PROPOSED

TERMS OF REFERENCE

OF

GHORAWARI OPENCAST EXPANSION PROJECT

FOR

(DETAILED ENVIRONMENTAL IMPACT ASSESSMENT STUDY)

(IV). Proposed Terms of Reference

Based on the information furnished in Form - I, the Terms of Reference (TORs) is proposed as under:-

The project under consideration is Ghorawari opencast expansion mine located in Junnardeo tahsil of Chinndwara district in Madhya Pradesh State as shown in the enclosed plan (Plate - I of Form - 1) and falls under the administrative control of Kanhan Area of Western Coalfields Limited.

A. Environmental Clearance

1) **Environmental Clearance** - The environmental clearance was obtained for 0.45 MTPA with 1296.011 ha of land area (with forestland of 593 ha.) vide MOEF letter no. J-11015/382/2007-IA.II(M) dated 19/02/2008.

B. Mining Parameters

3) There is no change in mining technology since commissioning of the mine in 1982.

4) There is no change in the land area since last environmental clearance (1296.011 ha vide letter dated 19/02/2008).

5) There is no change in total coal, total OB, manpower and other project parameters since last environmental clearance (vide letter dated 19/02/2008).

6) No fresh sources of water proposed to be used or exploited during the balance life.

7) Land reclamation measures as suggested in the approved EMP (vide letter dated 19/02/2008) are continuing and there would be no change in the final land use pattern.

C. Socio – Economic Issues

8) As there is no increase in land area therefore there is no fresh R&R involved.

9) Public Hearing had already been conducted while taking the last environmental clearance and all the issues have been settled.

D. Environmental Parameters

10) All pollution control measures with respect to Air, Water and Noise have been taken in fulfillment of the requirement of existing EC (0.45 MTPA) and Consent to Operate. The environment quality in and around the mine is monitored every fortnight as per Environment (Protection) Amendment Rule, Sept. 2000 and quarterly reports are being sent regularly to MPPCB and MOEF. The annual Environmental (Audit) Statement is submitted every year to MPPCB before 30th September. The measures will be continued during the balance life of mine with

enhancement of production so as to maintain the parameters well within the permissible limits.

E. Consent to Operate(CTO)

11) The mine is operating with Consent to Operate (0.45 MTPA) obtained from MPPCB. Consent to Operate from MPCB will be obtained for 2.50 MTPA after receipt of environmental clearance from MOEF and the conditions of CTO will be implemented during the balance life of mine with enhancement of production so as to maintain the parameters well within the permissible limits.

F. Proposal

12) All the conditions of new EC (1.50 MTPA) shall be duly implemented and six monthly compliance report will be submitted to MOEF as per the EIA Notification 2006.

In view of the above, due-diligence environmental clearance for Ghorawari OC expansion project, Tahsil – Junnardeo , Dist. – Chindwara for enhancement of production capacity from 0.45 MTPA to 1.50 MTPA with same land area of 1296.011 ha may be accorded under clause 7(ii) of EIA Notification 2006 based on the attached duly filled Form-1, TOR, Feasibility Report and Submission as above.

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FEASIBILITY REPORT

OF

GHORAWARI OPENCAST EXPANSION PROJECT

FEASIBILITY REPORT

1.0 INTRODUCTION

(A) GENERAL :

Ghorawari OC Expansion is a running mine since 1982 under Kanhan Area in Chhindwara district of Madhya Pradesh State. The EMP was approved by MOEF for a production capacity of 0.45 MTPA and land area of 1296.011 ha **vide its letter no. J-11015/382/2007-IA.II (M) dated 19/02/2008.** The mine is being monitored as per Environment (Protection) Amendment Rule, 2000 and quarterly reports are being sent regularly to MPPCB and MOEF. The Annual Environmental Statement is submitted every year to MPPCB before 30th September.

Now in terms of the meeting held at New Delhi on 28.02.2008 between Secretary (Coal) and Secretary (Environment) and subsequent meeting held on 21.04.2008 with Director , MOEF, Form-1 application with this feasibility report is being submitted for obtaining Environmental Clearance for peak production capacity of 1.50 MTPA under Clause 7(ii) of EIA Notification , 2006.

(B). LOCATION & COMMUNICATION :

Ghorawari OC patches mines are situated in Chhindwara district of Madhya Pradesh State and is bounded by latitudes 22 deg. 11' 43.1" and longitudes 78 deg 25' 00" to 77 deg 31' 69"E. The mine area is covered in Survey of India Topo Sheet No. 55 J/2 & J/8. Ghorawari OC Mines are situated near to Junnardeo Central Railway Station on Amla-Chindwara Central Railway Broad Guage line.

(C). TOPOGRAPHY & DRAINAGE :

The area is undulating with few mounds. The elevation of the area varies in the range of 780 to 800 meters above MSL. Drainage of the area is mainly controlled by Kanhan River flowing about 6-7 Km away from project.

(D). CLIMATE :

The climate in this are is generally dry and hot. The summer months are from April to June followed by rainy season upto September. The winter months are from November to January. May is the hottest month and the temperature rises to 45 degree centigrade. December is the coldest month with temperature falling to 8 – 10 degree centigrade. Average annual rainfall in this area is around 1300 mm.

(E). GEOLOGICAL RESERVES & LIFE OF THE MINE :

In the beginning period of the opencast mine, dumping of OB was done at nearby abandoned OC mines, thereafter void is being used for backfilling of OB dump. Considering the enhanced production capacity of the mine and balance extractable reserve re-assessed as on 01.04.2008 is 7.249. Mt. , the life of the patches has been estimated to be around 7 years.

(F). MINING TECHNOLOGY :

Within the Opencast leasehold area, Opencast Mine is proposed in Seam – III keeping safety barrier from the leasehold boundary. Quarry batter is drawn at 45 degree, as the type of rock is hard.

Seams – I & II are very thin at high depth, hence are declared unworkable seams.

As mentioned earlier, the already developed pillars of erstwhile Ghorawari Collieries are being extracted by opencast method through excavators and dumpers in patches. The details of patches have been shown on the plan attached as Plate-III.

(G). DESPATCH & COAL HANDLING :

Coal extracted from these OC patches are brought up to Hirdagar siding (about 12 kms) through tippers and then dispatched to Sarni Thermal Power Plant by Rail from this siding. Some of the coal is also dispatched by Road to ancillary consumers.

(H) . STUDY AREA

(i) Core Zone : Core Zone consists of leasehold area where the mining and allied activities take place.

The total land area of this project is 1296.011 ha. Break up is given below.

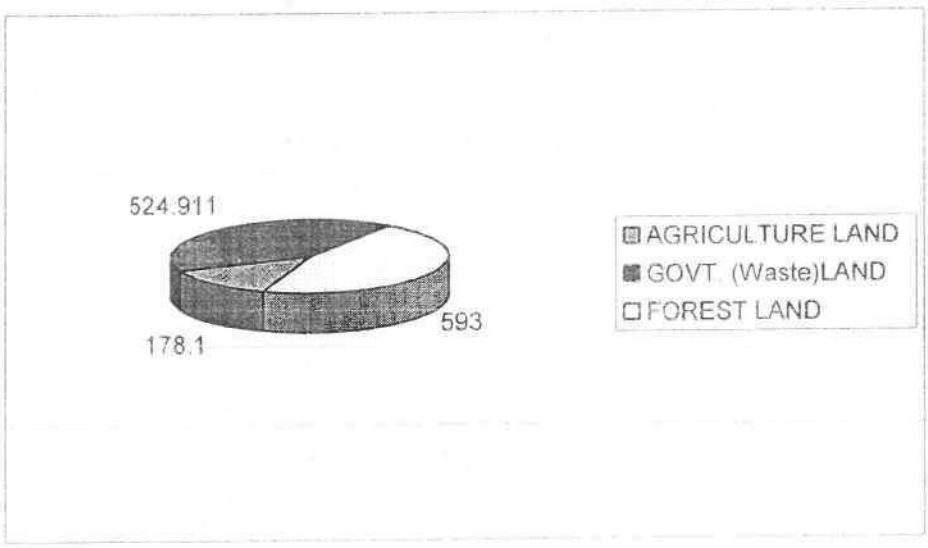
i.	Agricultural land	-	178.100 ha
ii.	Other (Govt. +WCL) land	-	524.911 ha
iii.	Forest land	-	593.000 ha
	TOTAL		**1296.011 ha**

(ii) Buffer Zone : Buffer Zone includes the area covered within a circle of 10 km radius from Core Zone. Buffer Zone in this case comprises of urban area, rural area and forest. There are 16 villages & WCL township in the buffer zone. Some of the features within buffer zone are given below.:

Sl. No.	FEATURES	DETAILS	DISTANCE
1	Industries / Thermal Power Plants/ Defence Installation	Nil	--
2	Other mines	Damua UG, Nandan UG, Jharna UG, Ghorawari UG, etc.	4 km
3	Railway Lines	Amla- Chindwara	3 Km
4	National / State Highway	Chindwara - Sarni	1 Km
5	Water Bodies	Kanhan River	About 6-7 km
6	Human Settlement	WCL township & 16 villages	within buffer zone

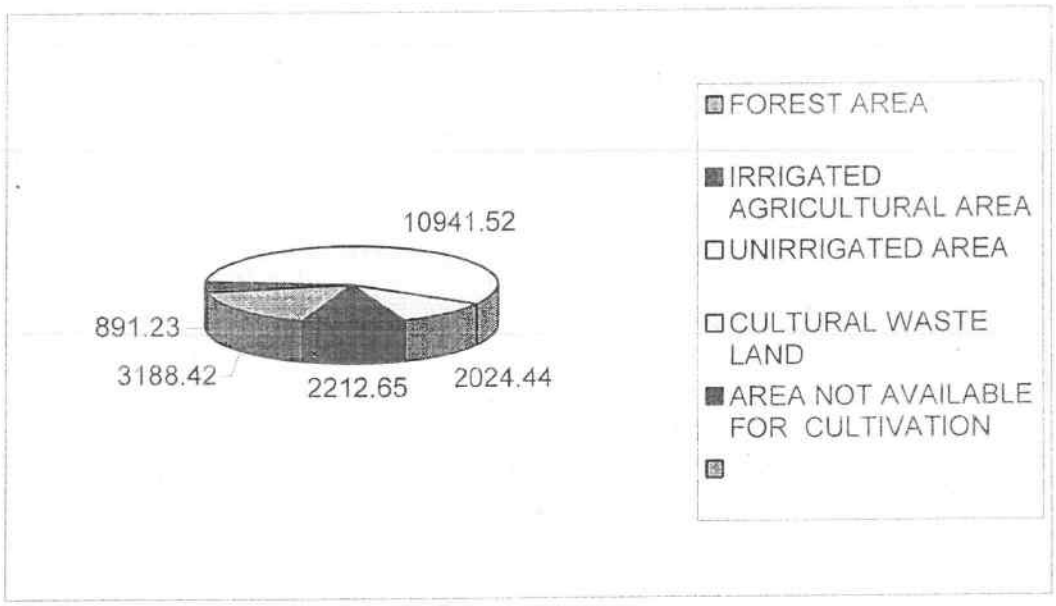
PRE MINING LAND USE IN CORE ZONE

(ALL FIGURES IN HECTARES)



EXISTING LAND USE PATTERN IN BUFFER ZONE

(ALL FIGURES IN HECTARES)



(I) PRODUCTION PERFORMANCE :-

The production performance for the last five years are given below.

Year	Coal (Mt.)
2003-2004	0.24
2004-2005	0.22
2005-2006	0.32
2006-2007	0.19
2007-2008	0.326

The total mineable reserve left in the mine is 7.249 Mt. and the balance life of mine is about 7 years. The projected production performance is given below.

YEAR	COAL (Mt)	OB(M.Cu.m.)
2008-09	0.59	5.16
2009-10	1.25	10.94
2010-11	1.25	10.94
2011-12	1.30	11.37
2012-15	0.95 X 3 = 2.85	8.31 X 3 = 24.93
TOTAL	**7.24**	**63.35**

However , the project is anticipated to achieve a peak production capacity of 1.50 MTPA for which Env. Clearance is solicited.

(J) COAL TRANSPORTATION :

Coal from the mine is being dispatched by road to Hirdagarh Railway siding, (about 12 km) and from there the coal is being transported to Satpura TPS , Sarni of MPEB by rail.

The various air pollution control measures being adopted during coal transportation are as follows:

i. Black topping of coal transportation road.
ii. Regular cleaning & water spraying on coal transportation road.
iii. Overloading of trucks is being strictly prohibited.
iv. Coal transportation is being done in trucks covered with tarpauline.
v. Regular monitoring of air quality as per Env. (Protection) amendment Rule,2000.
vi. Plantation along coal transportation road.

(K) LAND MANAGEMENT

i. Attempt has been made to minimise the land requirement for the project.
ii. All efforts has been made to maximize the backfilling.

Mining land use – Present Status vis- a- vis End of Mining

Sl. No.	Particulars	Present Land Use (in ha)	End of Mine Life Land Use (in ha)
1	Quarry Area	66.36 (Backfilled area- 39.816) (Plantation - 30.125)	750.36 (Backfilled area- 487.734 With plantation on 254.574) (Void - 262.626)
2	External OB Dump	15.31 (Plantation - 15.31)	217-.861 (Plantation - 136.075)
3	Road	2.65	2.65
4	Infrastructure	12.34	12.34
5	Township	140.00	140.00 (Plantation - 18.40)
5	Quarry area to be worked in Balance Life	684.00	Nil
7	Area for Ext. OB for balance life	202.551	Nil

8.	Rationalisation Area	172.80	172.80 (Plantation - 88.00)
	Total	1296.011 (Plantation - 48.435)	1296.011 (Plantation - 497.049)

iii. The backfilled area and external dumps are being reclaimed both technically and biologically. Proper reshaping of dumps and drainage arrangement for precipitation run-off will be done.

iv. Native species and mixed culture are being selected for successful biological reclamation.

2.0 PROJECT DESCRIPTION :

(A) GEOLOGY OF GHORAWARI LEASEHOLD AREA:

A) **Part of Lease 29, Lease nos. 9, 10, 11, & 13**:

In Ghorawari area , the sediments encountered in the drilled boreholes are represented by Moturs, Barakar & Talchir. Northern peripheral parts are covered by flows of basalt and underneath the sediment occur.
In the West , the hilly region is occupied by basaltic rocks of Deccan trap.
Besides this, few prominent Dolerite dykes traverse through the area having EW to NE – SW trend. Few boreholes drilled by MECL have encountered the dykes.

B) **Part of Lease 26 & west of Lease 26.** :

Based on the sediments encountered in the drilled borehole in the area, it is observed that they represent Moturs below soil cover. Moturs are followed by Barakar & Talchir. A small outcrop of Barakar sst. Is noted in the North Eastern part of the block. The Eastern part is covered by Deccan trap.

Area is traversed by Dolerite dykes having EW to NE – SW trend.

C) Lease nos. 5,6,7,8, 14, 15 & 16:

Based on the dat of drilled boreholes , it reveals that soil is mostly followed by coal bearing Barakars, which is followed Talchirs. However few boreholes encountered Moturs above Barakars

Area is traversed by Dolerite dykes having EW to NE – SW trend.

The geological sequence of the area is given in the following table :

AGE	FORMATION	LITHOLOGY
Sub-recent to recent	Soil / Detrital mantle	Sandy clays & Black cotton soil
----------	UNCONFORMITY----------	
Middle Permian	Moturs	Greenish, purplish & variegated clays intercalated with cgd. sst.
Lower Permian	Barakar	White to grayish, mgd to cgd. sst. Shale, carb. Shale and coal.
----------	UNCONFORMITY----------	
Upper carboniferous	Talchirs	Greenish to blackish splintery shale, sst. & boulder beds.
----------	UNCONFORMITY----------	
Archeans	Metamorphics	Schist & gneisses

Structure of the Area :

a. **Part of Lease 29, Lease nos. 9, 10, 11, & 13:**

Strike (on the basis of drawn floor contours), is almost EW with minor swings while at places it is NE – SW & ESE – WNW with Northerly dip varying from 6^0 to 7^0.

b. **Part of Lease 26 & west of Lease 26. :**

Strike is almost EW to N 70^0. E - S 70^0.W. At places it is NE- SW. Dip is Northerly, which varies from 5^0 to 13^0.

c. **Lease nos. 5,6,7,8, 14, 15 & 16:**

Strike is almost EW to NE – SW. Dip is Northerly with amount varying from 8^0 to 9^0. (gradient 1 in 6 to 1 in 7.8)

B. COAL SEAMS AND ITS QUALITY :

Prospecting for the area under consideration for this project had been done by MECL, IBM & NCDC and as per the reports it has been correlated that the workable coal seams from top to bottom as Seam I, II & III. In this area, two of these seams viz. Seam-I & Seam – II; not only occur in split sections, which are designated as IA, IB, IC, (Split of seam I, IIA, IIB (Split of Seam II), etc. but are also at high depth. Due to such splits in both these Seams they are also very thin , hence declared unworkable seams. As such, only Seam – III has been considered for extraction by Opencast method. The quality of coal is designated as " Grade – D ".

C. METHOD OF WORK :

Within the Opencast leasehold area of this project, Opencast Mine is proposed in Seam – III keeping safety barrier from the leasehold boundary. Quarry batter is drawn at 45 degree as the type of rock is hard.

As indicated above Seams- I & II are very thin and at high depth, hence declared unworkable.

Simaltaneous OB removal and backfilling in the decoaled area has been proposed for balance life of the mine. No OB dumping has been proposed in Coal Bearing & Forest Land , for the balance life of the mine. OB dump schedule has been indicated in the progressive mine closure plan. Coal of this seam had already been extracted by under ground mining method earlier. Presently remaining coal from already developed/ depillared galleries and the left out barrier portion is being extracted by opencast mining monethod in small patches by deep hole blasting with shovel dumper combination by obtaining permission from DGMS.

D. CALANDER PROGRAMME FOR BALANCE LIFE:

The total mineable reserve left in the mine is 7.249 Mt. and the balance life of mine is about 7 years.

YEAR	COAL (Mt)	OB(M.Cu.m.)	INTERNAL DUMPING (M.Cu.m.)	EXTERNAL DUMPING (M.Cu.m.)
2008-09	0.59	5.16	4.16	1.00
2009-10	1.25	10.94	8.31	2.63
2010-11	1.25	10.94	8.31	2.63
2011-12	1.30	11.37	8.53	2.84
2012-15	0.95 X 3 = 2.85	8.31 X 3 = 24.93	18.95	5.98
TOTAL	**7.24**	**63.34**	**48.26**	**15.08**

E. POWER :

Power supply for Ghorawai OC is obtained by tapping 33 KV Panara Feede originating from Khapaswami MPSEB substation. The distance of tapping from Khapaswami is around 9 Km and the length of 33 KV feeder from the tapping point to Ghorawari OC is around 5 Km. At the Colliery substation this is stepped down to 3.3 KV.

F. MARKETING, BENIFICATION & DESPATCH OF COAL

The property within the Ghorawai OC Patches is being worked by opencast method of working by using shovel dumper combination on hiring of equipment, The coal from OC patches is being dispatched to coal stockyard. The coal from the coal stockyard is being transported to Hirdagarh Siding & from there to consumer through railways. About 80 % of total coal production of Kanhan area is supplied to Thermal Power Station , Sarni and 20 % to misc. consumers.

G. MANPOWER

The total manpower strength of the Ghorawari Opencast is 217.

H. DISASTER MANAGEMENT PLAN :

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 This has been discussed in detail in relevant chapter. The mine is being worked as per mining statute. All stipulations as specified by DGMS are being followed in day to day operation of the mine.

3.0 DESCRIPTION OF THE ENVIRONMENT :

A) AIR QUALITY : The ambient air quality of Ghorawari OC is being monitored as per Env. Protection Amendment Rule, 2000 at following locations.

(i) Manager Office
(ii) Sub- Area Manager Office
(iii) Jharna Health Centre
(iv) Panara Village

In addition , the baseline ambient air quality data (Period- April'06 to June'06) has been generated as per the guidelines in vogue at the following locations.

Sl. No.	Location Name	Location code	Direction (from Site)	Distance (Km)
01.	Core Zone	A – 1	-	-
02.	Rakhabarra	A – 2	NE	6.2
03.	Dungariya	A – 3	E	4.8
04.	Kole	A – 4	SE	3.2
05.	Dongariya	A – 5	WSW	5.6
06	Rayjamun	A – 6	NNW	5.6

The details are enclosed as Annexure – III. The Windrose diagram is enclosed as Annexure – II.

Further to it , in order to assess existing ambient air quality in the mine activity area, the latest ambient air quality data generated as per Env. Protection Amendment Rule , 2000 has been considered. The details of these data is enclosed as Annexure- IV.

The results indicate that the monitored parameters i.e. level of SPM & RPM are well within the permissible limit. The values of SO2 & NOx are insignificant.

B). WATER QUALITY : The baseline water quality data (Period - April'06 to June'06) has been generated as per the guidelines in vogue at following locations.

Sl. No.	Location Name	Location code
01.	Mine effluent in April 2006	W - 1
02.	Mine effluent in June 2006	W - 2
03.	Ghorawari Kalan – Borewell	W - 3
04.	Nimdhana – Borewell	W - 4
05.	Kanhan river U/S	W - 5
06.	Kanhan river D/S	W - 6

The details of baseline water quality data is enclosed as Annexure- V.

