated effluents). Closure cost may be reviewed under the changing circumstances and new legislative requirements.

This mine has adequate quarriable reserve beyond the present PR limit and is going to be further extended in the dip side as such no closure action plan has been finalized at this juncture.

CHAPTER- V

ENVIRONMENTAL MONITORING PROGRAMME

5.0 ENVIRONMENTAL MONITORING –

The environmental monitoring programme at present is being carried at the mine as per details given below: -

S.N.	Items	Parameters	Frequency	No. of Stations	Submission
1.	Ambient Air Quality Monitoring	SPM, RPM, SO ₂ , Nox, CO & Fugitive dust	Every Fortnight as per Environment Protection (Amendment), Rule 2000	4	Quarterly Report are submitted to SPCB & MOEF
2.	Water Quality Monitoring	1) 4 Parameters viz. p H, Total Suspended Solids (TSS), Chemical Oxygen Demand (COD) & Oil and Grease. 2) 35 Parameters	Every Fortnight Once in a Year	3	Quarterly Report are submitted to SPCB & MOEF
3.	Noise Quality Monitoring	Noise Levels	Every Fortnight	2	Quarterly Report are submitted to SPCB & MOEF
4.	Environmental Statement		Annual		Annually Report is submitted to SPCB before 30 th September.
5.	Ground Water Level Monitoring & Quality	Water Level & Quality Parameters.	Water Level – Quarterly. Water Quality – Yearly.	In Buffer Zone Villages.	Quarterly Report are submitted to SPCB & MOEF
6.	Compliance Report of EC Conditions.	All conditions both Specific & General	1 st June & 1 st December	Not Applicable	Half yearly Report are submitted to & MOEF

CHAPTER- VI

ADDITIONAL STUDIES

6.0 INTRODUCTION:

Mining is a hazardous industry. There is risk to life and property associated with various mining and allied activities of the project. As such a detailed study has been carried out covering identification and assessment of risk, and recommendation of measures to prevent damage to life and property against such risks. They are discussed below.

6.1 PUBLIC CONSULTATION

The project has already been accorded Environmental clearance for 2.50 MTPA and fresh EC is being solicited for only expansion in production capacity up to maximum achievable level of 4.00 MTPA and the application has been made under Clause 7.2 of EIA Notification, 2006. MOEF has directed for conduct of fresh Public Hearing (Copy of MOEF Letter attached herewith as Annexure – I).

To ascertain the concern of local affected and others who have a plausible stake in environmental impacts of the project / activity public consultation will be done at project site or close proximity for local affected persons with the following activities.

- i) The process in which public would be directly involved or participate and indirect responses would be received through different modes of communications.
- ii) District Magistrate will preside over the Public Hearing process to get public concerns incorporated in the EIA report.
- iii) Videography of proceedings would be done and would be enclosed with the application for Expert Committee.
- iv) The proceedings will be signed by DM/ADM in the same day of hearing.
- v) The proceedings will be displayed in web site and other Govt. offices.

This EIA/EMP has been prepared for public consultation.

6.2 LAND SLIDING IN OB DUMP AND MINE PIT:

There is only one composite coal seam, to be worked out in this opencast mine. The OB/Parting between the sections are to be removed by shovel dumper combination. It is therefore, necessary to take certain precautions while OB dumps are formed. In some cases, the top soil get mixed with rock soil in the dump, due to which there is a possibility of landslide, particularly in rainy season, unless suitable slope is maintained. Therefore, steps are to be taken at the time of dumping of OB that the slope of dump does not go beyond the prescribed limit. Further, the topsoil dumping should be separate and it can be reused on the backfilled area.

6.2.1 Slope failure in OB dump:

It may be worthwhile to mention here that if proper care is not taken in designing proper bench height and bench slope, the OB dump may fail causing damage to life and property.