The present quality of pumped out water from the mine is being monitored as per Env. Protection Amendment Rule, 2000. The latest water quality data has been considered . The details of these data are enclosed as Annexure- VI.

The results indicate that observed values of different parameters of mine water discharge are well below the permissible limit .

C) **NOISE LEVEL** : The baseline water quality data (Period - April'06 to June'06) has been generated as per the guidelines in vogue at following locations.

Sl. No.	Location Name	Location code
01.	Core Zone	N - 1
02.	Rawarkhurd Village	N - 2
03.	Dungariya Village	N - 3
04.	Kola Village	N - 4
05.	Danuja Village	N - 5
06.	Muyari Village	N - 6
07.	Bijori Village	N - 7
08.	Junardeo Village	N - 8
09.	Minoriya Village	N - 9
10.	Markadhana Village	N - 10
11.	Biripura Village	N - 11
12.	Chikalbarri Village	N - 12

The details of baseline noise level data is enclosed as Annexure- VII.

The existing noise level data in the mine activity area which is being monitored as per Env. Protection Amendment Rule ,2000 have been enclosed as Annexure – VIII.

D) SOIL QUALITY :

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 were selected in the core and buffer zone during base line study period. Locations are selected in such a way that different types of soils for supporting different species of vegetation are covered. The soil quality monitoring stations are furnished below:

Corezone (Barren Land)	-	S_1
Nimdhana (Agri.)	-	S_2
Bandhi (Forest)	-	S_3

The details of soil quality data has been enclosed as Annexure- IX.

E). HYDROGEOLOGY :

The following hydrogeological regime has been projected to represent the existing hydrogeologica! set-up of Ghorawari OC Patches and its buffer zone. Generally sand stone horizons serve as aquifers and shale/clay acts as aquicludes whereas weathered/secondary porous zones are aquifers in Basalts & Metamorphics. The various hydrogeological unitsdeveloped in the study area are in the following table :

SL. No.	TYPE OF AQUIFER	DEPTH RANGE (m)	CORE ZONE	BUFFER ZONE
1	UNCONFINED	0 -30	Soil zone/ weathered Moturs/ Barakars/ Basalt	Wlts eathered Motur/ Barakar, Talchir, Basalts & Metamorphics.
	Semi-confined/ confined	Beyond 30	Motur and Barakrs	Motur/ Barakar, Talchir, Inter trapeans, vesicular and fractured / jointed Basalts and also lineaments, fractured/ fault zones in Metamorphics.

The following hydrogeological regime has been projected to represent the existing hydrogeological set-up of Ghorawari OC Patches and its buffer zone. Generally sand stone horizons serve as aquifers and shale/clay acts as aquicludes whereas weathered/secondary porous zones are aquifers in Basalts & Metamorphics. The various hydrogeological unitsdeveloped in the study area are in the following table :

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	Semi-confined/ confined	Beyond 30	Motur and Barakrs	Motur/ Barakar, Talchir, Inter trapeans, vesicular and fractured / jointed Basalts and also lineament s, fractured/ fault zones in Metamor phics.

The hydrogeological observation well in Kanhan area has been established. Depth to water table in core zone area is 5.55 m to 12.00 m bgl in pre-monsoon and 1.30 to 8.00 bgl in post –monsoon period. Average annual fluctuation being 4.00 m.

In buffer zone, depth to water table in unconfined aquiferin general varies from 4.05 m to 17.20 m bgl in premonsoon while it is from 0.05 m to 7.25 m bgl in post monoon period. Water table fluctuation in general is from 1.50 m to 8 m between the two extreme seasons.

Average being 5.00 m. Deep water levels and large z one of fluctuation are observed in the are a covered by Basalts and Metamorphics.The water table c onfiguration is mostly similar to that of topography but with that of reduced relief.

Water Level Trend :

Ground water level decaded average ofwater levels and water level for fluctuations **during 2002-2003 of National Hydrograph** stations network in Pench Kanhan Coalfields alongwith hydrographs drawn by CGWB for Jamai NHS were examined to assess the water level trends during premonsoon and post monsoon seasons. A rising trend both in post and premonsoon has been observed at the stations at Jamai.It is worth to make a mention of the fact that the hydrograph stations at Jamai are located in the active coal mining belt. It is imperative from the rising trend in the water levels in both the seasons that the mining activity in general in the area and underground mining in particular has not induced any effect in the ground water levels in the dugwells tapping the unconfined aquifer. It can be concluded that the underground mining at deeper depths in Gondwana covered are

a would affect the deeper aquifer(confined/ semiconfined) immediately overlying the working coal seam, but there would be insignificant effect on the unconfined aquifer. Further in the Basalt covered Gondwana area , the underground mining may not induce any impact on the water table (shallow) aquifer.However, the opencast mining will induce effect on all aquifer zones overlying the working coal seam.The effect on the unconfined is considerably more in comparison to the deep aquifers i.e. semiconfined aquifer due to continous desaturation/ draining of the aquifer.

GENERAL AQUIFER PARAMETERS : No detailed hydrogeological investigations were carried out at kanhan mine area. The bore hole drilled by CGWB at Jamai reveals aquifer at a depth of 27.70 m bgl capable of yielding 3.50 LPS. However, the aquifer parameters evaluated by CGWB in Parasia block in particular have been considered and attributed for the study area . The projected hydraulic parameters of the aquifers in Motur & Barakar formations are as follows :

Transmissivity - 20 to 50 m^2 / day
Hydraulic conductivity – 0.3 to.0.7 m / day
Storage coeffecient – 3 x10 $^{-2}$ to 5 x 10 $^{-4}$
Specific Yield - 0.03 to 0.05 (assigned)

The tubewells constructed in Gondwanas have registered moderate yield ranging from 2 LPS to 5 LPS. However, the borewells in the Basalts and Metamorphics in general recorded low yield varying from negligible to 3.0 LPS. With some exceptions of moderate yield due to secondary porosity and favourable physical setting. By judicious judgement of these facts and review of formations logs, the above parameters have been arrived from the wide range of values of different formations.

GROUND WATER RESOURCES IN THE AREA :

Ground water recharge :

Rainfall is the main recharge source for ground water. The study area receives an average annual rainfall of 1300 mm. Additionally, ground water is also being recharged from other sources such as return flow from irrigation and mine pumped out (waste) water thrown on land /natural drains, water logged voids, etc.

The replenishable ground water recharge has been computed by rainfall-infiltration method in the absence of long-term water table fluctuation data of different formations in the area. The rainfall-infiltration factor for semiconsolidated sandstones (Gondwanas), Basalts, Metamorphics and Talchir has been considered to be 12%, 13%, 8%, and 4% respectively (GEC Report –1997 CGWB NCR, 2005) by critical review of all the factors responsible for rainfall-recharge to ground water. While computation of ground water recharge , the hilly area with > 20% slope amounting to about 42 sq.km. has been discarded from the study area of 314 sq.km. The ground water recharge computation as per GEC 1997 norms I as under :

a)	Recharge from rainfall (area cover in 272 km^2)	MCM (Million Cubic Meters)
i)	Moturs/ Barakars – 99.70	14.36
ii)	Talchir - 86.90	4.17
iii)	Basalt - 58.20	9.08
iv)	Metamorphics - 27.20	2.61
	RECHARGE BY RAINFALL	30.22
b)	Recharge from other sources	0.60
c)	Gross Ground water recharge (a + b)	30.82

GROUND WATER DRAFT :

The ground water draft for domestic,irrigation and mine pumping use is computed as under :

Ground water draft of Ghorawari OCM area

Utility	Total Qty of withdrawal
Domestic (population)	0.95 MCM
Irrigation	5.64 MCM
Mine Pumping (Existing mines in Buffer zone	2.31 MCM
Annual Ground water Draft	8.90 MCM

round Water Balance : :

i)	Gross Ground Water recharge	30.82 MCM
ii)	Natural discharge to drains and other losses (10% of item I) above)	3.08 MCM
iii)	Net annual ground water availability	27.74 MCM
iv)	Allocation/ projection for next 25 years for domestic and industrial use	0.50 MCM
v)	Annual ground water draft for all uses	8.90 MCM
vi)	Ground water balance (items iii - iv & v)	18.34 MCM

The ground water balance flow chart is enclosed as Annexure - X

GROUND WATER STAGE OFDEVELOPMENT :

The stage of development computation in the present study is 33.88% , which can be categorized as ' Safe' with less than 70% value. As per report of CGWB and MP Govt. of 2005 , the stage of development of Jamai Block in which Ghorawari OCM is located is 21.42% and classified as ' safe' category.

Dynamic & Static Resources:

Dynamic and static reserves for the core and buffer zones are estimated by using the mine and aquifer parameters. Since the opencast mine acts as a large diameter well/ sink, the inflow to the mine is contributed from the saturated overburden formation i.e. multiple aquifer system. However, the unconfined aquifer is the most affected in the opencast mining area.

WATER QUALITY :

As part of the Environment Management Plan (EMP) preparation, the s urface water, ground water and mine water quality were monitored; the water quality parameters are within the stipulated standards,

MINE DRAINAGE / PUMPING:

The ground water inflow of Ghorawari OC computation has been done by utilizing the abovementioned aquifer and mine parameters. The ground water inflow to the mine has been estimated to be around 1040 m3/day (0.38 MCM annually) at the final quarry depth of 48 m. However, to keep the water level below stipulated level as per DGMS requirement the existing Ghorawari UG mine has to pump 3120 m3/day (1.14 MCM annually).

The operating mines in the buffer zone are continuously pumping ground water to the tune of 2.31 MCM annually as part of mine management.

RADIUS of MINE INFLUENCE AREA :

In the opencast mines, the different aquifers overlying the working coal seam would be contributing ground water to the mine by gravity drainage since they are exposed /removed at the mine. The anticipated ground water inflow to the mine is to the tune of 1040 m3 / day at the final quarry depth of 48 m. The shape and extent of the cone would depend on mainly hydraulic conductivity and specific yield of aquifers and also mine depth and area etc. Mine induced effect would be distinctly noticed within a distance of 900 m from the mine edge in the down-dip direction and becomes mlder / insignificant thereafter. However, the effect is limited/ negligible in the up-dip side of the incrop zone due to shallow mine depth & area and further mine development is towards dip-side only.

F. FLORA & FAUNA :.

- There is no endangered & endemic species in core & buffer zone.
- By developing plantation of native species efforts are being made to improve the green cover in and around the immediate vicinity of mine area.
- WCL in association with local people will make all efforts to conserve flora & fauna in the immediate surrounding of the mine area.

The authenticated list of flora & fauna is enclosed as Annexure – I.

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

A. ENV. IMPACT ASSESSMENT

Env. Impact assessment has been carried out by studying the likely impacts on existing ambient air , water and noise conditions etc. due to proposed expansion of the project. In this direction the first step is Scoping of important environmental aspects which are given below. :-

IMPORTANT ENVIRONMENTAL ASPECTS (Scoping)	
1. Forest land involved	Yes
2. Wild life sanctuary (10 Km. radius)	None
3. Fragile Eco/ Bio- diversity system nearby (10 Km. radius)	None
4. Coastal area nearby (10 Km. radius)	None
5. Environmental impact on the region.	No adverse impact anticipated. Efforts will be made by strengthening the existing pollution control measures with close monitoring to maintain the sinking capacity of ambient air to absorb the additional load due to proposed expansion, thereby maintaining the quality of ambient air to the existing level to the extent possible
6. Impact on quality & quantity o surface & ground water specific to the project.	a. Mine pumped out water is being let out only after treatment. Hence impact on surface water quality is not significant . b. The mine water pumping is to the tune of 4160 m^3/day & 4500 m^3/day during lean & monsoon period respectively. c. The radius of influence estimated for this project at final quarry depth is 900 m.
7. Risk & Hazards involved due to the project	Risk & hazards associated with mining is limited to mine area only. However, the mine

	is being worked as per the statute.
8. Points regarding mitigation measures for land, air, water and noise pollution	Various pollution control measures are being implemented effectively.

i. **Air Pollution Impact Assessment :**

From the analysis results of present ambient air quality data, it is seen that the main pollutant arising out of coal mining and associated activities at existing mine is dust (SPM & RPM) although values are within the permissible limit. Now , with the expansion of the mine , there is likelyhood of addition of pollution to the existing concentration level of different attributes of ambient air.
The ambient air monitoring data will be examined critically so as to identify the affected area and mine authorities will thereafter be able to take appropriate control measures to minimise the adverse effects as far as possible.
Further by strengthening the existing pollution control measures, the level is likely to remain within the permissible limit.

The representation of ambient air quality monitoring data in graphical form are shown in subsequent pages.

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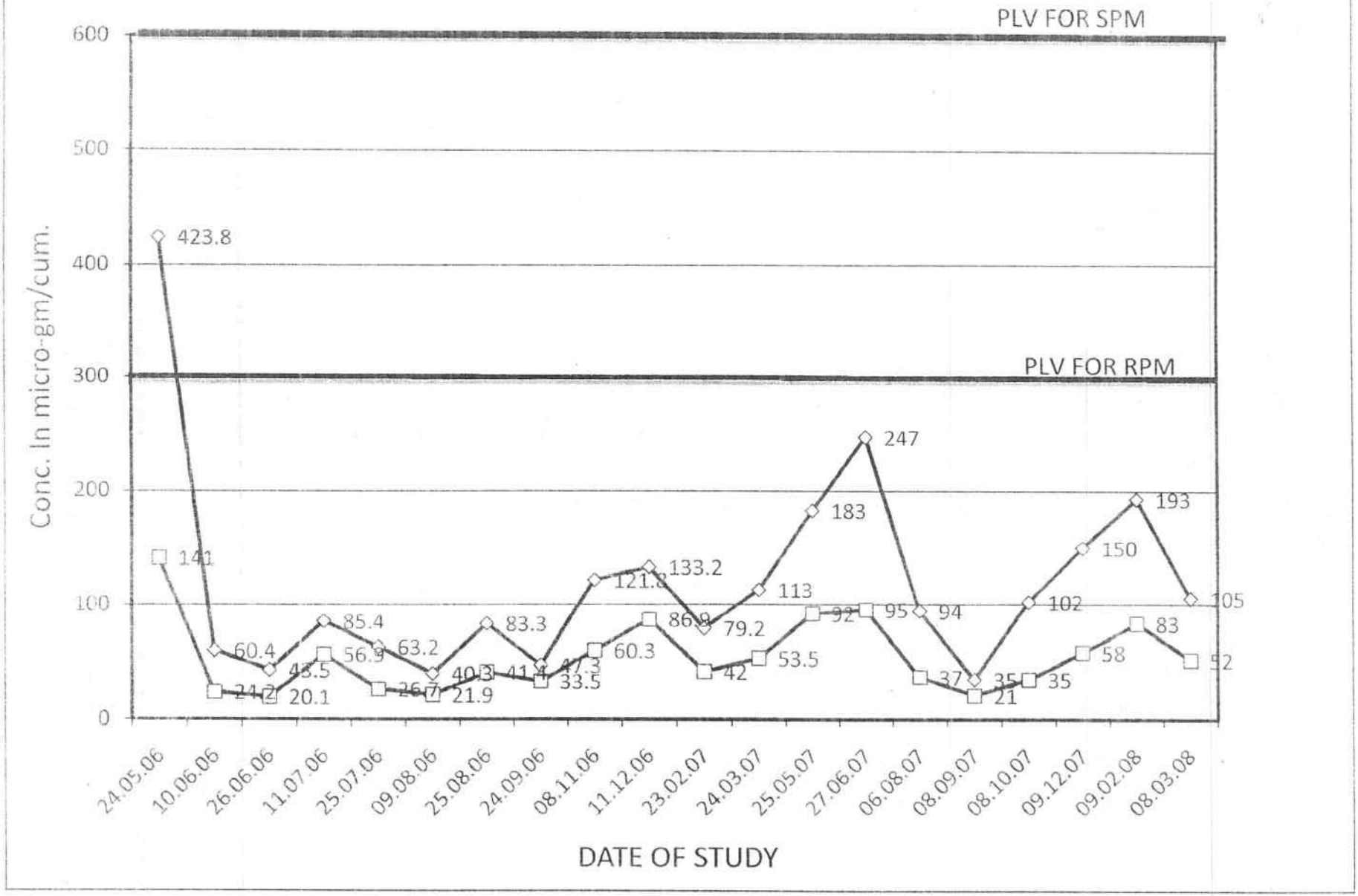
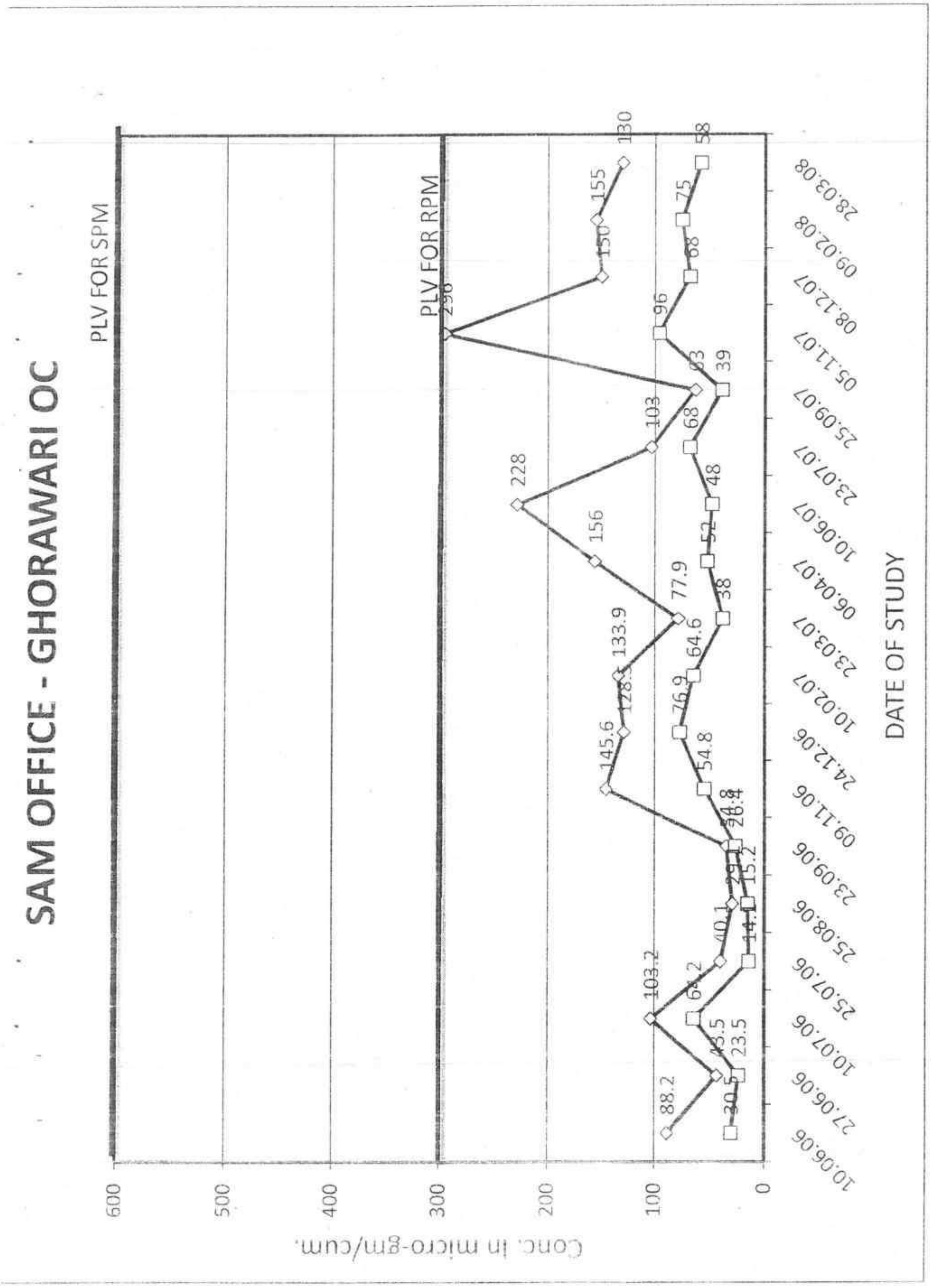
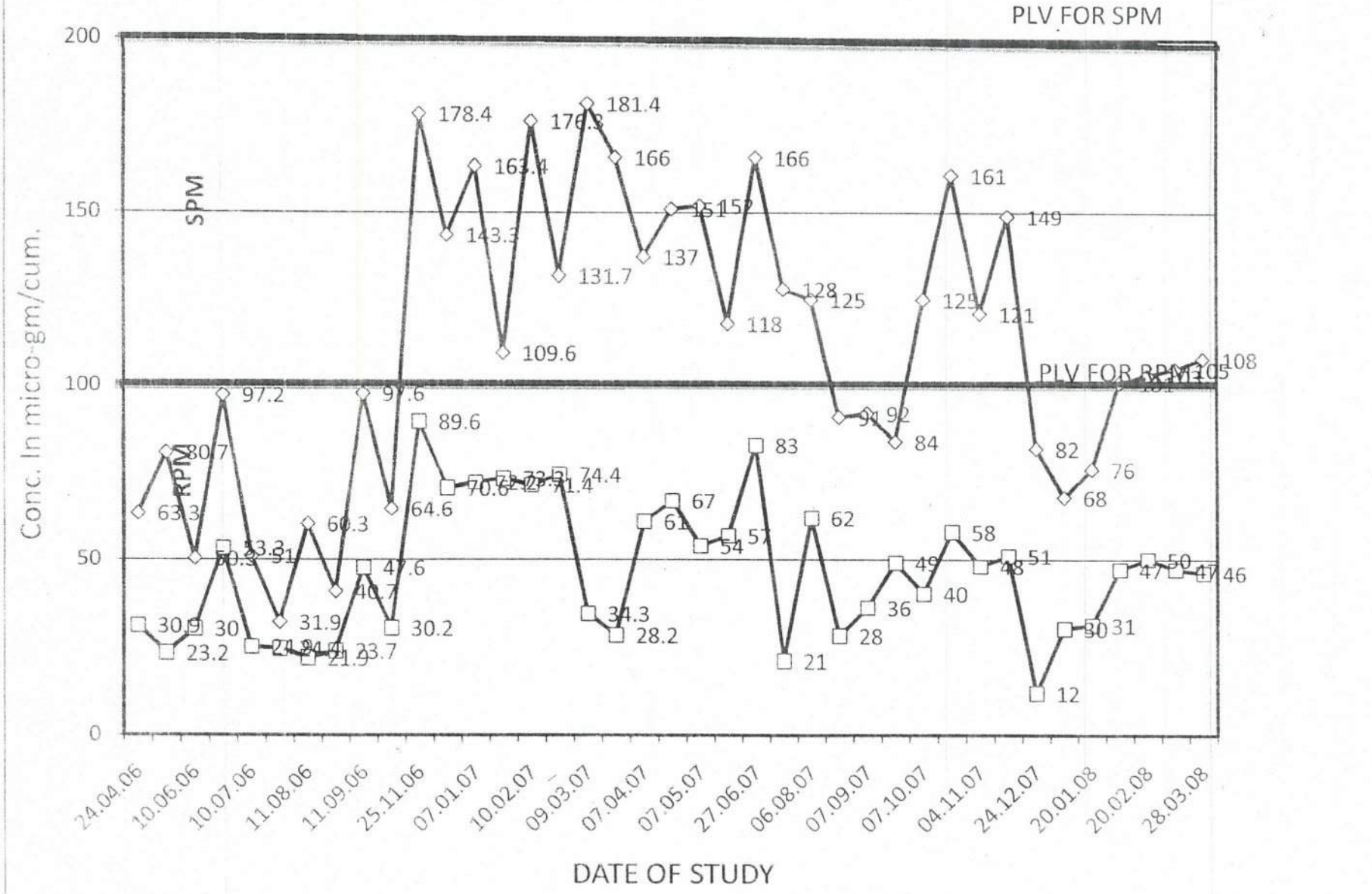
MANAGER OFFICE-GHORAWARI OC




SAM OFFICE - GHORAWARI OC
PLV FOR SPM
PLV FOR RPM
Conc. In micro-gm/cum.
DATE OF STUDY
0
100
200
300
400
500
600
10.06.06
27.06.06
10.07.06
25.07.06
25.08.06
23.09.06
09.11.06
24.12.06
10.02.07
23.03.07
06.04.07
10.06.07
23.07.07
25.09.07
05.11.07
08.12.07
09.02.08
28.03.08
88.2
43.5
103.2
40.1
145.6
128.5
133.9
77.9
156
228
103
63
298
150
155
130
30.5
23.5
64.2
14.1
15.2
54.8
76.9
64.6
38
52
48
68
39
96
68
75
58

62

COLONY - GHORAWARI OC



PANARA VILLAGE - GHORAWARI OC
PLV FOR SPM
PLV FOR RPM
Conc. in micro-gm/cum.
DATE OF STUDY
200
150
100
50
0
24.05.06
11.06.06
28.06.06
09.07.06
25.07.06
11.08.06
26.08.06
12.09.06
24.09.06
09.11.06
11.12.06
22.01.07
11.02.07
23.02.07
09.03.07
24.03.07
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07.05.07
25.05.07
10.06.07
23.07.07
06.08.07
22.08.07
07.09.07
24.09.07
26.10.07
04.11.07
24.11.07
20.01.08
08.02.08
20.02.08
08.03.08
28.03.08

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Hence , it is expected that pollution load to be generated due to increase in production at Ghorawari be well within the permissible limit as the existing air pollution control measures will be further strengthened with close monitoring for efficient & effective implementation of the pollution control measures to make the operation eco-friendly and it is expected that 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

ii. **Water Pollution Impact Assessment :**

The present quality of mine pumped out water is being regularly monitored as per Env. Protection Amendment Rule,2000. It is seen that the recorded value of all the quality parameters are well within the permissible limit.

Based on the factual position it can be predicted that the quality of mine pumped out water at Ghorawari OC mine due to proposed expansion is not going to change much from the existing level because of same hydrogeological conditions.

Moreover, regular monitoring of mine effluents will be continued as being carried out presently so as to assess the quality of mine effluents and if any undesirable element is found immediate mitigative action will be taken. It may be mentioned here that mine discharge is not being allowed to mix with natural water courses without treatment; i.e. mine discharge is being passed through a sedimentation pond before it is allowed to mix with nullah/stream, etc

iii. **Noise Pollution Impact Assessment :**

The present noise level in the mine activity area is being regularly monitored as per Env. Protection Amendment Rule,2000. It is seen that the recorded value are well within the permissible limit.

With the proposed expansion, the noise level is likely to increase mainly in the mine activity area, but with control measures, the propogation of noise will not be significant.

However, regular ambient noise level monitoring will continue to be carried out so as to identify affected areas and appropriate control measures will be taken to minimise the same.

iv. **Impact on Land :**

Mining land use – Present Status vis- a- vis End of Mining

Sl. No.	Particulars	Present Land Use (in ha)	End of Mine Life Land Use (in ha)
1	Quarry Area	66.36 (Backfilled area- 39.816) (Plantation - 30.125)	750.36 (Backfilled area- 487.734 With plantation on 254.574) (Void - 262.626)
2	External OB Dump	15.31 (Plantation - 15.31)	217-.861 (Plantation - 136.075)
3	Road	2.65	2.65
4	Infrastructure	12.34	12.34
5	Township	140.00	140.00 (Plantation - 18.40)
5	Quarry area to be worked in Balance Life	684.00	Nil
7	Area for Ext. OB for balance life	202.551	Nil
8.	Rationalisation Area	172.80	172.80 (Plantation - 88.00)
	Total	**1296.011 (Plantation - 48.435)**	**1296.011 (Plantation - 497.049)**

v. **Socio-economic Impact :**

The only major industry, being this coal mining has made its impact on the local population so as to improve the socio-economic and cultural status of the local people.

Although a few mines already exist in the buffer zone, mining activities at Ghorawari OC has definitely affected its surroundings and the employment scenario.

The direct employment opportunities have already improved around the coal mine areas & with the expansion of this project it will improve further. With the proposed expansion of the mine the occupational structure of the area is going to change further and many people are likely to be involved in the job of mining

and allied activities. Hence, income level of these people are likely to improve to significant level.

The monetary inflow in this area through salary & wages payable to the project employees will increase because almost 50% of this amount is being spent locally to meet the day to day domestic demand. This regular expenditure may lead to adequate & impressive economic-development of the area. This monetary inflow may also lead to improvement of civic amenities because people will go for more and more consumer goods, better educational facilities & communication . Simultaneously various small scale & medium scale manufacturing engineering units may also come up giving adequate alternate employment opportunities for local people.

Employment opportunities both direct & indirect in this project is likely to cause migration from outside. Amenities like medical educational, recreational etc. are available to local people and their quality of life will definitely improve.

The present network of metalled approach road to the place of work and places of public interests like shopping, education, medical services etc. is going to improve with continuation of mining operation.

With continuation of mining activities in the area, educational facilities developed in the area will continue to improve the literacy of the rural areas also.

vi. Impact on Health

At present there is a dispensary with qualified doctors & paramedical staffs in the project. At area level there is a full fledged hospital . The Periodical medical examination is being carried out regularly as per statute. The circulars and orders of DGMS including the rules and regulations under Mines Act are being adhered to in respect of occupational health and safety

No major occupational health hazard is anticipated due to the proposed expansion of the project.

The medical facilities are being extended to nearby villages. The situation is likely to improve further.

vii. Impact on Flora & Fauna

There is no endangered & endemic species in the core & buffer zone.

Both core and buffer zones are found to be free from ecologically sensitive and biologically rich areas / habitats. As such impact on flora & fauna is likely to be insignificant.

B. MITIGATIVE MEASURES

i. Air Pollution Control Measures :

- Water spraying in coal stockyard (total area – 9,600 sq.m) and on the haul road (length – 2.50 km) through mobile water sprinkler. It is proposed to install fixed type rain guns in the coal stockyard & along the haul road ;

- In blasting operation – Optimizing fragmentation by proper design of blast parameters;

- Black topping of coal transportation road (16 km) has been done from mine site to railway siding.

- The coal transportation is being done in trucks covered with tarpaulin & having valid PUC certificate and overloading of truck is being avoided .

- Regular cleaning of coal transportation road.

- Plantation in vacant land, along road & infrastructure (7,500 Nos.). On External OB Dumps (37,500 nos.) & in backfilled areas (75,500 Nos.).

Proposed Plantation Programme –

SUMMARY OF PLANTATION DURING BALANCE MINE LIFE				
Sl. No.	PARTICULARS	NUMBER OF TREES	AREA (ha)	REMARKS
1	EXTERNAL OB DUMP	3,50,000	120.675	TO BE PLANTED WITH NATIVE SPECIES
2	BACK FILLED AREA	6,35,000	224.359	TO BE PLANTED WITH NATIVE SPECIES
3	VACANT LAND (INCLUDING TOWNSHIP)	266000	106.40	TO BE PLANTED WITH NATIVE SPECIES

- The ambient air quality is being monitored as per Env.(Protection) Amendment Rule,2000.

ii. **Water Pollution Control Measures**

- The strata seepage water is being collected at dipside sump where suspended particles get sufficient time for settlement. The pumped out water is being utilized for domestic & industrial consumption and excess water (3720 KLD) is discharged into natural water course. Moreover the quality of mine pumped out water is quite satisfactory which is being monitored regularly as per Env. (Protection) Amendment Rule , 2000.
- Workshop effluent treatment plant for workshop effluent.
- Each residential unit is provided with conventional soak pit & septic tank arrangement.

iii. **Noise Pollution Control Measures**

- The mine is being worked as per mining statute after taking due permission from DGMS.
- Preventive maintenance of plants & machineries.
- Plantation in vacant land , around infrastructure , OB dump etc.
- Ear plug & ear muffs has been provided to workmen who are exposed to high noise level.
- Periodical medical examination of all workmen once in every five year.
- Regular monitoring of noise level as per Env.(Protection) Amendment Rule,2000.

iv. **Land Management**

- Attempt has been made to minimise the land requirement for the project.
- The backfilled area and external OB dumps are being reclaimed both technically and biologically.
- Native species and mixed culture are selected for successful biological reclamation.

The post-mining scenario can be summarized as below :

POST MINING LAND USE (CONCEPTUAL)						
Sl. No.	Category	Land Use (ha)				
		Plantation	Water Body	Public Use	Undisturbed Area	Total
1	Excavation	254.574	262.626	-	233.16	750.36
2	External OB Dump	136.075	-	-	81.786	217.861
3	Roads	-		2.65	-	2.65
4	Infrastructure		-	12.34	-	12.34
5	Township	18.40	-	121.60	-	140.00
6	Rationalisation Area	88.00	-	-	84.80	172.80
	Total	479.079	262.626	136.59	399.746	**1296.011**

v. 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 Kanhan Area of WCL, under which the existing Ghorawari OC project is in operation.

A no. of community development & social welfare measures are being undertaken by WCL authority in the nearby villages which are enclosed as Annexure- XI.

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.

vi Control measures to reduce impact on Flora and Fauna

- The enhancement of forest area will occur due to creation of green cover.
- This project is not likely to have any impact on diversity of flora & fauna species within terrestrial and aquatic habitats.
- WCL in association with local people will make all efforts to conserve the flora & fauna in the immediate surrounding of the mine area.
- Mine water is being discharged only after suitable treatment to natural water course. So ,no adverse impact on downstream aquatic life of surface water courses is expected.
- Improved blasting techniques are being used to minimise the noise & ground vibrations.

vii. Occupational Health & Safety

The circulars and orders of DGMS including the rules and regulations under Mines Act are being adhered to in respect of occupational health and safety . However , some measures regarding occupational health and safety are :

a. Water spraying .

b. Periodical medical examination of work force.

c. First aid facilities.

d. Refresher training to workforce as per statute.

5.0 DISASTER MANAGEMENT PLAN

Mining is a hazardous industry. There is risk to life and property associated with various mining and allied activities of the project. 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.

i. Safety aspects for outsourcing/hiring of HEMM

Special precaution should be taken while deploying workers in the mine. Before employing any labour to the mine proper vocational training should be imparted and recommendations of VIII Safety Conference should be strictly followed. Terms and conditions shall be fixed by management for deployment of labours by leaser of HEMM as well as machineries.

ii. Model traffic rules for HEMM & Light Vehicles

Suitable traffic rules as per recommendations of VII Safety Conference may be framed by Manager and implemented to ensure safe operation of dumpers, light vehicles and other HEMM deployed in the project.

iii. Precaution against Fire

(a) Wild or herbaceous plants shall be removed from the mine.

(b) No person shall deposit heated material or ashes on any opencast working. Also no person shall light a fire or permit a fire to be lighted in any OC working except by the permission in writing of the Manager and only for a special purpose specified therein.

(c) No coal shall be left exposed in coal benches more than its incubation period to avoid fire in seam due to spontaneous heating.

(d) Proper type of the extinguisher to be kept in each HEMM ready for use in case of emergency.

In coal stock coal shall be dispatched on the basis of first in first out.

iv. General Lighting

The standards of lighting to be provided in opencast coal mines during working hours at different places or areas where natural light is not sufficient has been specified in notification as GSR 804 Dt.18.6.75 [Cir(legis)1/1976] under regulation 154 of CMR 1957. The standards are summarized below.

Sl.No.	Location	Minimum standard of illumination (LUX)	Level of which illumination is to be provided.
1.	Operational area of Dragline & Shovel	5 10	Horizontal Vertical
2.	Operational area of drills	10	Vertical
3.	Operators cabin of shovel, dragline drill etc	30	Horizontal
4.	Dumper haul road	0.5 to 3.0	Horizontal
5.	OB & Coal Dumps	3.0	Horizontal
6.	Roadways & foot path from bench to bench	3.0	Horizontal
7.	Coal handling plant, workshop & service buildings	As per BIS Specification	

Lighting near the faces and haul road may be arranged by cluster of higher pressure sodium vapour lamps located on the top of an adjustable telescopic mast, mounted on a platform with rubber tyre which or skids and having portable diesel generating set so that same can be used in emergency.

v. Dust Suppression

For suppression of dust water sprinkler has been provided. Suppression of mine dust may be done by using puller bond & dust bond, for methodology of application DGMS Circular No. 8 of 1997 may be referred.

vi. Precautions against Surface Water

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.

(a) Provisions of garland drains around mine quarry are made. This will prevent surface run-off entering the mine pit. In order to divert the rain water 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

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

vii. Slope Stability

It is suggested that following action may be taken to deal with slope stability problem.

a) Vulnerable area may be identified and marked on quarry plan

b) Observation of actual alignment of fault, its throw, joints, etc. may be recorded during the process of exploitation.

c) Water drainage system may be properly implemented to prevent accumulation of water in cracks. Also dumps shall be leveled to prevent accumulation of water over it. Proper drainage in dumps shall be also provided to prevent erosion to toe of dump.

d) Regular monitoring of tension cracks, horizontal and vertical movement of strata in critical area may be done.

e) Rise side slope to be reinforced if required because it has to stand through out quarry life. No dumps/surface structures to be located within 15 m of quarry edge, as it will act as surcharge there by destabilizing the slope.

f) No undercutting of slopes to be done

g) Proper hydro geological studies to be done if water table is at level of slope it should be brought down by using submersible pumps to prevent hydrostatic pressure.

h) Proper selection of site for dumping to be done before dumping place shall be made free from loose material. Dumping shall not be done at an angle more than angle of repose of material being dumped.

i) After completion of dumping operations dumps to be stabilized by growing

vegetation.

viii. Height & Width of benches & Manner of Extraction

a) Height of benches (both in coal & OB) shall in no case be more than cutting/digging height of excavation.

b) Width of bench is coal & OB shall not be less than:
Widest equipment + 5m
Height of bench Or 3x largest dumper's width
Width of bench adopted as the maximum value amongst (a) & (b)

c) Each cycle of operation shall consist removal of overburden followed by extraction of the exposed coal. After extraction of coal no body shall be employed/no work to be done at any of the benches or bottom of quarry till benches in OB & coal are provided again from top downwards and coal is again exposed.

ix Miscellaneous Provisions

a. HEMM deployed in the project have been equipped with suitable inbuilt safety devices like audio-visual alarm, fire extinguishers etc.

b. Fencing should be erected around quarry surface, dumps etc. so that entry to unauthorized persons is checked.

c. Emergency Response Plan has been prepared by Manager as per Statute & mock rehearsal is being done regularly.

d. Monsoon preparation shall be done in project in advance each year. All provisions regarding storage, transport & use of explosive as per statute shall be strictly followed.

e. In addition special precautionary measures as per statute will be taken while working this mine, as the method involves quarrying the already developed pillars of underground workings.

x. Conservation

Although for calculation of mineable coal reserve 10% mining losses has been taken into account, but in practice all efforts would be made to minimize the losses.

All efforts shall be taken to reduce carpet loss on floor of quarry, loss of coal in each contact zones and to reduce pilferage of coal while transporting it from coal face to coal stockyard.

6.0 MONITORING & MANAGEMENT ORGANISATION

Close monitoring of the environment and implementation of various protective measures discussed in the report forms an important part of EMP. In the earlier paragraphs the causes of various pollutions along with the preventive and mitigative measures have been discussed. In this paragraph monitoring organization is being discussed.

Monitoring Organisation

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

WCL (HQ) acts as an apex body, which monitors the activities relating to environment at project level through the Chief General Manager.

Chief General Manager of the area co-ordinates the activities of various disciplines in the area to render all necessary assistance at the implementing level i.e. the Project. Nodal Officer (Environment) of the area monitors all aspects of environment on behalf of the Chief General Manager.

He also takes suitable steps for generation of environmental data along with CMPDI team for its analysis and interpretations. Plantation is being done on a large area. At present it is implemented through State Forest Deptt. The horticulturist along with the Supervisor shall only monitor and guide the agency for selection of site, treatment of soil and selection of species.

Project Officer, Ghorawari OC is primarily responsible for reclamation of the mined out area. He shall also be responsible for biological reclamation with the assistance of CGM's office.

7.0 ENVIRONMENTAL COST

S.No.		Capital Cost		Annual recurring cost	
		Existing	Proposed	Existing	Proposed
1.	Pollution Control (Separately provide break-up)	2.0 Lakhs	----	2.0 Lakhs	To be continued
2.	Pollution Monitoring (Separately provide break-up)	---	---	2.0 Lakhs	To be continued
3.	Occupational Health	In built in the project cost			
4.	Green Belt ▪ Mine ▪ Township	---	---	55.00 Lakhs	Based on the programme
5.	Reclamation/Rehabilitation of mined out area	In built in as per programme			
6.	Others	---			--
Total		2.0 Lakhs	---	59.00 Lakhs	---

Rs.3.00 / t has been kept under revenue head to cater for :-

i. Plantation
ii. Env. Monitoring / Env. Statement
iii. Socio-economic welfare measures
iv. Misc. Pollution Control Measures
v Compliance for statutory obligations like Consent fees , Water Cess payment , Authorization etc.

8.0 MINE CLOSURE PLANNING

i. 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:

To allow a productive and sustainable after-use of the site which is acceptable to the mine owner and the regulatory authority;

To protect public health and safety;

To alleviate or eliminate environmental damage and thereby encourage environmental sustainability;

To minimize adverse socio-economic impacts.

ii. 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.

iii. 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:

- Health & Safety: Regulation Nos. 6, 61, 106, 112 of Coal Mines Regulations, 1957 and its related DGMS Circulars;
- Environment Water (Prevention & Control of Pollution) Act, 1974;
- Air (Prevention & Control of Pollution) Act, 1981;
- Environmental (Protection) Act, 1986 and Environmental Protection (Amendment) Rule, 2000;
- DGMS Directives on Noise & Ground Vibration;
- Forest (Conservation) Act, 1980 – Not applicable in this project.
- Rehabilitation

CIL's policy -Not applicable in this project.
- Decommissioning/asset disposal, etc.

iv. Impact Assessment Remedial Measures

Environmental Impact on Landscape, Water Source, air and noise pollution during mine life has been discussed earlier. It is imperative that the environmental monitoring may be continued for 1-2 years after closure of patch Mines in order to assess corrective measures to be implemented to sustain pre-mining ecosystem and environment in the core and buffer zone (to the extent possible).

v. Stakeholders Involvement

Various stakeholders effected due to mine closure need to be identified and they may be as follows :

The Company : Employees, Management & Stakeholders

The Community : Local business and service providers, landholders, neighbours and nearby residents, local Government and NGOs and Community Groups.