With this in view, a proper slope analysis has been done to determine the safe bench slope and bench height, which are given below;

- Maxm. projected height of dump - 60 m.
- No. of terraces and height of each stage - two, max. 30 m each
- Over all slope - 28 degree.

In Mugoli OCP while forming & reclaiming external OB dumps, the above-mentioned guidelines regarding slope angle etc. are being tried.

6.3 MINE INUNDATION:

The mine pit receives water from three sources namely direct precipitation over mine area, surface run-off from surrounding area and seepage from strata. In heavy rainstorms, there may be situation where the mine would be flooded.

This may cause loss of human life and equipments. To guard against this situation. following steps are to be taken :

(A) Embankment has been constructed as a flood protection measures against Penganga River.

(B) Provisions of garland drains around mine quarry are made. This will prevent surface run-off entering the mine pit. In order to divert the rainwater around the excavated portion a garland drain has to be made; which should have the gradient suitable for diverting the water to the river/or nallah part away from the mine opening. This garland drain should be cleaned and graded before the onset of monsoon. With the advance of quarry face the position of garland drain has to be shifted.

(C) Provisions of pumps: Adequate number of pumps has been provided to drain mine water even during maximum rainfall.

6.4 BLASTING:

For quarrying of coal and removal of overburden, blasting has to be done by use of explosives. Flying pieces generated by blasting may prove dangerous to life and property. Hence, all the precautionary measures suggested by D.G.M.S. will be strictly followed e.g. controlled blasting etc. In addition, following precautions have been taken to avoid such dangerous situation.

(A) Blasting is to be done only once everyday.

(B) Before blasting is done, warning Sound is to be given so that people can move to safe places.

(C) Area lying within safety zone is to be fenced.

6.5 OTHER MEASURES:

Other measures have also been recommended for avoiding risk in mine operation. They are discussed below;

- (A) Provision of proper illumination in quarry, O.B. dumps area, along roads, in workshop & other work area.
- (B) Communication system - Efficient communication system (based on VHF system) have been provided for the project. This will allow proper communication link between various work centers and helps in avoiding accidents.
- (C) Maintenance facilities - The project will employ a large number of HEMMs for quarrying and transportation of local and OB. Ill - maintained HEMMs may prove to be the source of grave risk. A well-equipped workshop will be provided for scheduled maintenance of HEMMs to avoid their failures.
- (D) Training - Coal industry has set up a number of training institutes for imparting training to its employees. These training raise the safety awareness among workers and train them to carry out their assignments safely.
- (E) Medical aid - The project has provided for well equipped hospital and qualified doctors. They can attend to medical emergencies arising out of accidents.

6.6 CONCLUSIONS:

Following conclusions may be drawn from the above discussion:

- (a) Coal mining is associated with a number of hazards.
- (b) These hazards can be identified and assessed, which has been done for this project.
- (c) Preventive measures against identified risks have been provided in this report
- (d) With adoption of such protective measures, the operation of the mine would be safe.

6.7 SOCIO-ECONOMIC IMPACT

Mugoli Project has taken up various socio-economic developmental activities in and around the project site.

Moreover, with further continuation of the project, more and more developmental works are likely to be implemented through revenue budget which will add to the social benefit / positive impact due to this project.

Further to above, various works, which was mainly catering to the needs / socio-economic upliftment of the neighboring population have been detailed out in subsequent paragraphs.

Wani area is doing excellent job in the field of education, sanitation, cultural activities, tree plantation in the nearby villages through Mahila Mandal and other social organisation. In addition to above community development work camps of different medical activities are regularly organized on yearly basis.

However, further community development works will be taken up as directed by MOEF and after survey of the felt needs of the community around the project.

6.7.1 Peripheral development

As per the present practices in WCL coal mines, adequate steps are being taken for the local villagers by providing various infrastructural and welfare facilities and giving assistance in health care in Wani Area of WCL, under which the existing Mugoli OC project is in operation.