The State : The State Government. The Central Government and concerned Government Agencies.

There is need of regular consultations between the stakeholders to evolve the needs of the stakeholders and their involvement in the process.

vi. 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.

LIST OF ANNEXURE

ANNEXURE - I

List of Flora and Fauna of Ghorawari OC mine of Kanhan Area

Table no. 1 Flora and Vegetation

1.1 Top Storey of the Flora - Trees

Family name	Botanical name	Local name	Core zone	Buffer zone
Caesalpinaceae	*Bauhinia racemosa*	Apta	+	+
Caesalpinaceae	*Cassia siamea*		-	+
	C. fistula	Bahawa (Amaltas)	+	+
	Tamarindus indica	Chinch (Imli)	+	+
Simaroubaceae	*Ailanthus excelsa*	Maharukh	-	+
Combretaceae	*Anogiessus latifolia*	Dhawda	+	+
	Terminalia alata	Ain	-	+
Ebenaceae	*Diospyros melanoxylon*	Tendu	+	+
Euphorbiaceae	*Putranjiva roxburgii*	Putranjava		
	Phyllanthus emblica	Awla	+	+
Fabaceae	*Butea monosperma*	Palas	+	+
	Dalbergia paniculata	Dhobin	+	+
	D. sisso	Sisam	-	+
	Erythrina variegata	Kasai	+	+
	Pongamia pinnata	Karanj	-	+
	Pterocarpus marsupium	Bija	+	+
Meliaceae	*Azadirachta indica*	Neem	+	+
	Melia azadirachta	Bako Neem	+	+
	Soymida febrifuga	Rohan	+	+
Mimosaceae	*Acacia auriculiformis*	Australian Babul	+	+
	A. catechu	Khair	-	+
	A. leucophloea	Hiwar	+	+
	A. nilotica	Babul Australian	+	+
	A.concina	Shikakai	-	
	Leucaena leucocephala	Subabul	+	+
	Prosopis cineraria	Shami	+	+
Moraceae	*Artocarpus tintorius*	Phanas	-	
	Ficus benghalensis	Wad	+	+
	F. religiosa	pipal	+	+
Moringaceae	*Moringa critifolia*	Aal	+	+
Myrtaceae	*Syzygium cumini*	Jambhul/jamun	+	+
Rhamnaceae	*Zizyphus mauritiana*	Bor/ber	-	+
Rutaceae	*Citrus aurantium*	Santra	-	+
	C.aurantifolia	Limbu	+	+
	Limonia acidissima	Kwath	+	+
Sapotaceae	*Madhuca longifolia*	Mohwa	+	+
Verbenaceae	*Tectona grandis*	Sagwan	+	+

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1.2 Middle Story of the Flora - Shrub

Family name	Botanical name	Local name	Core zone	Buffer zone
Annonaceae	Artrabotrys hexapetalous	Hirwa chapa	-	+
Apocynaceae	*Taberna montana coronaria*	Tagar	-	+
Euphorbiaceae	*Jatropa curcus*	Chandrajyoti	+	+
	J. gossypifolia	Ratanjyoti	+	-
Moraceae	*Morus alba*	Shahtut	+	-
Rhamnaceae	*Ventilago denticulata*	Lokhandi	+	+
	Zizyphus jujuba	Bhor	+	+

1.3 Lower Story of Flora - Herbs

Herbs				
Family name	Botanical name	Local name	Core zone	Buffer zone
Acanthaceae	*Andrographis paniculata*	Bhui neem	+	+
Amaranthaceae	*Achyranthus aspera*		+	+
	A. spinosa	Kate chawli	+	+
Compositae	*Parthenium hysterophorus*	Gajar gawat	+	+
Euphorbiaceae	*Euphorbia hirta*	Dhudhi	+	+
Laminaceae	*Hyptis suaveolens*	N/a	+	+
	Leonitis nepatifolia		+	+
	Leucas biflora		+	+
Mimosaceae	*Mimosa pudica*	Lajavanti	+	+
Solanaceae	*Solanum noctrum*			
	Datura metal	Kala dhotra	+	+
Graminae	*Cynodon dactylon*	Durva/haialli/doob	+	-

Climbers				
Cuscutaceae	*Cuscuta reflexa*	Amar vel	+	+
Convolvulaceae	*Ipomoea quimoquit*		+	+
Cucurbitaceae	*Momordica charantia*	Karela	+	-
	Citrullus lanatus	Tarbooz	+	+
	Cucumis sativus	Kakdi	+	+
Oleaceae	*Jasminum officinale*	Chameli	+	+
Periplocaceae	*Cryptolepis buchanani*	Dhdhi	+	+

1.4 Agricultural crops

Family name	Botanical name	Local name	Core zone	Buffer zone
Malvaceae	*Abelmoschus esculentus*	Bhendi	-	+
Apiaceae	*Coriander sativum*	Dhaniya	-	+
Cucurbiataceae	*Cucurbita pepo*	Kaddu	-	+
Fabaceae	*Cajanus cajan*	Tuar	-	+
	Phaseolus mungo	Mung	+	+
	Dolichus lablab	Semi	-	+

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Graminae	*Zey mays*	Makkha	-	+
Linaceae	*Linum usitatissimum*	Jawas	+	+
Solanaceae	*Solanum melangana*	Bengan	+	+
	Capsicum annum	Mirchi	-	+
	Lycopersicon lycopersicom	Tomato	-	+

1.5 Aquatic plants

Family name	Botanical name	Local name	Core zone	Buffer zone
Convolvulaceae	Ipomoea aquatica		-	+
Graminae	C[illegible] aquatica		-	+

1.6 Agroforestry species

Family name	Botanical name	Local name	Core zone	Buffer zone
Bombacaceae	Bombax ceba	Katesawari	+	+
Caesalpinaceae	*Tamarindus indica*	Imli	+	+
Combretaceae	*Terminalia arjuna*	Arjun	+	+
Euphorbiaceae	*Phyllanthus emblica*	Awla	+	+
Fabaceae	*Crotolaria juncea*	Jute	+	+
	Dalbergia sisso	Shesam	+	+
	Pongamia pinnata	Karanj	+	+
Graminae	*Bambusa arundinacea*	Bamboo	+	+
Meliaceae	*Azadirachta indica*	Neem	+	+
Mimosaceae	*Acacia catechu*	Khair	+	+
Mimosaceae	*Acacia auriculiformis*	Vilayati Babool	+	+
	Albizia lebeck	Shirish	+	+
Myrtaceae	*Syzygium cumini*	Amrud	+	+
Moraceae	*Artocarpus integrifolius*	Phanas	+	+
Nyctageniaceae	*Nyctanthus arbortristis*	Parijat	+	+
Rhamnaceae	*Zizyphus jujuba*	Bhor	+	+
Simaroubiaceae	*Alianthus excelsa*	Maharukh		-
Verbenaceae	*Tectona grandis*	Sagwan	+	+
Anacardiaceae	*Mangifera indica*	Amba	+	+

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Table-2 - Fauna of Ghorawari OC

2.1 Mammals

Zoological name	Common name	(Protection) Act. 1972	Core zone	Buffer zone
Presbytis	Common Langoor	Shedule-II, Part I,	+	+
Canis aureus	Jackal	Shedule-II, Part II,	+	+
Herpestes	Indian Grey Mongoose	Shedule-IV, section	+	+
Felis chaus	Jungle cat	Shedule-II, Part II,	+	+
Boselaphus	Nilgai	Shedule-III, section	+	+
Rattus rattus	House Rat	Shedule-V, section	+	+
Bandicota	Indian Mouse	Shedule-V, section	+	+

2.2 Fishes

Channa punefatus	Maral	Not Applicable	-	+
Clarias batrachus	Mangur	Not Applicable	-	+
Catla catla	Katla	Not Applicable	-	+

2.3 Birds

Apus affinis	House swift	Shedule-IV, section	-	+
Ardea purpurea	Bhagule	Shedule-IV, section	-	+
Eudynamys scolopa	Koel	Shedule-IV, section	+	+
Carvus splendens	Kavvwa	Shedule-V, section	-	+
Columbia livia	Kabutar	Shedule-IV, section	+	+
Galles gallus	Jungli Mrugi	Shedule-IV, section	+	+
Pavo cristatus	Peafowl	Shedule-I, Part III,	-	+
Vanellus indicus	Titavi	Shedule-IV, section	+	+
Centropus	Bhardwaj	Shedule-IV, section	-	+
Prodiceps	Pandubi	Shedule-IV, section	-	-

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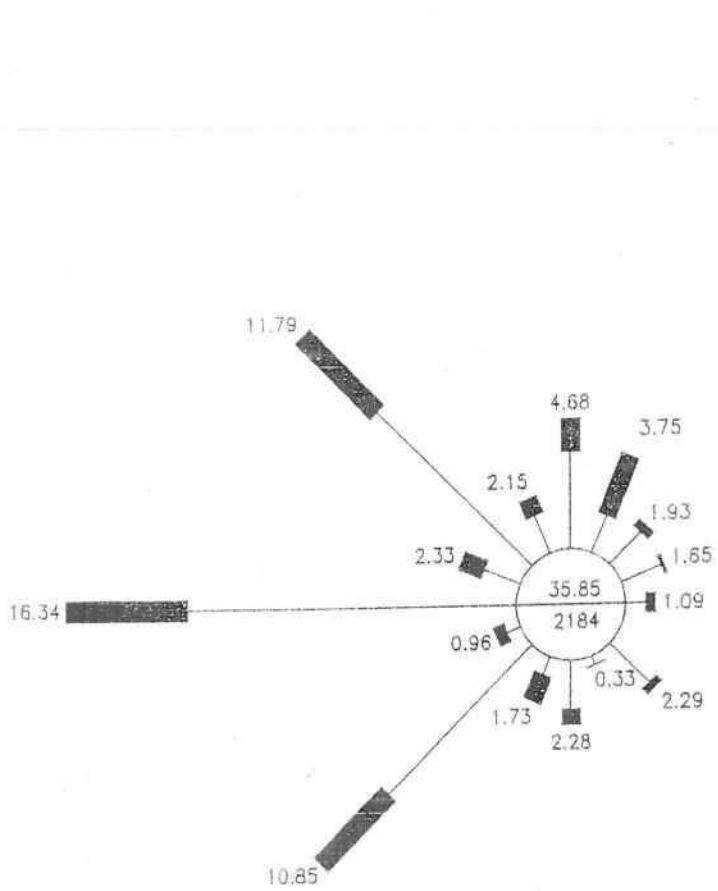
FIG-3 : SEASONAL WINDROSE

PROJECT : GHORAWARI OCM
LOCATION : GHORAWARI VILLAGE

SEASON : SUMMER 2006
PERIOD : APRIL – JUNE 2006



SCALE : 1 CM = 2.5%

(NOS. IN PERCENTAGE)

WIND VELOCITY (KMPH)

% CALM / NO. OF OBS.

<1.0 1-5 5-11 11-19

R & C

ANNEXURE - III

AIR QUALITY DATA

Location : Core zone (A1)

Season : Summer 2006
Period : April '06 - June'06

Unit: µg/m^3

WEEK	DATE	SPM (24 Hrly)	RPM (24 Hrly)	SO2 Ist Shift	NOx Ist Shift	SO2 II-Shift	NOx II-Shift	SO2 III-Shift	NOx III-Shift	SO2 24-hrly	NOx 24-hrly	CO (24-hrly)
I	06/07.04.2006	346	116	8.5	13.8	8.8	14.1	8.0	12.2	8.4	13.4	<114.5
	07/08.04.2006	336	112	8.9	14.1	9.2	14.0	8.6	13.3	8.9	13.8	<114.5
II	13/14.04.2006	352	121	9.2	14.6	9.5	14.7	8.7	13.6	9.1	14.3	<114.5
	14/15.04.2006	338	115	8.5	13.9	8.8	14.3	8.2	13.0	8.5	13.7	<114.5
III	20/21.04.2006	346	117	8.7	13.1	8.9	13.8	8.0	12.4	8.5	13.1	<114.5
	21/22.04.2006	366	126	8.2	12.9	8.5	13.1	7.9	11.6	8.2	12.5	<114.5
IV	27/28.04.2006	358	122	8.6	12.0	8.8	12.5	8.1	10.9	8.5	11.8	<114.5
	28/29.04.2006	345	119	8.9	13.1	9.1	13.3	8.6	12.2	8.9	12.9	<114.5
V	04/05.05.2006	336	111	9.3	13.6	9.4	14.0	8.7	12.8	9.1	13.5	<114.5
	05/06.05.2006	342	116	9.1	13.4	9.3	13.8	8.6	12.6	9.0	13.3	<114.5
VI	11/12.05.2006	372	126	8.9	13.0	9.2	13.5	8.4	11.7	8.8	12.7	<114.5
	12/13.05.2006	386	128	9.5	14.1	9.6	14.1	8.9	12.6	9.3	13.6	<114.5
VII	18/19.05.2006	395	129	9.4	14.0	9.7	14.3	8.7	12.6	9.3	13.6	<114.5
	19/20.05.2006	386	125	9.7	14.3	9.9	14.6	8.5	12.7	9.4	13.9	<114.5
VIII	25/26.05.2006	349	118	9.6	13.8	9.8	14.1	8.6	12.2	9.3	13.4	<114.5
	26/27.05.2006	334	115	8.2	13.2	8.6	13.8	8.4	12.0	8.4	13.0	<114.5
IX	01/02.06.2006	391	132	9.5	14.1	9.4	14.3	8.7	13.3	9.2	13.9	<114.5
	02/03.06.2006	375	129	9.2	13.9	9.3	14.2	8.5	12.7	9.0	13.6	<114.5
X	08/09.06.2006	354	124	9.0	12.5	9.2	13.2	8.3	12.0	8.8	12.6	<114.5
	09/10.06.2006	335	116	8.7	12.7	9.0	13.1	8.1	12.2	8.6	12.7	<114.5
XI	15/16.06.2006	348	117	8.3	12.3	8.9	12.9	8.0	11.9	8.4	12.4	<114.5
	16/17.06.2006	328	109	8.5	12.5	8.7	12.8	7.9	11.7	8.4	12.3	<114.5
XII	22/23.06.2006	322	105	8.1	12.6	8.2	12.9	7.6	11.5	8.0	12.3	<114.5
	23/24.06.2006	330	109	8.3	12.7	8.6	12.8	7.9	11.5	8.3	12.3	<114.5

ANNEXURE -III

AIR QUALITY DATA

Season : Summer 2006

Location : Rawarkhurd (A2)

Period : April '06 - June '06

Unit: µg/m³

WEEK	DATE	SPM (24 Hrly)	RPM (24 Hrly)	SO2 Ist Shift	NOx Ist Shift	SO2 II-Shift	NOx II-Shift	SO2 III-Shift	NOx III-Shift	SO2 24-hrly	NOx 24-hrly	CC (24 hrly
I	06/07.04.2006	95	29	4.1	7.2	4.2	7.3	4.0	6.8	4.1	7.1	<114
	07/08.04.2006	101	31	4.5	7.6	4.7	7.5	4.2	6.5	4.5	7.2	<114
II	13/14.04.2006	98	30	4.6	7.8	4.6	7.9	4.4	6.7	4.5	7.5	<114
	14/15.04.2006	94	28	5.0	8.2	5	8.3	4.8	7.2	4.9	7.9	<114
III	20/21.04.2006	105	32	4.8	7.6	4.9	7.7	4.6	6.8	4.8	7.4	<114
	21/22.04.2006	104	30	4.9	8.3	4.6	8.4	4.7	7.4	4.7	8.0	<114
IV	27/28.04.2006	96	28	4.5	7.6	4.6	7.7	4.3	7.1	4.5	7.5	<114
	28/29.04.2006	92	26	4.2	7.5	4.3	7.6	4.0	6.8	4.2	7.3	<114
V	04/05.05.2006	105	29	4.0	7.2	4.2	7.3	4.0	6.9	4.1	7.1	<114
	05/06.05.2006	116	31	4.3	7.8	4.5	7.9	4.2	7.3	4.3	7.7	<114
VI	11/12.05.2006	105	28	4.2	7.5	4.3	7.5	4.1	7.4	4.2	7.5	<114
	12/13.05.2006	112	33	4.1	7.6	4.1	7.7	4.0	6.8	4.1	7.4	<114
VII	18/19.05.2006	124	29	4.6	7.1	4.6	7.2	4.3	6.4	4.5	6.9	<114
	19/20.05.2006	108	26	4.7	6.9	4.8	7.1	4.6	6.5	4.7	6.8	<114
VIII	25/26.05.2006	96	24	4.9	6.7	4.9	6.9	4.5	6.3	4.8	6.6	<114
	26/27.05.2006	90	27	5.1	7.8	5.2	7.9	4.8	7.2	5.0	7.6	<114
IX	01/02.06.2006	86	28	5.4	8.1	5.4	8.2	4.7	7.5	5.2	7.9	<114
	02/03.06.2006	82	26	5.7	7.6	5.8	7.3	5.2	7.4	5.6	7.4	<114
X	08/09.06.2006	94	22	4.9	7.8	4.9	7.9	4.6	7.2	4.8	7.6	<114
	09/10.06.2006	92	24	5.1	6.8	5.3	6.9	4.7	6.5	5.0	6.7	<114
XI	15/16.06.2006	86	22	5.3	7.1	5.6	7.2	5.0	6.8	5.3	7.0	<114
	16/17.06.2006	94	23	5.0	6.5	5.2	6.8	4.7	6.3	5.0	6.5	<114
XII	22/23.06.2006	88	24	4.8	6.3	4.9	6.3	4.6	6.0	4.8	6.2	<114
	23/24.06.2006	82	26	4.6	6.7	4.9	6.3	4.4	6.2	4.6	6.4	<114

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ANNEXURE - III

AIR QUALITY DATA

Season : Summer 2006
Period : April '06 - June '06

Location : Dungariya (A3)

Unit: $\mu g/m^3$

WEEK	DATE	SPM (24 Hrly)	RPM (24 Hrly)	SO2 Ist Shift	NOx Ist Shift	SO2 II-Shift	NOx II-Shift	SO2 III-Shift	NOx III-Shift	SO2 24-hrly	NOx 24-hrly	CO (24-hrly)
I	06/07.04.2006	116	38	4.4	7.8	4.7	7.9	4.2	7.6	4.4	7.8	<114.5
	07/08.04.2006	105	34	4.8	8.1	4.9	8.3	4.6	7.9	4.8	8.1	<114.5
II	13/14.04.2006	96	32	4.5	7.9	4.6	8.3	4.3	7.5	4.5	7.9	<114.5
	14/15.04.2006	85	31	4.3	7.5	4.7	7.6	4.2	7.4	4.4	7.5	<114.5
III	20/21.04.2006	96	33	4.4	7.2	4.9	7.4	4.5	7.0	4.6	7.2	<114.5
	21/22.04.2006	108	36	4.7	7.8	5.0	8.3	4.6	7.6	4.8	7.9	<114.5
IV	27/28.04.2006	100	34	4.8	8.4	4.9	8.6	4.5	7.9	4.7	8.3	<114.5
	28/29.04.2006	94	31	4.9	7.6	5.2	7.9	4.2	7.2	4.8	7.6	<114.5
V	04/05.05.2006	85	28	4.5	7.8	4.8	8.0	4.3	7.4	4.5	7.7	<114.5
	05/06.05.2006	100	31	4.2	7.0	4.5	7.4	4.0	6.9	4.2	7.1	<114.5
VI	11/12.05.2006	91	28	4.6	7.5	4.9	7.7	4.5	7.1	4.7	7.4	<114.5
	12/13.05.2006	94	24	4.7	7.6	4.8	7.9	4.4	7.1	4.6	7.5	<114.5
VII	18/19.05.2006	82	26	5.1	8.3	5.3	8.5	4.8	7.6	5.1	8.1	<114.5
	19/20.05.2006	88	27	4.9	7.6	5.2	7.8	4.7	7.2	4.9	7.5	<114.5
VIII	25/26.05.2006	76	26	5.3	8.6	5.6	8.7	4.7	7.9	5.2	8.4	<114.5
	26/27.05.2006	81	26	5.7	9.1	5.8	9.2	5.1	8.4	5.5	8.9	<114.5
IX	01/02.06.2006	103	31	4.8	8.4	5.3	8.8	4.4	8.0	4.8	8.4	<114.5
	02/03.06.2006	114	34	5.3	7.9	5.6	8.2	4.8	7.5	5.2	7.9	<114.5
X	08/09.06.2006	82	29	5.6	8.3	5.7	8.4	4.7	7.0	5.3	7.9	<114.5
	09/10.06.2006	84	28	5.1	8.1	5.3	8.2	4.8	7.6	5.1	8.0	<114.5
XI	15/16.06.2006	76	31	4.9	7.6	5.0	7.9	4.4	7.2	4.8	7.6	<114.5
	16/17.06.2006	92	30	4.7	7.4	4.9	7.5	4.3	6.8	4.6	7.2	<114.5
XII	22/23.06.2006	95	32	5.0	7.8	5.3	7.9	4.8	6.5	5.0	7.4	<114.5
	23/24.06.2006	81	33	4.7	7.5	4.9	7.8	4.6	6.9	4.7	7.4	<114.5

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ANNEXURE -III

AIR QUALITY DATA

Season : Summer 2006
Period : April '06 - June'06

Location : Kola (A4)

Unit: µg/m³

WEEK	DATE	SPM (24 Hrly)	RPM (24 Hrly)	SO2 Ist Shift	NOx Ist Shift	SO2 II-Shift	NOx II-Shift	SO2 III-Shift	NOx III-Shift	SO2 24-hrly	NOx 24-hrly	CO (24-hrly)
I	06/07.04.2006	94	35	4.8	8.6	4.9	8.9	4.5	8.6	4.7	8.7	<114.5
	07/08.04.2006	105	38	5.2	9.0	5.3	9.3	4.7	9.2	5.1	9.2	<114.5
II	13/14.04.2006	100	37	4.8	8.7	5.1	8.9	4.6	8.7	4.8	8.8	<114.5
	14/15.04.2006	96	34	4.7	8.6	5.0	8.7	4.4	8.5	4.7	8.6	<114.5
III	20/21.04.2006	84	32	5.3	9.3	5.4	9.1	5.1	9.2	5.3	9.2	<114.5
	21/22.04.2006	95	34	5.4	9.7	5.6	9.8	5	9.0	5.3	9.5	<114.5
IV	27/28.04.2006	115	38	4.8	9.2	5.0	9.4	4.7	8.6	4.8	9.1	<114.5
	28/29.04.2006	124	41	4.7	9.3	4.9	9.3	4.2	8.4	4.6	9.0	<114.5
V	04/05.05.2006	118	39	4.9	9.8	5.2	9.9	4.8	8.6	5.0	9.4	<114.5
	05/06.05.2006	112	36	5.1	10.1	5.4	10.4	5	9.2	5.2	9.9	<114.5
VI	11/12.05.2006	106	34	4.7	8.9	5.1	9.2	4.6	8.4	4.8	8.8	<114.5
	12/13.05.2006	95	32	4.9	9.1	4.9	9.2	4.7	8.7	4.8	9.0	<114.5
VII	18/19.05.2006	98	33	4.6	9.6	4.9	9.7	4.3	8.2	4.6	9.2	<114.5
	19/20.05.2006	88	31	5.1	9.2	5.3	9.4	4.7	7.6	5.0	8.7	<114.5
VIII	25/26.05.2006	105	36	5.6	9.4	5.7	9.6	5.1	8.1	5.5	9.0	<114.5
	26/27.05.2006	101	35	5.6	9.4	5.8	9.7	5.2	8.4	5.5	9.2	<114.5
IX	01/02.06.2006	94	32	5.4	9.2	5.6	9.4	5	8.2	5.3	8.9	<114.5
	02/03.06.2006	107	35	5.7	10.3	5.8	10.4	5.1	9.4	5.5	10.0	<114.5
X	08/09.06.2006	115	37	5.2	10.1	5.3	10.2	5.1	8.9	5.2	9.7	<114.5
	09/10.06.2006	112	38	4.9	9.6	5.1	9.7	4.6	8.4	4.9	9.2	<114.5
XI	15/16.06.2006	104	37	4.7	9.6	4.9	9.8	4.7	8.1	4.8	9.2	<114.5
	16/17.06.2006	92	34	5.0	9.2	5.3	9.3	5.00	8.0	5.1	8.8	<114.5
XII	22/23.06.2006	104	38	4.9	8.9	5.1	9.1	4.7	7.6	4.9	8.5	<114.5
	23/24.06.2006	110	39	5.3	9.3	5.4	9.4	5.1	8.2	5.3	9.0	<114.5

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ANNEXURE-III

AIR QUALITY DATA

Season : Summer 2006
Period : April '06 - June'06

Location : Danuja (A5)

Unit: $\mu g/m^3$

WEEK	DATE	SPM (24 Hrly)	RPM (24 Hrly)	SO2 Ist Shift	NOx Ist Shift	SO2 II-Shift	NOx II-Shift	SO2 III-Shift	NOx III-Shift	SO2 24-hrly	NOx 24-hrly	CO (24-hrly)
I	06/07.04.2006	108	36	5.5	8.4	5.7	8.8	5.2	8.0	5.5	8.4	<114.5
	07/08.04.2006	116	38	5.1	8.8	5.3	9.0	5.1	8.7	5.2	8.8	<114.5
II	13/14.04.2006	129	39	5.2	9.1	5.2	9.4	5	8.6	5.1	9.0	<114.5
	14/15.04.2006	132	35	5.6	8.7	5.4	9.1	5.4	8.2	5.5	8.7	<114.5
III	20/21.04.2006	126	32	5.2	8.4	5.3	8.8	5	8.2	5.2	8.5	<114.5
	21/22.04.2006	120	30	5.9	8.3	6.1	8.6	5.6	8.1	5.9	8.3	<114.5
IV	27/28.04.2006	105	31	5.2	9.0	5.4	9.2	5.1	8.6	5.2	8.9	<114.5
	28/29.04.2006	134	36	6.1	9.5	6.3	9.6	5.8	9.4	6.1	9.5	<114.5
V	04/05.05.2006	126	34	5.8	9.3	5.9	9.5	5.6	9.0	5.8	9.3	<114.5
	05/06.05.2006	119	33	5.2	8.8	5.4	9.4	5.1	8.4	5.2	8.9	<114.5
VI	11/12.05.2006	121	30	5.6	8.9	5.8	9.2	5.4	8.6	5.6	8.9	<114.5
	12/13.05.2006	130	32	6.3	9.1	6.2	9.5	5.8	8.8	6.1	9.1	<114.5
VII	18/19.05.2006	125	31	6.5	9.5	6.6	9.9	6.2	9.1	6.4	9.5	<114.5
	19/20.05.2006	116	30	6.0	10.1	6.1	10.4	5.8	9.4	6.0	10.0	<114.5
VIII	25/26.05.2006	110	29	5.8	9.6	5.9	9.9	5.4	9.2	5.7	9.6	<114.5
	26/27.05.2006	108	27	5.7	9.4	6	9.4	5.3	9.0	5.7	9.3	<114.5
IX	01/02.06.2006	102	29	5.3	9.3	5.7	9.4	5.2	9.1	5.4	9.3	<114.5
	02/03.06.2006	94	27	5.0	9.0	5.4	9.2	5.1	9.0	5.2	9.1	<114.5
X	08/09.06.2006	100	31	5.3	8.4	5.6	8.9	5.0	8.3	5.3	8.5	<114.5
	09/10.06.2006	103	29	5.2	8.9	5.5	8.8	5.3	8.4	5.3	8.7	<114.5
XI	15/16.06.2006	95	29	5.0	9.1	5.3	9.3	5.1	8.6	5.1	9.0	<114.5
	16/17.06.2006	98	28	4.9	8.4	5.1	8.6	4.6	8.1	4.9	8.4	<114.5
XII	22/23.06.2006	103	32	5.3	8.6	5.5	8.7	5	8.2	5.3	8.5	<114.5
	23/24.06.2006	108	34	5.6	8.7	5.8	9.0	5.1	8.4	5.5	8.7	<114.5

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ANNEXURE -III

AIR QUALITY DATA

Location :Muyari (A6)

Season : Summer 2006
Period : April '06 - June'06

Unit: µg/m^3

WEEK	DATE	SPM (24 Hrly)	RPM (24 Hrly)	SO2 Ist Shift	NOx Ist Shift	SO2 II-Shift	NOx II-Shift	SO2 III-Shift	NOx III-Shift	SO2 24-hrly	NOx 24-hrly	CO (24-hrl
I	06/07.04.2006	104	36	5.1	8.9	5.4	9.1	5.0	8.2	5.2	8.7	<114.5
	07/08.04.2006	126	41	5.6	9.4	5.9	9.6	5.2	8.9	5.6	9.3	<114.5
II	13/14.04.2006	125	40	5.4	8.8	5.5	8.9	5.3	8.0	5.4	8.6	<114.5
	14/15.04.2006	116	38	5.3	9.2	5.4	9.2	5.0	8.4	5.2	8.9	<114.5
III	20/21.04.2006	110	37	4.7	8.1	5.1	8.8	4.9	7.6	4.9	8.2	<114.5
	21/22.04.2006	105	34	4.9	8.3	5.3	9.0	4.5	7.9	4.9	8.4	<114.5
IV	27/28.04.2006	123	38	5.1	8.6	5.5	8.7	5.0	8.1	5.2	8.5	<114.5
	28/29.04.2006	112	37	5.4	8.9	5.7	9.2	5.2	8.4	5.4	8.8	<114.5
V	04/05.05.2006	108	36	5.9	9.2	5.9	9.4	5.6	8.6	5 8	9.1	<114.5
	05/06.05.2006	105	35	6.1	9.9	6.0	10.3	5.8	9.2	6.0	9.8	<114.5
VI	11/12.05.2006	96	34	5.8	9.2	5.7	9.5	5.6	9.0	5.7	9.2	<114.5
	12/13.05.2006	104	36	5.3	9.4	5.4	9.4	5.2	8.4	5.3	9.1	<114.5
VII	18/19.05.2006	124	38	5.8	10.3	5.9	10.5	5.6	9.3	5.8	10.0	<114.5
	19/20.05.2006	130	42	6.3	10.8	6.5	11.1	5.7	9.7	6.2	10.5	<114.5
VIII	25/26.05.2006	125	38	6.5	11.1	6.4	11.4	6.0	10.0	6.3	10.8	<114.5
	26/27.05.2006	134	44	5.8	10.6	6.0	10.9	5.6	9.4	5.8	10.3	<114.5
IX	01/02.06.2006	142	46	5.2	10.3	5.5	10.5	5.1	9.2	5.3	10.0	<114.5
	02/03.06.2006	136	42	5.4	9.6	5.7	9.7	5.1	8.6	5.4	9.3	<114.5
X	08/09.06.2006	125	38	5.1	9.5	5.2	9.6	5.0	8.1	5.1	9.1	<114.5
	09/10.06.2006	114	37	5.6	8.9	5.7	8.8	5.2	7.6	5.5	8.4	<114.5
XI	15/16.06.2006	106	34	5.4	8.4	5.5	8.2	5.3	8.2	5.4	8.3	<114.5
	16/17.06.2006	100	35	5.2	8.0	5.4	8.4	5.0	7.4	5.2	7.9	<114.5
XII	22/23.06.2006	96	32	4.9	8.3	5.3	8.6	4.9	7.8	5.0	8.2	<114.5
	23/24.06.2006	87	31	4.7	7.9	4.9	8.3	4.6	7.3	4.7	7.8	<114.5

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ANNEXURE- IV

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC

YEAR : 2006
Q.E. : JUNE

1. Manager Office - Ghorawadi OC : KGOA-1

(24 hourly values in µg/m³)

Month	Dates of Sampling From - To	Parameters SPM	RPM	NOx	SO_2
MAY 2006	23.05.06 - 24.05.06	423.8	141.0	< 6	< 6
JUNE 2006	09.06.06 - 10.06.06	60.4	24.2	< 6	< 6
JUNE 2006	25.06.06 - 26.06.06	43.5	20.1	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000		**600**	**300**	**120**	**120**

2. SAM Office - Ghorawadi : KGOA-2

(24 hourly values in µg/m³)

Month	Dates of Sampling From - To	Parameters SPM	RPM	NOx	SO_2
JUNE 2006	09.06.06 - 10.06.06	88.2	30.5	< 6	< 6
JUNE 2006	26.06.06 - 27.06.06	43.5	23.5	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000		**600**	**300**	**120**	**120**

3. Colony : KGOA-3

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
APR. 2006	23.04.06	-	24.04.06	63.3	30.9	< 6	< 6
MAY 2006	22.05.06	-	23.05.06	80.7	23.2	< 6	< 6
JUNE 2006	09.06.06	-	10.06.06	50.3	30.0	< 6	< 6
JUNE 2006	26.06.06	-	27.06.06	97.2	53.3	< 6	< 6
PERMISSIBLE LIMIT				**200**	**100**	**80**	**80**

4. Panara Village : KGOA-4

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
MAY 2006	23.05.06	-	24.05.06	97.8	27.0	< 6	< 6
JUNE 2006	10.06.06	-	11.06.06	112.4	32.8	< 6	< 6
JUNE 2006	27.06.06	-	28.06.06	176.3	70.8	< 6	< 6
PERMISSIBLE LIMIT				**200**	**100**	**80**	**80**

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC
YEAR : 2006
Q.E. : SEPT.

1. Manager Office - Ghorawadi OC : KGOA-1

(24 hourly values in µg/m^3)

Month	Dates of Sampling From - To	Parameters SPM	RPM	NOx	SO_2
JUL. 2006	10.07.06 - 11.07.06	85.4	56.9	< 6	< 6
JUL. 2006	24.07.06 - 25.07.06	63.2	26.7	< 6	< 6
AUG. 2006	08.08.06 - 09.08.06	40.3	21.9	< 6	< 6
AUG. 2006	24.08.06 - 25.08.06	83.3	41.4	< 6	< 6
SEP. 2006	23.09.06 - 24.09.06	47.3	33.5	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000		**600**	**300**	**120**	**120**

2. SAM Office - Ghorawadi : KGOA-2

(24 hourly values in µg/m^3)

Month	Dates of Sampling From - To	Parameters SPM	RPM	NOx	SO_2
JUL. 2006	09.07.06 - 10.07.06	103.2	64.2	< 6	< 6
JUL. 2006	24.07.06 - 25.07.06	40.1	14.1	< 6	< 6
AUG. 2006	24.08.06 - 25.08.06	29.1	15.2	< 6	< 6
SEP. 2006	22.09.06 - 23.09.06	34.8	26.4	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000		**600**	**300**	**120**	**120**

3. Colony : KGOA-3

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
JUL. 2006	09.07.06	-	10.07.06	51.0	24.9	< 6	< 6
JUL. 2006	23.07.06	-	24.07.06	31.9	24.4	< 6	< 6
AUG. 2006	10.08.06	-	11.08.06	60.3	21.9	< 6	< 6
AUG. 2006	24.08.06	-	25.08.06	40.7	23.7	< 6	< 6
SEP. 2006	10.09.06	-	11.09.06	97.6	47.6	< 6	< 6
SEP. 2006	22.09.06	-	23.09.06	64.6	30.2	< 6	< 6
PERMISSIBLE LIMIT				**200**	**100**	**80**	**80**

4. Panara Village : KGOA-4

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
JUL. 2006	08.07.06	-	09.07.06	23.9	12.6	< 6	< 6
JUL. 2006	24.07.06	-	25.07.06	81.0	53.9	< 6	< 6
AUG. 2006	10.08.06	-	11.08.06	44.7	22.6	< 6	< 6
AUG. 2006	25.08.06	-	26.08.06	32.6	14.9	< 6	< 6
SEP. 2006	11.09.06	-	12.09.06	44.4	34.5	< 6	< 6
SEP. 2006	23.09.06	-	24.09.06	27.7	18.5	< 6	< 6
PERMISSIBLE LIMIT				**200**	**100**	**80**	**80**

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2006
NAME OF THE AREA : KANHAN Q.E. : DEC.
NAME OF THE PROJECT : GHORAWADI OC

1. Manager Office - Ghorawadi OC : KGOA-1

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
NOV. 2006	07.11.06	-	08.11.06	121.8	60.3	< 6	< 6
DEC. 2006	10.12.06	-	11.12.06	133.2	86.9	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				**600**	**300**	**120**	**120**

2. SAM Office - Ghorawadi : KGOA-2

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
NOV. 2006	08.11.06	-	09.11.06	145.6	54.8	< 6	< 6
DEC. 2006	23.12.06	-	24.12.06	128.5	76.9	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				**600**	**300**	**120**	**120**

3. Colony : KGOA-3

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
NOV. 2006	24.11.06	-	25.11.06	178.4	89.6	< 6	< 6
DEC. 2006	23.12.06	-	24.12.06	143.3	70.6	< 6	< 6
PERMISSIBLE LIMIT				**200**	**100**	**80**	**80**

4. Panara Village : KGOA-4

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
NOV. 2006	08.11.06	-	09.11.06	63.9	38.0	< 6	< 6
DEC. 2006	10.12.06	-	11.12.06	122.6	63.0	< 6	< 6
PERMISSIBLE LIMIT				**200**	**100**	**80**	**80**

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC
YEAR : 2007
Q.E. : MAR.

1. Manager Office - Ghorawadi OC : KGOA-1

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
FEB. 2007	22.02.07	-	23.02.07	79.2	42.0	< 6	< 6
MAR. 2007	23.03.07	-	24.03.07	113.0	53.5	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				**600**	**300**	**120**	**120**

2. SAM Office - Ghorawadi : KGOA-2

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
FEB. 2007	09.02.07	-	10.02.07	133.9	64.6	< 6	< 6
MAR. 2007	22.03.07	-	23.03.07	77.9	38.0	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				**600**	**300**	**120**	**120**

3. Colony : KGOA-3

(24 hourly values in µg/m³)

Month	Dates of Sampling From - To	Parameters SPM	RPM	NOx	SO_2
JAN. 2007	06.01.07 - 07.01.07	163.4	72.2	< 6	< 6
JAN. 2007	21.01.07 - 22.01.07	109.6	73.3	< 6	< 6
FEB. 2007	09.02.07 - 10.02.07	176.3	71.4	< 6	< 6
FEB. 2007	23.02.07 - 24.02.07	131.7	74.4	< 6	< 6
MAR. 2007	08.03.07 - 09.03.07	181.4	34.3	< 6	< 6
MAR. 2007	22.03.07 - 23.03.07	166.0	28.2	< 6	< 6
PERMISSIBLE LIMIT		**200**	**100**	**80**	**80**

4. Panara Village : KGOA-4

(24 hourly values in µg/m³)

Month	Dates of Sampling From - To	Parameters SPM	RPM	NOx	SO_2
JAN. 2007	21.01.07 - 22.01.07	140.3	48.2	< 6	< 6
FEB. 2007	10.02.07 - 11.02.07	161.0	70.0	< 6	< 6
FEB. 2007	22.02.07 - 23.02.07	169.1	54.1	< 6	< 6
MAR. 2007	08.03.07 - 09.03.07	175.9	59.8	< 6	< 6
MAR. 2007	23.03.07 - 24.03.07	143.5	55.9	< 6	< 6
PERMISSIBLE LIMIT		**200**	**100**	**80**	**80**

CO MONITORING DATA

(All values are given in µg/m³)

Sl. No.	Monitoring Location	Monitoring Date	Observed Value	NAAQ Standards (1 hour)
1.	Manager office – Jharna UG	08.03.07	< 114.3	10000
2.	SAM office - Ghorawari	08.03.07	< 114.3	10000
3.	Colony	08.03.07	< 114.3	4000
4.	Panara village	08.03.07	< 114.3	4000

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC
YEAR : 2007
Q.E. : JUNE

1. Manager Office - Ghorawadi OC : KGOA-1

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
MAY 2007	24.05.07	-	25.05.07	183	92	< 6	< 6
JUN. 2007	26.06.07	-	27.06.07	247	95	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				**600**	**300**	**120**	**120**

2. SAM Office - Ghorawadi : KGOA-2

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
APR. 2007	05.04.07	-	06.04.07	156	52	< 6	< 6
JUN. 2007	09.06.07	-	10.06.07	228	48	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				**600**	**300**	**120**	**120**

3. Colony : KGOA-3

(24 hourly values in µg/m^3)

Month	Dates of Sampling From - To	Parameters SPM	RPM	NOx	SO_2
APR. 2007	06.04.07 - 07.04.07	137	61	< 6	< 6
APR. 2007	23.04.07 - 24.04.07	151	67	< 6	< 6
MAY 2007	06.05.07 - 07.05.07	152	54	< 6	< 6
MAY 2007	24.05.07 - 25.05.07	118	57	< 6	< 6
JUN. 2007	26.06.07 - 27.06.07	166	83	< 6	< 6
PERMISSIBLE LIMIT		**200**	**100**	**80**	**80**

4. Panara Village : KGOA-4

(24 hourly values in µg/m^3)

Month	Dates of Sampling From - To	Parameters SPM	RPM	NOx	SO_2
APR. 2007	07.04.07 - 08.04.07	177	70	< 6	< 6
APR. 2007	22.04.07 - 23.04.07	100	46	< 6	< 6
MAY 2007	06.05.07 - 07.05.07	153	64	< 6	< 6
MAY 2007	24.05.07 - 25.05.07	168	61	< 6	< 6
JUN. 2007	09.06.07 - 10.06.07	162	70	< 6	< 6
PERMISSIBLE LIMIT		**200**	**100**	**80**	**80**

AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC
YEAR : 2007
Q.E. : SEP.