The various development works like construction of Primary, School, Post office, Shopping center, diversion of cart track for villagers, establishment of bank, diversion of irrigation canal etc; have been completed, mainly for catering to the needs/socio-economic upliftment of the neighbouring population. The details are as follows:-

YEAR	NAME OF WORK	AMOUNT SPENT (Rs.)
1994-95	For providing Borehole / Hand pump for drinking water & furniture for Primary school / High school to Sakhara, Mugoli & New Kolgaon village	75000/-
1995-96	Nil	Nil
1996-97	a) Furniture for Sakhara / Mugoli / Kolgaon Z.P. school	65000/-
	b) Construction of Bus stand at Kolgaon	25000/-
	SUB TOTAL	90000/-
	CD WORK:-	
	a) Rural sports / sports for villagers, furniture for Z.P. school of Sakhara, Mugoli / Kolgaon etc.	15000/-
1997-98	Nil	
1998-99	Nil	
1999-00	Construction of Community Centre at Bhimnagar, Mugoli	100000/-
2000-01	Chairs / Table / Almirah, Sound System to Community Centre, Bhimnagar, Mugoli	40000/-
	CD WORK:-	
	a) Construction of laboratory hall to Adarsha High School, Sakhara	122000/-
	b) Tatpatti, Chair, Almirah, Music Instrument, Playing materials to Z.P. school of Matholi, Kolgaon, Sakhara & Mugoli	30000/-
	c) Sakhara, Kolgaon village sports	2500/-
	SUB TOTAL	154500/-
2001-02	CD WORK:-	
	a) Village sports, Mugoli	5000/-

YEAR	NAME OF WORK	AMOUNT SPENT (Rs.)
2002-03	a) One additional Hand pump, Drain repair at Bhimnagar & Hand pump repair at Mugoli	30000/-
	b) Books for library of Mugoli	2000/-
	c) One Hand pump & repair of Kolgaon school building	40000/-
	d) Repairing of WBM road from Matholi to Sakhara	45000/-
	e) Providing & fixing of Barbed wire fencing for SC / ST land at Kolgaon	30000/-
	f) Furniture for library of Kolgaon village	25000/-
	g) Furniture for Jyotiba Fule library, Kailashnagar	15000/-
	h) Books for Jyotiba Fule library, Kailashnagr	5000/-
	SUB TOTAL	192000/-
2003-04	a) Construction of drain at Bhimnagar rehabilitation site at Mugoli	120000/-
	b) Repairing of WBM road at Kolgaon village	110000/-
	c) Pipeline along with water tank at Matholi village	30000/-
	SUB TOTAL	260000/-
2004-05	a) Construction of compound wall of community center, Bhimnagar	79000/-
	b) Construction of one room for library of Kolgaon	50000/-
	c) Mats for 3 Primary Z.P. school Mugoli, Matholi & Kolgaon	30000/-
	SUB TOTAL	159000/-
2005-06	a) Extension of drain at Bhimnagar	44000/-
	b) Hand pump at Kolgaon rehabilitation village	30000/-
	c) Repairing of WBM road to Arterial road to Mugoli village	100000/-
	d) Books & furniture for Kolgaon library	50000/-
	SUB TOTAL	224000/-
2006-07	a) Roofing of Stage at Bhimnagar	125000/-
	CD WORK:-	
	a) Extension of 2 rooms for primary school at Matholi village	97000/-
	SUB TOTAL	2,22,000
2007-08	Construction of approach road to Mungoli village joining to Arterial road (Balance work upto culvert at Mungoli OCP)	1,00,000/-
	Construction of shed for community Hall at Mothli	4,97,000/-
	Fencing & Miscellaneous works for Ramabai Ambedkar Library at Kolgaon village under SC-ST & 20 Poing programme at Mungoli OCP	1,19,000/-
	Making culvert for Shioni village under CD works	3,59,000/-
	Approach road from Embankment to culvert of Shioni village under C.D. wrks at Mungoli OCP	1,48,000/-
	SUB TOTAL	12,23,000/-