1. Manager Office - Ghorawadi OC : KGOA-1

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
AUG. 2007	05.08.07	-	06.08.07	94	37	< 6	< 6
SEP. 2007	07.09.07	-	08.09.07	35	21	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				**600**	**300**	**120**	**120**

2. SAM Office - Ghorawadi : KGOA-2

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
JUL. 2007	22.07.07	-	23.07.07	103	68	< 6	< 6
SEP. 2007	24.09.07	-	25.09.07	63	39	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				**600**	**300**	**120**	**120**

3. Colony : KGOA-3

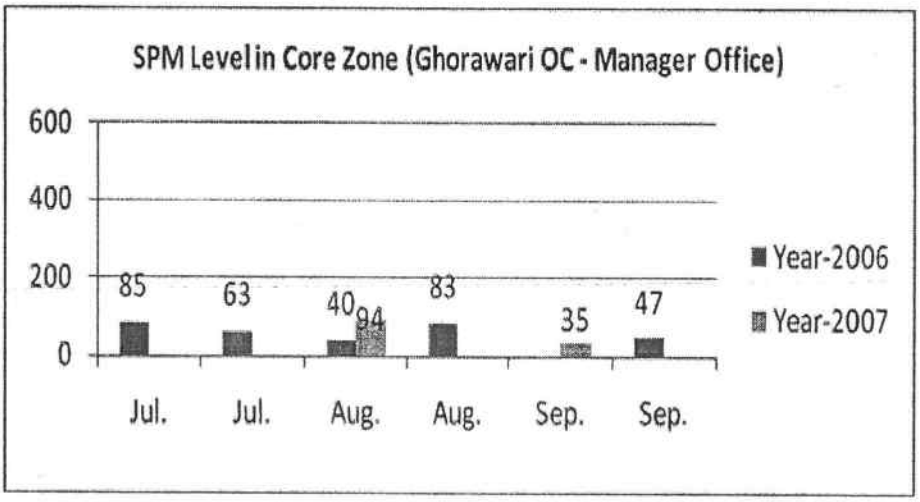
(24 hourly values in µg/m^3)

Month	Dates of Sampling From - To	Parameters SPM	RPM	NOx	SO_2
JUL. 2007	22.07.07 - 23.07.07	128	21	< 6	< 6
AUG. 2007	05.08.07 - 06.08.07	125	62	< 6	< 6
AUG. 2007	20.08.07 - 21.08.07	91	28	< 6	< 6
SEP. 2007	06.09.07 - 07.09.07	92	36	< 6	< 6
SEP. 2007	24.09.07 - 25.09.07	84	49	< 6	< 6
PERMISSIBLE LIMIT		**200**	**100**	**80**	**80**

4. Panara Village : KGOA-4

(24 hourly values in µg/m^3)

Month	Dates of Sampling From - To	Parameters SPM	RPM	NOx	SO_2
JUL. 2007	10.07.07 - 11.07.07	94	38	< 6	< 6
JUL. 2007	22.07.07 - 23.07.07	50	20	< 6	< 6
AUG. 2007	05.08.07 - 06.08.07	129	81	< 6	< 6
AUG. 2007	21.08.07 - 22.08.07	81	25	< 6	< 6
SEP. 2007	06.09.07 - 07.09.07	57	41	< 6	< 6
SEP. 2007	23.09.07 - 24.09.07	42	18	< 6	< 6
PERMISSIBLE LIMIT		**200**	**100**	**80**	**80**



AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC
YEAR : 2007
Q.E. : DEC.

1. Manager Office - Ghorawadi OC : KGOA-1

(24 hourly values in µg/m³)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
OCT. 2007	07.10.07	-	08.10.07	102	35	< 6	< 6
DEC. 2007	08.12.07	-	09.12.07	150	58	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				**600**	**300**	**120**	**120**

2. SAM Office - Ghorawadi : KGOA-2

(24 hourly values in µg/m³)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
NOV. 2007	04.11.07	-	05.11.07	296	96	< 6	< 6
DEC. 2007	07.12.07	-	08.12.07	150	68	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				**600**	**300**	**120**	**120**

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3. Colony : KGOA-3

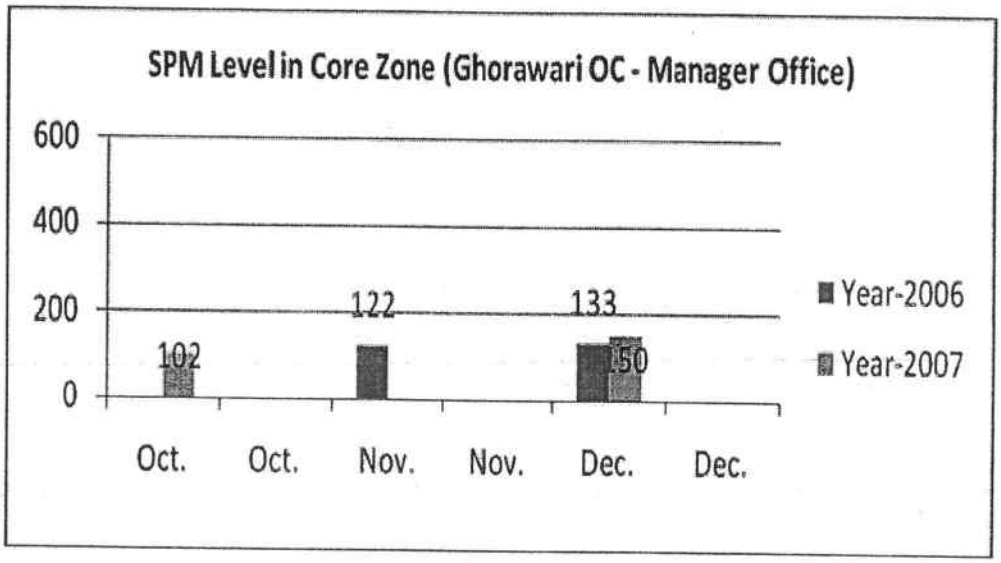
(24 hourly values in µg/m³)

Month	Dates of Sampling From - To	Parameters SPM	RPM	NOx	SO_2
OCT. 2007	06.10.07 - 07.10.07	125	40	< 6	< 6
OCT. 2007	24.10.07 - 25.10.07	161	58	< 6	< 6
NOV. 2007	03.11.07 - 04.11.07	121	48	< 6	< 6
DEC. 2007	08.12.07 - 09.12.07	149	51	< 6	< 6
DEC. 2007	23.12.07 - 24.12.07	82	12	< 6	< 6
PERMISSIBLE LIMIT		**200**	**100**	**80**	**80**

4. Panara Village : KGOA-4

(24 hourly values in µg/m³)

Month	Dates of Sampling From - To	Parameters SPM	RPM	NOx	SO_2
OCT. 2007	25.10.07 - 26.10.07	108	22	< 6	< 6
NOV. 2007	03.11.07 - 04.11.07	94	18	< 6	< 6
NOV. 2007	23.11.07 - 24.11.07	136	40	< 6	< 6
DEC. 2007	23.12.07 - 24.12.07	82	12	< 6	< 6
PERMISSIBLE LIMIT		**200**	**100**	**80**	**80**



AIR QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC
YEAR : 2008
Q.E. : MAR.

1. Manager Office - Ghorawadi OC : KGOA-1

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
FEB. 2008	08.02.08	-	09.02.08	193	83	< 6	< 6
MAR. 2008	07.03.08	-	08.03.08	105	52	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				**600**	**300**	**120**	**120**

2. SAM Office - Ghorawadi : KGOA-2

(24 hourly values in µg/m^3)

Month	Dates of Sampling			Parameters			
	From	-	To	SPM	RPM	NOx	SO_2
FEB. 2008	08.02.08	-	09.02.08	155	75	< 6	< 6
MAR. 2008	27.03.08	-	28.03.08	130	58	< 6	< 6
TLV as per Env.(Protection) Amendment Rule 2000				**600**	**300**	**120**	**120**

3. Colony : KGOA-3

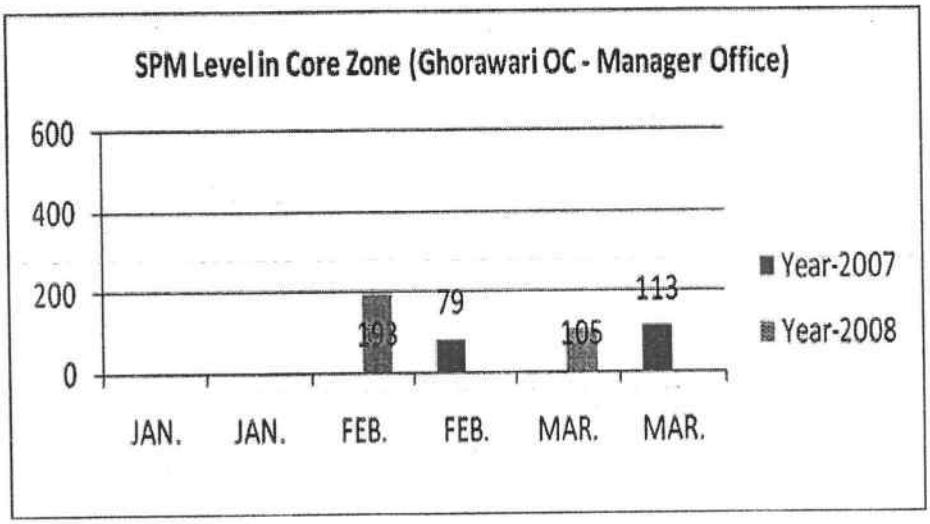
(24 hourly values in µg/m^3)

Month	Dates of Sampling From - To	Parameters SPM	RPM	NOx	SO_2
JAN. 2008	07.01.08 - 08.01.08	68	30	< 6	< 6
JAN. 2008	19.01.08 - 20.01.08	76	31	< 6	< 6
FEB. 2008	07.02.08 - 08.02.08	101	47	< 6	< 6
FEB. 2008	19.02.08 - 20.02.08	103	50	< 6	< 6
MAR. 2008	06.03.08 - 07.03.08	105	47	< 6	< 6
MAR. 2008	27.03.08 - 28.03.08	108	46	< 6	< 6
PERMISSIBLE LIMIT		**200**	**100**	**80**	**80**

4. Panara Village : KGOA-4

(24 hourly values in µg/m^3)

Month	Dates of Sampling From - To	Parameters SPM	RPM	NOx	SO_2
JAN. 2008	19.01.08 - 20.01.08	141	63	< 6	< 6
FEB. 2008	07.02.08 - 08.02.08	167	80	< 6	< 6
FEB. 2008	19.02.08 - 20.02.08	97	47	< 6	< 6
MAR. 2008	07.03.08 - 08.03.08	177	82	< 6	< 6
MAR. 2008	27.03.08 - 28.03.08	161	81	< 6	< 6
PERMISSIBLE LIMIT		**200**	**100**	**80**	**80**



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CO MONITORING DATA

(All values are given in µg/m^3)

Sl. No.	Monitoring Location	Monitoring Date	Observed Value	NAAQ Standards (1 hour)
1.	Manager office – Ghorawari OC	27.03.08	< 114.3	10000
2.	SAM office - Ghorawari	27.03.08	< 114.3	10000
3.	Colony	27.03.08	< 114.3	4000
4.	Panara village	27.03.08	< 114.3	4000

MINE/WASTE WATER QUALITY DATA (Summer 2006)

Location : Mine effluent

S. No	Parameter	Unit	Result		General Standards for discharge of Effluents into Inland Surface water GSR 422(E)
	Date of Sampling		20.04.2006	20.06.06	
1.	Colour	Pt-Co	20	10	-
2.	Suspended Solids	mg/l	18	24	100
3.	Particle size of suspended solids	Shall pass 850 micron ISI sieve	100% are passing through 850 micron ISI sieve		Shall pass 850 micron ISI sieve
4.	Dissolved solids (inorganic)	mg/l	1050	1140	-
5.	pH	-	7.35	7.50	5.5-9.0
6.	Temperature	°C	31.5	32.0	5°C above water temperature
7.	Oil & Grease	mg/l	Nil	Nil	10
8.	Total residual chlorine	mg/l	Nil	Nil	1.0
9.	Ammonical Nitrogen (as N)	mg/l	0.42	0.61	50
10.	Kjeldahl nitrogen	mg/l	1.46	1.74	100
11.	Free ammonia (as NH_3)	mg/l	Nil	Nil	5.0
12.	BOD - 3 Days at 27°C	mg/l	4	8	30
13.	COD	mg/l	20	24	250
14.	Arsenic (as As)	mg/l	<0.01	<0.01	0.2
15.	Mercury (as Hg)	mg/l	<0.001	<0.001	0.01
16.	Lead (as Pb)	mg/l	<0.01	<0.01	0.01
17.	Cadmium (as Cd)	mg/l	<0.01	<0.01	2
18.	Hexavalent Chromium (as Cr^{6+})	mg/l	<0.001	<0.001	0.10
19.	Total Chromium	mg/l	<0.001	<0.001	2.0
20.	Copper (as Cu)	mg/l	<0.001	<0.001	3
21.	Zinc (as Zn)	mg/l	<0.01	<0.01	5
22.	Selenium (as Se)	mg/l	<0.01	<0.01	0.05
23.	Nickel (as Ni)	mg/l	<0.01	<0.01	3
24.	Boron (as B)	mg/l	<0.01	<0.01	-
25.	Percent Sodium	mg/l	29.54	30.15	-
26.	Residual Sodium Carbonate	mg/l	Nil	Nil	-
27.	Cyanides (as CN)	mg/l	Nil	Nil	0.2
28.	Chloride (as Cl)	mg/l	360	380	-
29.	Fluorides (as F)	mg/l	0.12	0.18	2
30.	Dissolved Phosphates (as PO_4)	mg/l	0.08	0.08	5.0
31.	Sulphates (as SO_4)	mg/l	102	115	-
32.	Sulphides (as S)	mg/l	Nil	Nil	2
33.	Phenols (as C_6H_5OH)	mg/l	Nil	Nil	1.0
34.	Bio-assay test	90%survival of fish after 96 hours in 100% effluent	100%survival of fish after 96 hours in 100% effluent		90%survival of fish after 96 hours in 100% effluent
35.	Manganese (as mn)	mg/l	Nil	Nil	2.0
36.	Iron (as Fe^{+2})	mg/l	0.74	0.61	3.0
37.	Vanadium (as V)	mg/l	Nil	Nil	0.2
38.	Nitrate Nitrogen	mg/l	0.68	0.54	10

GROUND WATER QUALITY DATA (Summer 2006)

Sampling Date 10.05.2006

S.No.	Parameter	Unit	Result		IS: 10500-1991 Norms
			Borewell – Nimdana	Borewell – Gkorawari kalan	
1	pH	-	7.59	7.65	6.5 – 8.5
2	Colour	Hazen Units	<5	<5	10
3	Temperature	°C	30.5	30.5	-
4	Turbidity	NTU	6	7	10
5	Total suspended solids	mg/l	<2	<2	-
6	Total dissolved solids	mg/l	395	1105	500
7	Total volatile solids	mg/l	-	-	-
8	Dissolved Oxygen	mg/l	4.22	4.10	-
9	BOD - 3 days at 27°C	mg/l	<2	<2	-
10	COD	mg/l	10	14	-
11	Oil & grease	mg/l	Nil	Nil	-
12	Residual chlorine	mg/l	Nil	Nil	0.2
13	Chloride (as Cl)	mg/l	60	233	250
14	Flouride (as F)	mg/l	0.08	0.03	1.0
15	Sulphate (as SO_4)	mg/l	17	105	200
16	Sulphide (as S)	mg/l	Nil	Nil	-
17	Cyanide (as CN)	mg/l	Nil	Nil	0.05
18	Insecticides/pesticides	mg/l	Nil	Nil	Absent
19	Phenols (as C_6H_5OH)	mg/l	<0.001	<0.001	0.001
20	Chromium (as Cr)	mg/l	<0.01	<0.01	0.05
21	Copper (as Cu)	mg/l	<0.01	<0.01	0.05
22	Selenium (as Se)	mg/l	<0.01	<0.01	0.01
22	Arsenic (as As)	mg/l	<0.01	<0.01	0.05
23	Barium (as Ba)	mg/l	<0.01	<0.01	-
24	Cadmium	mg/l	<0.01	<0.01	0.01
25	Nickel (as Ni)	mg/l	<0.01	<0.01	-
26	Boron (as B)	mg/l	<0.01	<0.01	-
27	Mercury (as Hg)	mg/l	<0.001	<0.001	0.001
28	Silver (as Ag)	mg/l	<0.01	<0.01	-
29	Lead (as Pb)	mg/l	<0.01	<0.01	0.05
30	Zinc (as Pb)	mg/l	0.04	0.04	5
31	Alkalinity to phenolphthalein	mg/l	Nil	Nil	-
32	Alkalinity to methyl orange	mg/l	180	350	200
33	Iron (as Fe)	mg/l	0.09	0.04	0.3
34	Total Hardness Temporary Hardness Permanent Hardness	mg/l	170 180 -	393 350 -	300 - -
35	Calcium (as Ca)	mg/l	44	92	75
36	Magnesium (as Mg)	mg/l	14	39	30
37	Total Nitrogen (as N)	mg/l	Nil	Nil	-
38	Percent sodium	%	36.79	39.15	-
39	Coliform organisms	MPN/100ml	-0-	-0-	Absent
40	Sodium,(as Na)	mg/l	49	146	200
41	Potassium (as K)	mg/l	12	81	-

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ANNEXURE-V

SURFACE WATER QUALITY DATA (Summer 2006)

Sampling Date : 15.05.2006

Sl. No.	Parameter	Unit	Kanhan river U/s	Kanhan River D/s	IS:2296-1982 Tolerance limits for Inland Surface water (Class C)
1	pH	-	7.55	7.68	6.5 – 8.5
2	Colour	Hazen Units	25	38	300
3	Temperature	°C	30.0	31.5	-
4	Turbidity	NTU	34	44	-
5	Total suspended solids	mg/l	22	30	-
6	Total dissolved solids	mg/l	590	640	1500
7	Total volatile solids	mg/l	12	13	-
8	Dissolved Oxygen	mg/l	5.34	5.11	4.0
9	BOD - 3 days, 27°C	mg/l	3	3	3.0
10	COD	mg/l	14	20	-
11	Oil & grease	mg/l	Nil	Nil	-
12	Residual chlorine	mg/l	Nil	Nil	-
13	Chloride (as Cl)	mg/l	80	104	600
14	Flouride (as F)	mg/l	0.20	0.24	1.5
15	Sulphate (as SO_4)	mg/l	16	22	400
16	Sulphide (as S)	mg/l	Nil	Nil	-
17	Cyanide (as CN)	mg/l	<0.01	<0.01	0.05
18	Insecticides/pesticides	mg/l	Nil	Nil	Absent
19	Phenols (as C_6H_5OH)	mg/l	<0.001	<0.001	0.005
20	Chromium (as Cr)	mg/l	<0.01	<0.01	0.05
21	Copper (as Cu)	mg/l	<0.01	<0.01	1.5
22	Selenium (as Se)	mg/l	<0.01	<0.01	0.05
22	Arsenic (as As)	mg/l	<0.01	<0.01	0.2
23	Barium (as Ba)	mg/l	<0.01	<0.01	-
24	Cadmium	mg/l	<0.01	<0.01	0.01
25	Nickel (as Ni)	mg/l	<0.01	<0.01	-
26	Boron (as B)	mg/l	<0.01	<0.01	-
27	Mercury (as Hg)	mg/l	<0.001	<0.001	-
28	Silver (as Ag)	mg/l	<0.01	<0.01	-
29	Lead (as Pb)	mg/l	<0.01	<0.01	0.1
30	Zinc (as Pb)	mg/l	0.08	0.12	15
31	Alkalinity to phenolphthalein	mg/l	Nil	Nil	-
32	Alkalinity to methyl orange	mg/l	322	344	-
33	Iron (as Fe)	mg/l	1.11	1.40	50
35	Calcium (as Ca)	mg/l	62	82	-
36	Magnesium (as Mg)	mg/l	21	25	-
37	Total Nitrogen (as N)	mg/l	0.12	0.21	-
38	Percent sodium	%	28.87	26.56	-
39	Coliform organisms	MPN/100ml	<1100	<1100	5000
40	Sodium (as Na)	mg/l	48	42	-
41	Potassium (as K)	mg/l	30	28	-

Richardson & Cruddas (1972) Ltd.

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EFFLUENT WATER QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC

YEAR : 2006
Q.E. : JUNE

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

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
MAY 2006	23.05.06	6.75	90	140	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)

EFFLUENT WATER QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC
YEAR : 2006
Q.E. : SEPT.

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

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
AUG. 2006	10.08.06	7.20	34	60	BDL
AUG. 2006	23.08.06	7.40	24	40	BDL
SEP. 2006	11.09.06	7.88	42	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)

EFFLUENT WATER QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC
YEAR : 2006
Q.E. : DEC.
DATE : 26.10.06

1. Name of the Location : Mine water discharge - KJOW-1

Sl. No.	Parameters	Analysis Results	Standards for discharge Part A, Schedule VI
1	pH	6.50	5.5 – 9.0
2	Temperature (^{0}C)	27.9	Te<Ts+5^{0}C
3	Colour (Hz)	7	*
4	Odour	Unobject.	Unobjectionable
5	Turbidity (NTU)	3	*
6	Conductivity (us/cm)	1290	*
7	Total Suspended Solids (mg/l)	12	100
8	Total Dissolved Solids (mg/l)	902	*
9	Oil & Grease (mg/l)	BDL	10
10	Dissolved Oxygen (mg/l)	3.9	*
11	C.O.D. (mg/l)	30	250
12	B.O.D. 3 days at 27^{0}C (mg/l)	< 5	30
13	Total Residual Chorine (mg/l)	BDL	1 (Max.)
14	Ammonical Nitrogen (mg/l)	0.03	50
15	Total kjeldahl Nitrogen (mg/l)	2.98	100
16	Free Ammonia (mg/l)	BDL	5.0
17	Arsenic (mg/l)	BDL	0.2
18	Lead (mg/l)	BDL	0.1
19	Cadmium (mg/l)	BDL	2
20	Hexavalent Chromium (mg/l)	BDL	0.1
21	Total Chromium (mg/l)	BDL	2
22	Copper (mg/l)	BDL	3
23	Zinc (mg/l)	BDL	5
24	Selenium (mg/l)	BDL	0.05
25	Nickel (mg/l)	BDL	3
26	Fluoride (mg/l)	1.47	2
27	Dissolved Phosphate (mg/l)	0.01	5
28	Sulphide (mg/l)	0.01	2
29	Iron (mg/l)	0.10	3
30	Manganese (mg/l)	BDL	2
31	Vanadium (mg/l)	BDL	0.2
32	Nitrate Nitrogen (mg/l)	2.1	10
33	Sulphate (mg/l)	444	*
34	Chloride (mg/l)	14	*
35	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
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC
YEAR : 2007
Q.E. : MAR.

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

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
JAN. 2007	21.01.07	7.11	42	60	BDL
FEB. 2007	23.02.07	6.96	54	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)

DRINKING WATER QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC

YEAR : 2007
Q.E. : JUNE
DATE : 23.05.2007

Name of the Location : Drinking water

Sl. No.	Parameter	Analysis Result	Standard (IS 10500 : 1991)	
			Desirable limit	*Permissible limit in the absence of alternate source*
1.	Colour (Hazen)	9	5	*25*
2.	Odour	Unobjectionable	Unobjectionable	-
3.	Taste	Agreeable	Agreeable	-
4.	Turbidity (NTU)	5	5	*10*
5.	pH value	7.20	6.5 to 8.5	*No relaxation*
6.	Total Hardness(as $CaCO_3$) (mg/l)	368	300	*600*
7.	Iron (mg/l)	BDL	0.3	*1.0*
8.	Chlorides (mg/l)	22	250	*1000*
9.	Residual, Free Chlorine (mg/l)	0.04	0.2	-
10.	Dissolved Solids (mg/l)	480	500	*2000*
11.	Calcium (mg/l)	112	75	*200*
12.	Copper (mg/l)	BDL	0.05	*1.5*
13.	Manganese (mg/l)	BDL	0.1	*0.3*
14.	Sulphate (mg/l)	46	200	*400*
15.	Nitrate (mg/l)	12	45	*100*
16.	Fluoride (mg/l)		1.0	*1.5*
17.	Mercury (mg/l)	BDL	0.001	*No relaxation*
18.	Cadmium (mg/l)	BDL	0.01	*No relaxation*
19.	Selenium (mg/l)	BDL	0.01	*No relaxation*
20.	Arsenic (mg/l)	BDL	0.05	*No relaxation*
21.	Lead (mg/l)	BDL	0.05	*No relaxation*
22.	Zinc (mg/l)	BDL	5	*15*
23.	Chromium (Cr^{6+}) (mg/l)	BDL	0.05	*No relaxation*
24.	Alkalinity (mg/l)	48	200	*600*
25.	Aluminium (mg/l)	BDL	0.03	*0.2*
26.	Boron (mg/l)	BDL	1	*5*
27.	Phenolic Compounds (mg/l)	BDL	0.001	*0.002*
28.	Coliform (MPN / 100 ml)	NIL	Shall be absent	-

(BDL – Below Detectable Limit)

EFFLUENT WATER QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC

YEAR : 2007
Q.E. : SEP.

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

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
JUL. 2007	23.07.07	7.65	36	60	BDL
SEP. 2007	23.09.07	7.42	30	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)

EFFLUENT WATER QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC

YEAR : 2007
Q.E. : DEC.

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

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
NOV. 2007	04.11.07	7.43	34	60	BDL
NOV. 2007	24.11.07	7.24	44	80	BDL
DEC. 2007	08.12.07	7.54	24	40	BDL
DEC. 2007	23.12.07	7.08	58	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)

EFFLUENT WATER QUALITY MONITORING DATA

NAME OF THE COMPANY : WCL YEAR : 2007
NAME OF THE AREA : KANHAN DATE : 23.12.07
NAME OF THE PROJECT : GHORAWADI OC

1. Name of the Location : Mine water discharge - KJOW-1

Sl. No.	Parameters	Analysis Results	Standards for discharge Part A, Schedule VI
1	pH	7.08	5.5 – 9.0
2	Temperature (^{0}C)	21.5	Te<Ts+5^{0}C
3	Colour (Hz)	Acceptable	*
4	Odour	Unobject.	Unobjectionable
5	Turbidity (NTU)	6	*
6	Conductivity (us/cm)	820	*
7	Total Suspended Solids (mg/l)	58	100
8	Total Dissolved Solids (mg/l)	534	*
9	Oil & Grease (mg/l)	BDL	10
10	Dissolved Oxygen (mg/l)	4.6	*
11	C.O.D. (mg/l)	80	250
12	B.O.D. 3 days at 27^{0}C (mg/l)	5	30
13	Total Residual Chorine (mg/l)	BDL	1 (Max.)
14	Ammonical Nitrogen (mg/l)	0.1	50
15	Total kjeldahl Nitrogen (mg/l)	3.18	100
16	Free Ammonia (mg/l)	BDL	5.0
17	Arsenic (mg/l)	BDL	0.2
18	Lead (mg/l)	BDL	0.1
19	Hexavalent Chromium (mg/l)	BDL	0.1
20	Total Chromium (mg/l)	BDL	2
21	Copper (mg/l)	BDL	3
22	Zinc (mg/l)	0.1	5
23	Selenium (mg/l)	BDL	0.05
24	Nickel (mg/l)	BDL	3
25	Fluoride (mg/l)	0.51	2
26	Dissolved Phosphate (mg/l)	0.08	5
27	Sulphide (mg/l)	0.01	2
28	Iron (mg/l)	BDL	3
29	Manganese (mg/l)	BDL	2
30	Nitrate Nitrogen (mg/l)	2.1	10
31	Sulphate (mg/l)	154	*
32	Chloride (mg/l)	24	*
33	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 : 2008
NAME OF THE AREA : KANHAN Q.E. : MAR.
NAME OF THE PROJECT : GHORAWADI OC

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

Month	Date of Sample collection	Analysis Results			
		pH	TSS (mg/l)	COD (mg/l)	O & G (mg/l)
JAN. 2008	19.01.08	7.31	46	80	BDL
FEB. 2008	08.02.08	7.52	80	120	BDL
FEB. 2008	22.02.08	7.10	60	80	BDL
MAR. 2008	07.03.08	7.70	32	50	BDL
MAR. 2008	27.03.08	7.32	26	40	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)

ANNEXURE-VII

NOISE LEVEL DATA

Season : Summer 2006

Location : Core Zone (N1)

Sampling Date : 27.05.2006

Sl. No.	Time (Hrs.)		L_{eq} Noise Level, dB(A)	Peak Noise Level, dB(A)
1	Day	06-10	61.4	65.2
2		10-14	63.2	67.6
3		14-18	61.7	64.9
4	Night	18-22	50.5	54.7
5		22-02	52.0	55.8
6		02-06	51.5	54.9

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ANNEXURE – VII

NOISE LEVEL DATA

Season : Summer 2006

Location : Rawarkhund village (N2)

Sampling Date : 27.05.2006

Sl. No.	Time (Hrs.)		L_{eq} Noise Level, dB(A)	Peak Noise Level, dB(A)
1	Day	06-10	42.4	44.8
2		10-14	43.5	47.2
3		14-18	44.8	48.3
4	Night	18-22	41.2	43.2
5		22-02	36.4	38.3
6		02-06	37.1	38.7

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ANNEXURE – VII

NOISE LEVEL DATA

Season : Summer 2006

Location : Dungariya village (N3)

Sampling Date : 27.05.2006

Sl. No.	Time (Hrs.)		L_{eq} Noise Level, dB(A)	Peak Noise Level, dB(A)
1	Day	06-10	41.8	43.5
2		10-14	43.4	45.7
3		14-18	45.6	47.9
4	Night	18-22	40.9	42.6
5		22-02	36.5	37.9
6		02-06	37.2	38.8

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ANNEXURE – VII

NOISE LEVEL DATA

Season : Summer 2006

Location : Kola Village (N4)

Sampling Date : 28.05.2006

Sl. No.	Time (Hrs.)		L_{eq} Noise Level, dB(A)	Peak Noise Level, dB(A)
1	Day	06-10	42.6	44.5
2		10-14	43.8	45.9
3		14-18	45.4	47.7
4	Night	18-22	41.3	43.2
5		22-02	36.8	38.2
6		02-06	37.2	39.4

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ANNEXURE - VII

NOISE LEVEL DATA

Season : Summer 2006

Location : Danuja Village (N5)

Sampling Date : 28.05.2006

Sl. No.	Time (Hrs.)		L_{eq} Noise Level, dB(A)	Peak Noise Level, dB(A)
1	Day	06-10	41.8	43.9
2		10-14	43.2	45.7
3		14-18	45.4	47.8
4	Night	18-22	40.8	42.6
5		22-02	36.8	38.4
6		02-06	37.3	39.2

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ANNEXURE – VII

NOISE LEVEL DATA

Season : Summer 2006

Location Name : Muyari Village (N6)

Sampling Date : 28.05.2006

Sl. No.	Time (Hrs.)		L_{eq} Noise Level, dB(A)	Peak Noise Level, dB(A)
1	Day	06-10	42.8	45.2
2		10-14	43.9	46.7
3		14-18	45.8	48.6
4	Night	18-22	41.2	43.4
5		22-02	36.6	38.7
6		02-06	37.2	39.5

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ANNEXURE – VII

NOISE LEVEL DATA

Season : Summer 2006

Location Name : Bijori Village (N7)

Sampling Date : 28.05.2006

Sl. No.	Time (Hrs.)		L_{eq} Noise Level, dB(A)	Peak Noise Level, dB(A)
1	Day	06-10	41.8	43.4
2		10-14	42.7	45.3
3		14-18	44.8	47.5
4	Night	18-22	40.9	42.6
5		22-02	36.4	37.8
6		02-06	37.2	38.9

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NOISE LEVEL DATA

Season : Summer 2006

Location Name : Junardev Village (N8)

Sampling Date : 28.05.2006

Sl. No.	Time (Hrs.)		L_{eq} Noise Level, dB(A)	Peak Noise Level, dB(A)
1	Day	06-10	41.4	42.8
2		10-14	42.9	45.5
3		14-18	44.6	47.7
4	Night	18-22	40.8	42.3
5		22-02	36.5	38.2
6		02-06	37.1	39.6

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ANNEXURE – VII

NOISE LEVEL DATA

Season : Summer 2006

Location : Minoriya Village (N9)

Sampling Date : 28.05.2006

Sl. No.	Time (Hrs.)		L_{eq} Noise Level, dB(A)	Peak Noise Level, dB(A)
1	Day	06-10	41.7	42.3
2		10-14	42.9	44.6
3		14-18	45.6	47.9
4	Night	18-22	40.7	42.6
5		22-02	36.7	38.5
6		02-06	37.3	39.8

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NOISE LEVEL DATA

Season : Summer 2006

Location : Markadhana Village (N10)

Sampling Date : 27.05.2006

Sl. No.	Time (Hrs.)		L_{eq} Noise Level, dB(A)	Peak Noise Level, dB(A)
1	Day	06-10	42.9	44.7
2		10-14	43.3	46.5
3		14-18	45.4	48.6
4	Night	18-22	41.3	42.8
5		22-02	36.7	38.9
6		02-06	37.2	39.4

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ANNEXURE – VII

NOISE LEVEL DATA

Season : Summer 2006

Location : Biripura Village (N11)

Sampling Date : 27.05.2006

Sl. No.	Time (Hrs.)		L_{eq} Noise Level, dB(A)	Peak Noise Level, dB(A)
1	Day	06-10	41.4	43.4
2		10-14	42.4	45.3
3		14-18	46.3	48.3
4	Night	18-22	39.2	41.3
5		22-02	36.9	38.3
6		02-06	38.3	40.1

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ANNEXURE – VII

NOISE LEVEL DATA

Season : Summer 2006

Location : Chikalbarri Village (N12)

Sampling Date : 28.05.2006

Sl. No.	Time (Hrs.)		L_{eq} Noise Level, dB(A)	Peak Noise Level, dB(A)
1	Day	06-10	41.0	45.1
2		10-14	42.0	46.9
3		14-18	43.5	46.5
4	Night	18-22	39.5	41.3
5		22-02	38.5	40.3
6		02-06	40.1	42.3

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NOISE LEVEL DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC

YEAR : 2006
Q.E. : JUNE

Name of the Location : Manager Office - KGON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
MAY 2006	23.05.06	57.1	51.2	
JUNE 2006 JUNE 2006	09.06.06 25.06.06	62.6 64.7	51.0 55.0	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		**75**	**70**	

Name of the Location : Colony - KGON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
MAY 2006	23.05.06	52.6	44.2	
JUNE 2006 JUNE 2006	08.06.06 26.06.06	53.1 54.3	42.6 44.1	
Permissible Limit		**55**	**45**	

NOISE LEVEL DATA

NAME OF THE COMPANY : WCL YEAR : 2006
NAME OF THE AREA : KANHAN Q.E. : SEPT.
NAME OF THE PROJECT : GHORAWADI OC

Name of the Location : Manager Office - KGON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JUL. 2006 JUL. 2006	10.07.06 24.07.06	52.3 60.0	45.8 52.0	
AUG. 2006 AUG. 2006	10.08.06 24.08.06	62.6 51.3	56.9 48.2	
SEP. 2006 SEP. 2006	11.09.06 23.09.06	51.3 51.3	43.8 48.2	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		**75**	**70**	

Name of the Location : Colony - KGON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JUL. 2006 JUL. 2006	10.07.06 24.07.06	51.8 53.0	43.9 44.0	
AUG. 2006 AUG. 2006	09.08.06 24.08.06	51.2 53.1	40.5 44.1	
SEP. 2006 SEP. 2006	10.09.06 22.09.06	53.6 53.1	44.2 44.3	
Permissible Limit		**55**	**45**	

NOISE LEVEL DATA

NAME OF THE COMPANY : WCL YEAR : 2006
NAME OF THE AREA : KANHAN Q.E. : DEC.
NAME OF THE PROJECT : GHORAWADI OC

Name of the Location : Manager Office - KGON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
OCT. 2006 OCT. 2006	08.10.06 26.10.06	56.3 61.6	50.4 55.9	
NOV. 2006 NOV. 2006	08.11.06 22.11.06	51.3 61.3	44.8 56.4	
DEC. 2006 DEC. 2006	10.12.06 23.12.06	51.2 55.1	44.6 49.3	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		**75**	**70**	

Name of the Location : Colony - KGON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
OCT. 2006 OCT. 2006	08.10.06 26.10.06	53.3 51.2	48.3 42.8	
NOV. 2006 NOV. 2006	08.11.06 25.11.06	54.2 54.2	43.8 43.5	
DEC. 2006 DEC. 2006	10.12.06 23.12.06	54.2 54.3	43.6 42.3	
Permissible Limit		**55**	**45**	

NOISE LEVEL DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC

YEAR : 2007
Q.E. : MAR.

Name of the Location : Manager Office - KGON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JAN. 2007 JAN. 2007	08.01.07 21.01.07	57.1 50.1	51.3 43.2	
FEB. 2007 FEB. 2007	09.02.07 22.02.07	57.2 57.3	46.3 46.3	
MAR. 2007 MAR. 2007	08.03.07 23.03.07	50.2 63.2	43.3 58.9	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		**75**	**70**	

Name of the Location : Colony - KGON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JAN. 2007 JAN. 2007	07.01.07 21.01.07	52.5 51.8	44.1 42.6	
FEB. 2007 FEB. 2007	09.02.07 23.02.07	51.8 51.6	43.0 43.2	
MAR. 2007 MAR. 2007	08.03.07 22.03.07	51.7 53.8	42.5 44.2	
Permissible Limit		**55**	**45**	

NOISE LEVEL DATA

NAME OF THE COMPANY : WCL
NAME OF THE AREA : KANHAN
NAME OF THE PROJECT : GHORAWADI OC
YEAR : 2007
Q.E. : JUNE

Name of the Location : Manager Office - KGON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
APR. 2007 APR. 2007	06.04.07 22.04.07	57.1 58.0	51.2 52.0	
MAY 2007 MAY 2007	06.05.07 22.05.07	57.8 60.1	51.0 52.3	
JUN. 2007 JUN. 2007	10.06.07 26.06.07	53.4 59.0	50.4 54.0	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		**75**	**70**	

Name of the Location : Colony - KGON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
APR. 2007 APR. 2007	06.04.07 22.04.07	52.5 53.0	43.1 42.3	
MAY 2007 MAY 2007	06.05.07 22.05.07	52.0 52.3	43.0 40.1	
JUN. 2007 JUN. 2007	10.06.07 26.06.07	49.6 50.0	40.8 41.0	
Permissible Limit		**55**	**45**	

NOISE LEVEL DATA

NAME OF THE COMPANY : WCL YEAR : 2007
NAME OF THE AREA : KANHAN Q.E. : SEP.
NAME OF THE PROJECT : GHORAWADI OC

Name of the Location : Manager Office - KGON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JUL. 2007 JUL. 2007	11.07.07 23.07.07	53.8 55.0	48.7 50.0	
AUG. 2007 AUG. 2007	04.08.07 21.08.07	67.0 62.0	62.2 57.0	
SEP. 2007 SEP. 2007	07.09.07 24.09.07	68.9 66.0	63.8 60.0	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		**75**	**70**	

Name of the Location : Colony - KGON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JUL. 2007 JUL. 2007	11.07.07 23.07.07	53.6 53.0	40.7 41.0	
AUG. 2007 AUG. 2007	04.08.07 21.08.07	50.2 52.0	43.0 42.5	
SEP. 2007 SEP. 2007	07.09.07 24.09.07	52.4 51.8	43.7 43.0	
Permissible Limit		**55**	**45**	

NOISE LEVEL DATA

NAME OF THE COMPANY : WCL YEAR : 2007
NAME OF THE AREA : KANHAN Q.E. : DEC.
NAME OF THE PROJECT : GHORAWADI OC

Name of the Location : Manager Office - KGON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
OCT. 2007	05.10.07	65.9	60.8	
OCT. 2007	24.10.07	64.0	60.0	
NOV. 2007	04.11.07	55.2	50.3	
NOV. 2007	24.11.07	64.7	60.3	
DEC. 2007	08.12.07	62.0	57.0	
DEC. 2007	24.12.07	63.0	58.0	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		**75**	**70**	

Name of the Location : Colony - KGON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
OCT. 2007	05.10.07	52.2	43.1	
OCT. 2007	24.10.07	52.0	43.0	
NOV. 2007	04.11.07	54.1	43.9	
NOV. 2007	24.11.07	53.6	44.8	
DEC. 2007	08.12.07	53.0	44.0	
DEC. 2007	24.12.07	52.6	43.2	
Permissible Limit		**55**	**45**	

NOISE LEVEL DATA

NAME OF THE COMPANY : WCL YEAR : 2008
NAME OF THE AREA : KANHAN Q.E. : MAR.
NAME OF THE PROJECT : GHORAWADI OC

Name of the Location : Manager Office - KGON-1

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JAN. 2008 JAN. 2008	05.01.08 17.01.08	51.3 59.2	45.6 52.3	
FEB. 2008 FEB. 2008	07.02.08 22.02.08	55.1 56.0	48.2 47.0	
MAR. 2008 MAR. 2008	07.03.08 26.03.08	56.8 64.2	50.3 60.6	
Noise Level Standard as per Env. (Protection) Amendment rule 2000		**75**	**70**	

Name of the Location : Colony - KGON-2

Month	Date of Data collection	Noise Level in dB(A)		Remarks
		Day Time	Night Time	
JAN. 2008 JAN. 2008	06.01.08 17.01.08	53.6 48.4	42.9 40.3	
FEB. 2008 FEB. 2008	07.02.08 22.02.08	53.7 52.0	42.9 42.2	
MAR. 2008 MAR. 2008	07.03.08 28.03.08	54.8 52.4	43.9 42.8	
Permissible Limit		**55**	**45**	

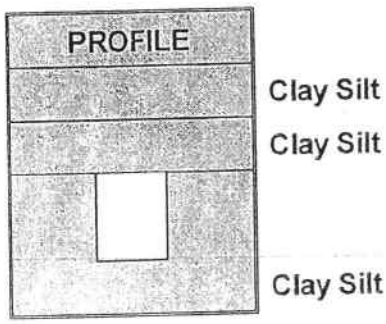
ANNEXURE- IX

SOIL QUALITY DATA

Location : Barren land, Core Zone (S_1)