YEAR	NAME OF WORK	AMOUNT SPENT (Rs.)
2008-09	Construction of road at Bhimnagar SC/ST Programme	5,29,000/-
	Development works to Primary School & Community Hall at Matholi village	4,01,000/-
	Construction of shed for community place jugad	5,19,000/-
	SUB TOTAL	14,49,000
2009-10	Drinking water tank & toilets for students of Adarsh High School at Sakhra village.	1,24,000/-
	Development work at Community place at Jugad	82,000/-
	Protective work at culvert on approach to Shioni village	82,000/-
	Concrete road at Sakhra village 150 x 3 mtr.	2,32,000/-
	SUB TOTAL	5,20,000/-

However, further community development works will be taken up as directed by MOEF and after survey of the "felt needs" of the community around the project.

6.8 REHABILITATION SCHEME

Resettlement of 11 families of Bhimnagar Basti & 40 families of Kolgaon village completed and land losers have been suitably compensated as per norms.

Status of implementation of R & R

The status of implementation of R& R is as given below :-

A. REHABILITATION

Status of Rehabilitation of Land Oustees:-

S.N.	Description	Total
1	Total no. of holdings	420
2	Total no. of eligible land holdings	331
3	Employment provided to eligible land owners	243
4	Subsistence allowance paid in lieu of employment to the eligible land owners	64
5	Proposal sent to WCL, HQ a) For employment b) For subsistence allowance	7 1
6	Balance cases against which option not received from land owners	16
7	Land Compensation Paid (Rs. In lakhs)	302.22

B. RESETTLEMENT OF HOUSE OUSTEES

B . 1

Resettlement done at Kolgaon village - No. of families already rehabilitated – 40

Rehabilitation work already done :-

S.N.	Activity	Expenditure upto 31/03/2007	As per approved scheme
1	Cost of land	52849.00	60000.00
2	Cost of transportation of household materials from old site to new site	90000.00	100000.00
3	Cost of school building	638878.00	520963.80
4	Construction of drains	560294.93	396169.20
5	Construction of WBM roads	119912.10	345574.60
6	Black topping of roads	0.00	231072.80
7	Construction of culverts	0.00	99170.40
8	Construction of Mandir	166913.38	140000.00
9	Electrification / street light	265000.00	268288.00
10	Construction of two nos. hand pump	65470.00	60000.00
11	Ex- gratia	1000000.00	1000000.00
12	Misc. drain, compound wall to temple	190359.00	423266.20
	Total	3149676.41	3644505.00

Total sanction cost of scheme was Rs. 36.44 lakhs. All works completed except black topping of road against which water supply scheme is being taken up on demand of villagers for which work tendered at Area level.

- Expenditure already made – Rs. 31.50 lakhs
- Expenditure to be made – Rs. 4.76 lakhs

B. 2. Resettlement done at Bhimnagar Basti - No. of families already rehabilitated – 11

Total families rehabilitated – 11

Following household materials were given to each family:-

S.N.	description	Issued quantity
1	Bricks	6000 Nos.
2	Cement	10 Bags
3	Sand	01 Truck
4	Rubble	04 Tractor
5	Red Soil	02 Trip
6	Bamboo	20 Nos.
7	Balli	16 Nos.
8	Chattai	02 Bundle
9	G.I. Sheet	10 Nos.

Apart from above, the following works have also been done :-

S.N.	description	Amount (Rs. Lakhs)
1	WBM Roads (Internal Roads)	2.00
2	Construction of Water Tank	0.25
3	Community hall	0.90
4	Play Ground & Fencing Work	0.97
5	Stage & G.I. Sheet roofing work	1.79
6	Drinking Water Pipe Line	1.14
7	Electric line	0.50
8	Construction of drain	0.49
9	Providing & fixing of hand pump	0.35
10	Concrete road (Proposed for 2008-09)	5.00
Total		13.39

There is no village falling over the mine lease area as such no house oustees are involved. During the proposed expansion also there is no change in the status.

6.9 CORPORATE SOCIAL RESPONSIBILITY IN WCL - A Case Study

Community Development for local community

Looking beyond its employees, WCL also contributes to the socio – economic emancipation of deprived and downtrodden people living in villages around its mines, under its community Development, Tribal Sub Plan and Special Component Plan.

Activities undertaken and being continued are ;-

- ❖ Contribution and maintenance of approach roads, culverts, bridges, compound walls, tube-wells
- ❖ Repairs, maintenance and provisions of furniture to village schools
- ❖ Organization of health camps
- ❖ Financial help in organizing social and cultural activities in nearby villages
- ❖ Awareness Programmes against social evils
- ❖ Promoting self-employment schemes for village youths.

Expenditure incurred for Social Mitigation projects.

All fig. in Rs. Lakhs

Year	Budget		Actual Expenditure	
	CD	SCP/TSP	CD	SCP/TSP
2005 – 06	250.00	125.00	235.92	99.60
2006 – 07	314.59	117.41	263.94	111.03
2007 – 08	308.11	130.96	249.76	101.70
2008 – 09	308.12	127.00	246.30	100.72
2009 - 10	289.35	144.63	243.61	109.76

Corporate Social Responsibility (CSR) – efforts made & achievement till date are :-

- Health & Sanitation (Health camps like eye-camps, family planning etc, awareness programme) by different organization of companies, periodic homeopathic camps. Details of health camps organized during last two years for non-employees are given below:-

During 2008 – 09 , a total of 167 nos. of medical camps were organized for local neighbouring community with a total beneficiaries of 17735.

During 2009 – 10 , a total of 135 nos. of medical camps were organized for local neighbouring community with a total beneficiaries of

- Mobile Medical Services – Two (2) nos. of mobile vans under process for sanction through out – sourcing – one for PENCH Area and one for BALLARPUR Area.
- Literacy drive for employees & women – All employees are functionally literate.
- Distribution of free books – Taken care by respective area / mine management under felt needs regularly.
- Education:- No. of schools / colleges made / run by the company, establishment of libraries.

I) There are 96 Educational Institutes getting grants / infrastructures with 49706 students.

II) There are 5 fully financed project school comprising of 4 Central Schools and 1 DAV School having 3913 students.

III) School Buses:- 150 buses, Beneficiaries - 35747 students

IV) Scholarship of meritorious students:-

The year-wise expenditure & no. of students benefited for last five years is as under:-

Year	No. of Students	Amount in Rs.
2005 – 06	2411	2086050
2006 – 07	2924	2598150
2007 – 08	3518	3231300
2008 – 09	4326	3986700
2009 -10	5020	4542650

- Drinking water supply to local community through infrastructural support
- Organisation of various sports and cultural activities in neighbouring villages and during last five years Rs. 627.16 lakhs have been spent on this account.
- Construction of Bridges

Expenditure incurred on construction of bridges is as follows:-

Name of Bridge	Expenditure in Rs. Lakhs
Wardha River Bridge Ballarpur Area	830
Sasti Nallah Ballarpur Area	351
Makardhokda Bridge Umrer Area	250
Tawa Bridge, Pathakhera Area	361
Pench Bridge	145

- Banks / Post Offices.
No. of branches of bank functioning in the coalfield – 113.
- No. of co-operatives:-
No. of co-operatives societies functioning in the coalfield – 45
- Monthly monetary compensation to take care of livelihood of medical unfit cases.

The details for last five years are as follows :-

Year	Monetary Compensation to Female Dependents in Nos.
2005 - 06	125
2006 – 07	129
2007 – 08	137
2008 – 09	36
2009 – 10	69

- Jobs to dependents in case of death & medical unfit.

The details for last five years are as follows:-

Year	Jobs to Dependents in Nos.
2005 -06	
2006 – 07	518
2007 – 08	407
2008 – 09	414
2009 – 10	58

- Free supply of LPG (to employees) for reduction of air pollution – All employees **(60680 as on 01/06/2010)** are covered.
- Education / training to local people on environmental issues – During environment week celebration every year, various programmes on education / training / awareness building are carried out at each area as well as in corporate HQ.

Employee Welfare

The motto of WCL is to bring smiles on every human face of its employees. In this regard the welfare amenities created by WCL are detailed as below :-

- ❖ 62 residential colonies covering 65.95% employees

- ❖ 51 water treatment plants supplying potable, drinking water to 3.22 lakhs population
- ❖ 11 well equipped hospitals with 710 beds, 54 dispensaries manned by 193 doctors
- ❖ 79 canteen & 71 rest shelters
- ❖ 13 stadiums, 48 children's parks, 150 school buses, 30 clubs, 27 gymnasiums, 38 community halls
- ❖ Supportive financial grant (recurring and non-recurring) and other infrastructural assistance to educational institutions run by State Govt., Grampanchayats and Private Societies (There are 101 educational institutions in WCL coalfields areas)
- ❖ Scholarships to meritorious ward of employees under CIL Scholarships Scheme
- ❖ **Social Security Cover**

Contributory provident fund, Gratuity (covered by innovative Group Gratuity Assurance Scheme), and Coal Mines Pension Scheme.

Expenditure on Welfare amenities

Sl. No.	Year	Expenditure (Rs. in 'Lakhs')
3	2005-06	4669.01
4	2006-07	4990.93
5	2007-08	5300.99
6	2008 - 09	5821.01
7	2009 - 10	5879.53

New – Initiatives

With the launch of CIL's Corporate Social Responsibility Policy, WCL will now implement CSR activities within a radius of 15 Kms. The CSR initiatives will be village specific, need-based and will be in synchronization with local development to ensure that they are socially acceptable to local people and these voluntary efforts will help active balance of our economic goals and societal well being.

Accordingly, target for CSR activities during 2010-11 has been fixed with a CSR Budget of RS. 2286.75 lakhs (@ Rs. 5 per tonne of last year production i.e. 45.735 million tonnes) will be implemented as per the policy document.

CONCLUSION

W.C.L. has an unwavering commitment to a philosophy of recouping nature's largesse as concurrent activity with coal mining. CSR is playing an increasingly significant role in company's narratives and practices. W.C.L. is fully alive to its responsibility of integrating protection measures in its developmental programme and will strive hard to become a "Good Neighbour."

CHAPTER – VII

PROJECT BENEFITS

7.0 PROJECT BENEFITS

The benefits of the project can be summarized as below:-

- The physical infrastructure in the area has already been improved substantially by following ways:-
 - a) Development of road thereby improving the communication.
 - b) Improvement in Power, Telephone (including Mobile) facility.
 - c) Improvement in Health Care facility & Educational facility.
 - d) Improvement in Market / Trade & Business.
- The social infrastructure by way of cultural mixing of people of other states with local community glorifying “UNITY IN DIVERSITY”.
- Substantial employment in the project & indirect employment for business & trading, contractor, transportation, vehicle contractor, nursery development.

CHAPTER - VIII

ENVIRONMENTAL COST – BENEFIT ANALYSIS

Ministry of Environment & Forests while issuing TOR has not specifically indicated for carrying out “Cost Benefit” Analysis, hence the same has not been carried out.

CHAPTER - IX

ENVIRONMENT MANAGEMENT PLAN

9.0 GENERAL

Close monitoring of the environment and implementation of various protective measures discussed in the report forms an important part of EMP. In the earlier chapters the causes of various pollutions along with the preventive and mitigating measures have been discussed. In this chapter description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored, after approval of the EIA is being discussed.

9.1 MONITORING ORGANISATION

To have a close watch on the environmental condition and implementation of the various measures suggested, a multi-disciplinary approach is essential.

(a) WCL headquarter acts as an apex body which supervises the activities relating to environment at project level through the General Manager.

(b) General Manager of the area coordinates the activities of various disciplines in the area to render all necessary assistance at the implementing level i.e. the Project. Area Nodal Officer (Environment) monitors all aspects of environment on behalf of the General Manager. He also takes suitable steps for generation of environment data along with its analysis and interpretations.

As far as plantation is concerned horticulturist with suitable backup staff shall be provided in the area for undertaking the plantation jobs including raising of a nursery. Plantation will have to be done on a large area. Therefore, it may be desired that an outside agency may have to be employed for this purpose. The horticulturist along with the supervisor shall only monitor and guide the agency for selection of site, treatment of soil, selection of species etc.

(c) Project Officer is responsible for mechanical reclamation of the area. He is also responsible for biological reclamation with the assistance of GM's office.

ORGANISATION FOR ENVIRONMENT MANAGEMENT

SN	Measures/Actions		Agency
1.	Environmental Control	1	Chief General Manager, Wani Area
		2	Nodal Officer, (Environment), Wani Area
		3	Project Officer, Mugoli OC Extn.
		4	Staff Officer (Civil), Wani Area
		5	Environmental Cell (WCL H.Q.)
2.	Environmental Monitoring	1	Chief General Manager, Wani Area
		2	Staff Officer (Civil), Wani Area
		3	Nodal Officer (Environment), Wani Area.
		4	Project Officer, Mugoli OC Extn.
		5	Environment Cell of WCL Headquarters
		6	Environmental Laboratory of CMPDI, RI-IV
3.	Reclamation	1	Project Officer, Mugoli OC Extn.
		2	Nodal Officer (Environment), Wani Area
		3	Environmental Supervisor
		4	Horticulturist

9.2 ENVIRONMENTAL COST PROJECTION

It is an existing mine running since October 93. One sedimentation pond for treatment of mine pumped out water & ETP for workshop effluent have already been constructed. Mobile water sprinklers & fixed water sprinklers have been put into use. Coal transportation road has been totally blacktopped. Plantation is being done regularly through revenue budget of the mine. The progressive expenditure incurred till date towards env. Pollution control measures are about Rs. 149.62 lakhs under capital head and the same under revenue head come to Rs 107.465 lakhs. .

Rs.3.00 / t has been kept under revenue head to cater for: -

- i) Plantation
- ii) Env. Monitoring / Auditing
- iii) Socio-economic welfare measures
- iv) Misc. Pollution Control Measures
- v) Compliance for statutory obligations like Consent fees, Water Cess payment , Authorization etc.

It is felt that the above provisions are adequate to handle the existing pollution load. However, if need arises, necessary action along with provision of fund shall be accordingly taken.

9.2.1 ENVIRONMENTAL COST

The details of expenditure incurred till date on environmental mitigation measures both under Capital & Revenue head is given as below :-

CAPITAL EXPENDITURE:-

ACCOUNT HEAD	PROGRESSIVE
Reclamation (HEMM)	3.01 Lakhs
Air Pollution Control	109.85 Lakhs
Water Pollution control	36.76 Lakhs
TOTAL	149.62 Lakhs

REVENUE / OTHER EXPENDITURE:-

ACCOUNT HEAD	PROGRESSIVE
Afforestation	60.22 Lakhs
Monitoring	20.45 Lakhs
Air Pollution	23.65 Lakhs
Water Pollution	28.22 Lakhs
Legal Expenses (Consent fee for Air, Water & Hazardous Waste)	17.675 Lakhs
Environment Statement	1.08 Lakhs
Rainwater Harvesting	4.65 Lakhs
Total	150.855 Lakhs

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