Season : Summer
Sampling Date : 21.05.2006

Sl. No.	Parameter	Depth, cm		
		0-30	30-60	60-100
1.	pH	7.86	7.92	7.96
2.	Electrical conductivity (m-mhos/cm at 20°C)	0.389	0.394	0.398
3.	Nitrogen, mg/kg	0.116	0.118	0.128
4.	Phosphorus, mg/kg	0.671	0.676	0.682
5.	Potassium, mg/kg	0.002	0.002	0.002
6.	Total magnesium, mg/kg	1.84	1.86	1.92
7.	Organic carbon (%)	2.45	2.37	2.21
8.	**Grain size distribution** Sand(%) Silt (%) Clay (%)	 7.25 21.84 70.91	 6.27 23.46 70.27	 4.38 21.72 73.29
9.	Textural class	Clay silt		
10.	Bulk density (g/cc)	1.18	1.21	1.19
11.	Liquid limit (%)	13.8	13.1	13.2
12.	Plastic limit (%)	10.9	10.3	10.2
13.	Infiltration rate (cm/hr)	-	2.3	-
14.	Field capacity (%)	8.6	8.4	9.1
15.	Wilting co-efficient (%)	0.5	0.5	0.5
16.	Available water storage capacity (%)	8.1	7.8	8.6



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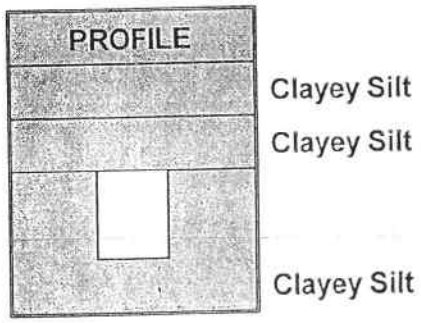
ANNEXURE – IX

SOIL QUALITY DATA

Location : Agriculture Land, Nimdhana (S_2)

Season : Summer
Sampling Date : 21.05.2006

Sl. No.	Parameter	Depth, cm		
		0-30	30-60	60-100
1.	PH	8.37	8.42	8.46
2.	Electrical conductivity (m-mhos/cm at 20°C)	0.031	0.036	0.029
3.	Nitrogen, mg/kg	0.904	0.914	0.918
4.	Phosphorus, mg/kg	1.26	1.31	1.35
5.	Potassium, mg/kg	0.031	0.034	0.036
6.	Total magnesium, mg/kg	1.26	1.25	1.29
7.	Organic carbon (%)	2.42	2.53	2.49
8.	**Grain size distribution** Sand (%) Silt (%) Clay (%)	 9.86 32.71 57.43	 8.49 30.29 61.22	 6.94 29.31 63.75
9.	Textural class	Clayey Silt		
10.	Bulk density (g/cc)	1.29	1.31	1.33
11.	Liquid limit (%)	20.64	21.72	21.76
12.	Plastic limit (%)	14.36	14.42	14.92
13.	Infiltration rate (cm/hr)	-	4.6	-
14.	Field capacity (%)	8.2	8.3	8.4
15.	Wilting co-efficient (%)	0.6	0.6	0.6
16.	Available water storage capacity (%)	7.6	7.7	7.8



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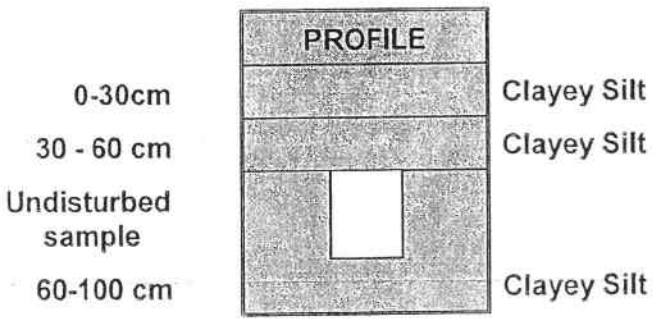
ANNEXURE – IX

SOIL QUALITY DATA

Location : Forest Land, Bandi (S_3)

Season : Summer
Sampling Date : 21.05.2006

Sl. No.	Parameter	Depth, cm		
		0-30	30-60	60-100
1.	pH	7.81	7.83	7.85
2.	Electrical conductivity (m-mhos/cm at 20°C)	0.394	0.392	0.394
3.	Nitrogen, mg/kg	0.086	0.092	0.096
4.	Phosphorus, mg/kg	0.681	0.684	0.688
5.	Potassium, mg/kg	0.002	0.002	0.003
6.	Total magnesium, mg/kg	2.16	2.38	2.41
7.	Organic carbon (%)	2.38	2.53	2.62
8.	**Grain size distribution** Sand (%) Silt (%) Clay (%)	 6.82 24.92 68.26	 8.97 21.26 69.77	 6.37 20.73 72.90
9.	Textural class	Clayey Silt		
10.	Bulk density (g/cc)	1.12	1.15	1.19
11.	Liquid limit (%)	13.8	14.3	14.6
12.	Plastic limit (%)	11.6	11.8	11.9
13.	Infiltration rate (cm/hr)	-	2.9	-
14.	Field capacity (%)	8.9	9.1	9.3
15.	Wilting co-efficient (%)	0.5	0.5	0.5
16.	Available water storage capacity (%)	8.4	8.6	8.8



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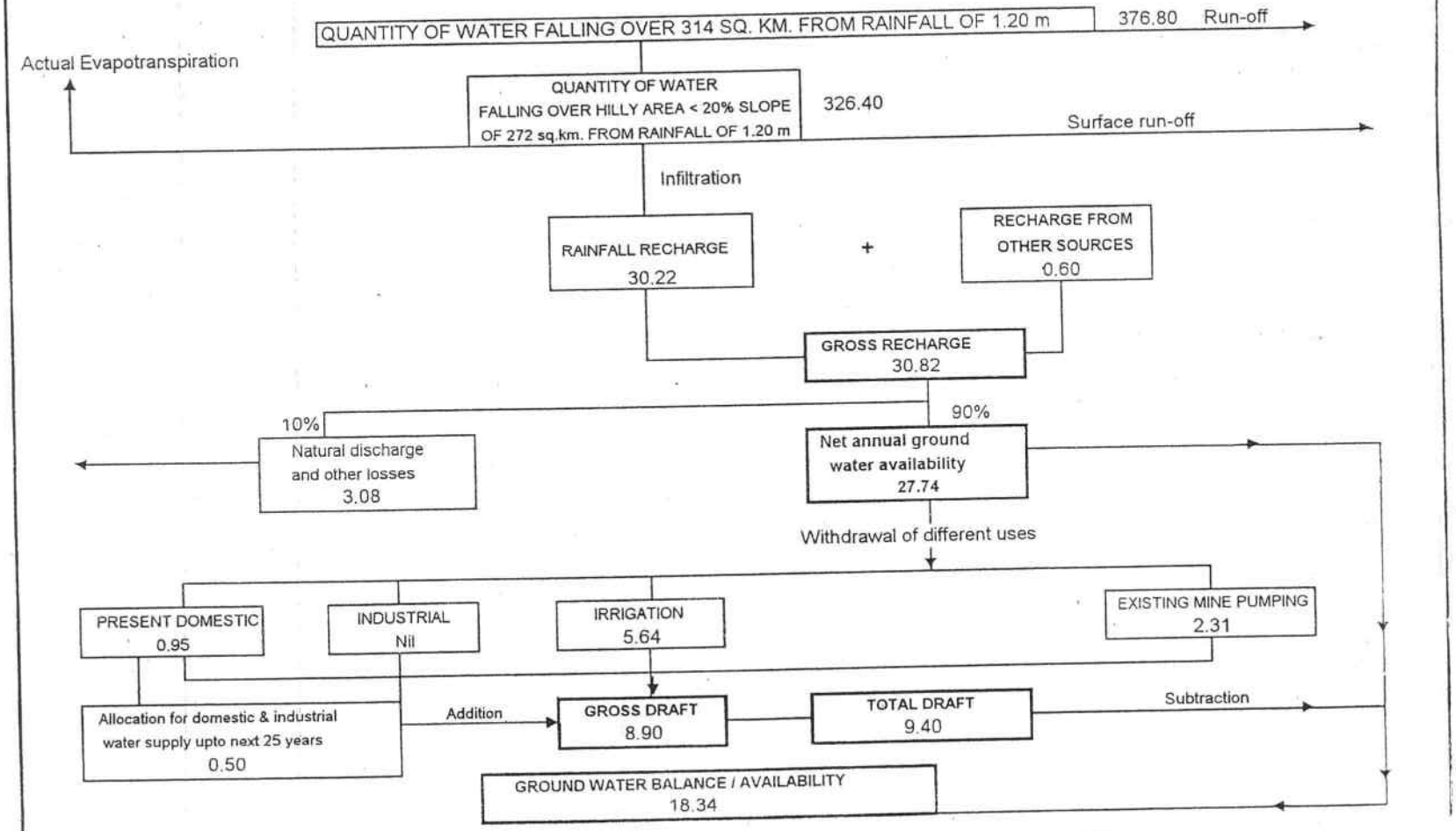
ANNEXURE-X

GHORAWARI OPEN CAST PATCHES MINE
GROUND WATER BALANCE COMPUTATION
(All Values are in MCM)



Note :- Proposed Mine Draft 0.38 MCM at final quarry depth of 80 m, thereby balance reduces to 17.96 MCM

WELFARE WORKS DONE UNDER WCL COMMUNITY DEVELOPMENT & SC/ST PROGRAMME

KANHAN AREA.

S.N.	ACTIVITY / WORK	COMPLETION COST (Rs. Lakhs)	NAME OF MINE	NAME OF VILLAGE	DISTANCE OF VILLAGE FROM MINE(KM)
2000 – 01 (KAN)					
	COMMUNITY DEVELOPMENT WORKS				
1	Construction of Rest Shelter at Kali Mati Tahsil parisar near Junnardeo	0.68	Ambara	Kali Mati	8
2	Construction of one class room at Khapa Swamy village near CGM office	0.76	CGM Office	Khapa Swamy	-
3	Construction of one KIOSK (Cold Water Pyau at Junnardeo)	0.29	Ambara	Junerdeo	8
4	Financial assistance to district authority for repairing of Parasia – Damua road	2.50	Damua	Damua	3
	SC / ST DEVELOPMENT WORKS				
1	Construction of 2 nos. additional class room at Nandan village	3.09	Nandan UG	Nandan	1
2	Construction of approach road of Moari village	2.42	Mori UG	Moari	1
2001 – 02(KAN)					
	COMMUNITY DEVELOPMENT WORKS				
1	Construction of Rest Shelter near Hinglaga mandir near Moari colliery	2.00	Moari colliery	Moari	1
2	Repair works (Latrine, Bathroom) of various schools at Ghorawari, Datla & Dungaria schools	0.33	Ghorawari UG Datla OC	Ghorawari, Datla & Dungaria	7
	SC / ST DEVELOPMENT WORKS				
1	Construction of approach road of Moari village	2.00	Moari colliery	Moari	1

ANNEXURE - XI

S.N.	ACTIVITY / WORK	COMPLETION COST (Rs. Lakhs)	NAME OF MINE	NAME OF VILLAGE	DISTANCE OF VILLAGE FROM MINE(KM)
2002 – 03 (KAN)					
		COMMUNITY DEVELOPMENT WORKS			
1	Construction of community hall at Khapa Swamy village	3.10	Jharna UG	Khapa Swamy	7
2	Rest shelter at Tandsi village	0.48	Tandsi UG	Tandsi	1
3	Eye camp for villagers	0.70	-	-	-
4	Funeral shed at Datla village	0.46	Jharn UG	Datla	7
		SC / ST DEVELOPMENT WORKS			
1	Construction of 2 class rooms at Tribal School Moari village	1.10	Moari /Mohan colliery	Moari	2
2	Boundary wall for Khapa Swamy tribles school	0.50	Gharawari OC	Khapa Swamy	7
3	Steel furniture for Nandan tribal school	0.83	Nandan	Nandan	1
4	Latrine & Bathroom at community hall of CGM office	1.41	Ghorawari OC	Khapaswamy	7
5	Misc. Expenditure	0.50			
2003 – 04 (KAN)					
		COMMUNITY DEVELOPMENT WORKS			
1	Construction of 3 nos. funeral sheds at Jharna, Damua & Ambara villages	1.50	Jharna, Damua & Ambara	Jharna, Damua & Ambara	2
2	Construction of 50 nos. slogan boards from CGM office to Damua	0.53	-	GM o to Damua	
3	Construction of Bus Stop shed at Jannardeo – Tamiya road.	0.50	Ambara OC	Juneradeo	8
4	Construction of retaining wall at Kanhan Valley school ground	0.97	Ghorawari OC	Dungariya	7
5	HDPE pipeline at Ambara	7.00	Ambara OC	Ambara	2
6	Misc. Expenditure	0.50			

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S.N.	ACTIVITY / WORK	COMPLETION COST (Rs. Lakhs)	NAME OF MINE	NAME OF VILLAGE	DISTANCE OF VILLAGE FROM MINE(KM)
2003-04 (KAN)	**SC / ST DEVELOPMENT WORKS**				
1	One bore hole at Ambara	1.50	Ambara OC	Ambara	2
2	Const on one class room at Hanotiya Gram	1.47	Old Sukri	Hanotiya	6
3	To provide dual desk at ghorawari & Dungaria school	1.00	Ghorawari oc	Dungariya/Ghorwa	7
4	Const of boundary wll and toilet at girls school , Dungariya	0.90	Ghorwarai OC	Dungariya	7
5	One borewell at Rampur village	0.54	Tandsi UG	Rampur	4
6	Misc	0.48			
2004-05(KAN)					
	COMMUNITY DEVELOPMENT WORKS				
1	Construction of 2 nos. funeral sheds at Tandsi & Ambara	1.01	Tandsi & Ambara	Tandsi & Ambara	3
2	Construction of boundary wall at Girls Govt. School at Dungaria	2.14	Jharna UG	Dungaria	5
3	Construction of 2 class rooms at Gouri – Palachourai school	2.29	Ambara	Palachouri	3
4	Construction of 2 class rooms at Saraswati Shisu Mandir Dungaria	2.45	Jharna UG	Dungaria	5
5	Construction of 2 additional class rooms at Tandsi – Kanhan Valley school	3.68	Tandsi	Tandsi	2
6	Misc. & Last Year payment	1.02	-	-	
	SC / ST DEVELOPMENT WORKS				
1	Construction of Retaining Wall at Nandan School's Play ground (1st phase)	0.96	Nanda UG	Nandan	2
2	One Bore hole at nandan Village	0.97	Nandan UG	Nandan	2
3	To provide school furniture for trible schools of Rampur & Ambara Village	1.00	Ambara & Tandsi	Rampur &Ambara	2
4	Construction of Urnils for girls & Boys at Govt School of Bawanwara Village	0.39	Jharna UG	Bawanwara	6
5	Misc & Last year payments	0.53			

S.N.	ACTIVITY / WORK	COMPLETION COST (Rs. Lakhs)	NAME OF MINE	NAME OF VILLAGE	DISTANCE OF VILLAGE FROM MINE(KM)
2005-06(KAN)					
		COMMUNITY DEVELOPMENT WORKS			
1	Const of One class room for Dungariya	186	JharnaUG	Dungariya	7
2	Const of Toilet t Palachouri school	0.47	Ambara	Palachouri	3
3	Const of Toilet at Junardeo School	1.00	Ambara	Junerdeo	8
4	Const of Boundary wall of ghorawari kabristan	1.47	Jharna UG	Ghorawari	2
5	Const of 2 class room at Primary school Sukri gram	2.14	Ambara	Sukri	7
6	Const of 2 class room at urdoo School, Damua	2.15	Damua	Damua	3
7	Const of Remaining boundary wall of HSS Dungariya	1.57	Jharna UG	Dungariya	7
8	To provide steel Dual desk to Sukri and Damua school	1.00	Ambara & Damua	Sukri & Damua	8-3
		SC / ST DEVELOPMENT WORKS			
1	Const of retaining wall cum galary of nandan play ground	1.75	Nandan UG	Nandan	2
2	Const of 2 class room at Amadhana school	2.37	Ghorawari OC	Amadhana	8
3	Const of 2 class room at Bamanwara school	2.78	Jharna UG	Bamanwara	8
4	Const of 2 class room at Girls school, Dmua	2.76	Damua	Damua	3
5	Const of 2 class room at Girls school, Junerdeo	2.77	Ambara	Junerdeo	8
6	Const of 2 class room at nandan school	2.20	Nandan	Nandan	3
7	Spill over	1.22	-		

S.N.	ACTIVITY / WORK	COMPLETION COST (Rs. Lakhs)	NAME OF MINE	NAME OF VILLAGE	DISTANCE OF VILLAGE FROM MINE(KM)
2006-07(KAN)					
		COMMUNITY DEVELOPMENT WORKS			
1	Const of 2 class room at Kanhan velly school Dungariya	4.13	Jharna UG	Dungariya	7
2	Const of Boundary wall at Panara Kabristan	1,62	Jharna UG	Panara	6
3	To provide Dual Desk foir Rampur Dungariya School	1.00	Tandsi UG	Rampur	2
4	Const of retaining wll cum galary at Tandsi Ply gropund	1.82	Tandsi UG	Tandsi	1
5	Const of yatree Partikshalaya at Reampur bus stand	1.00	Tandsi UG	Rampur	4
6	100 mtr RCC Road at maori Village	1.00	Mohan	Maori	2
7	Last year spill over & other payments	2.26			
		SC / ST DEVELOPMENT WORKS			
1	Const of retaining wall of nandan Ply ground	2.74	Nandan UG	Nandan	2
2	Musical Instruments to Adivasi Mandal	1.00	-	--	
3	Const of boundary wall of Tribe hostel, Rampur	1.05	Tandsi UG	Rampur	3
4	Const of 2 class room at Ambara School	1.99	Ambara	Ambara	1
5	One bore hole at Khapaswami village	2.05	Jharna UG	Khapaswamy	8
6	One bore hole at Datla Badi village	1.00	Datla	Datal Basti	8
7	Last year spill over	3.37			

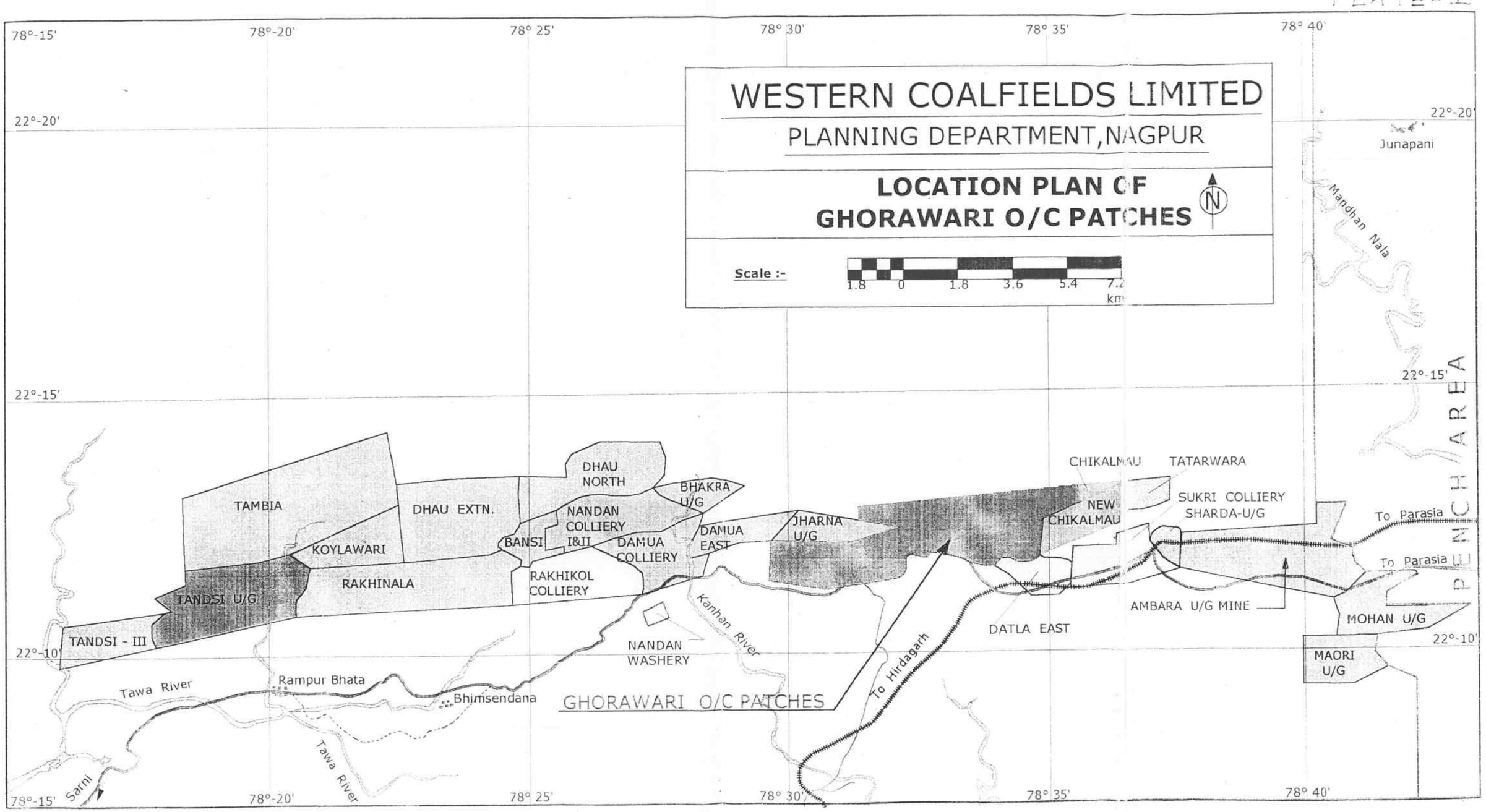
PLATE-I

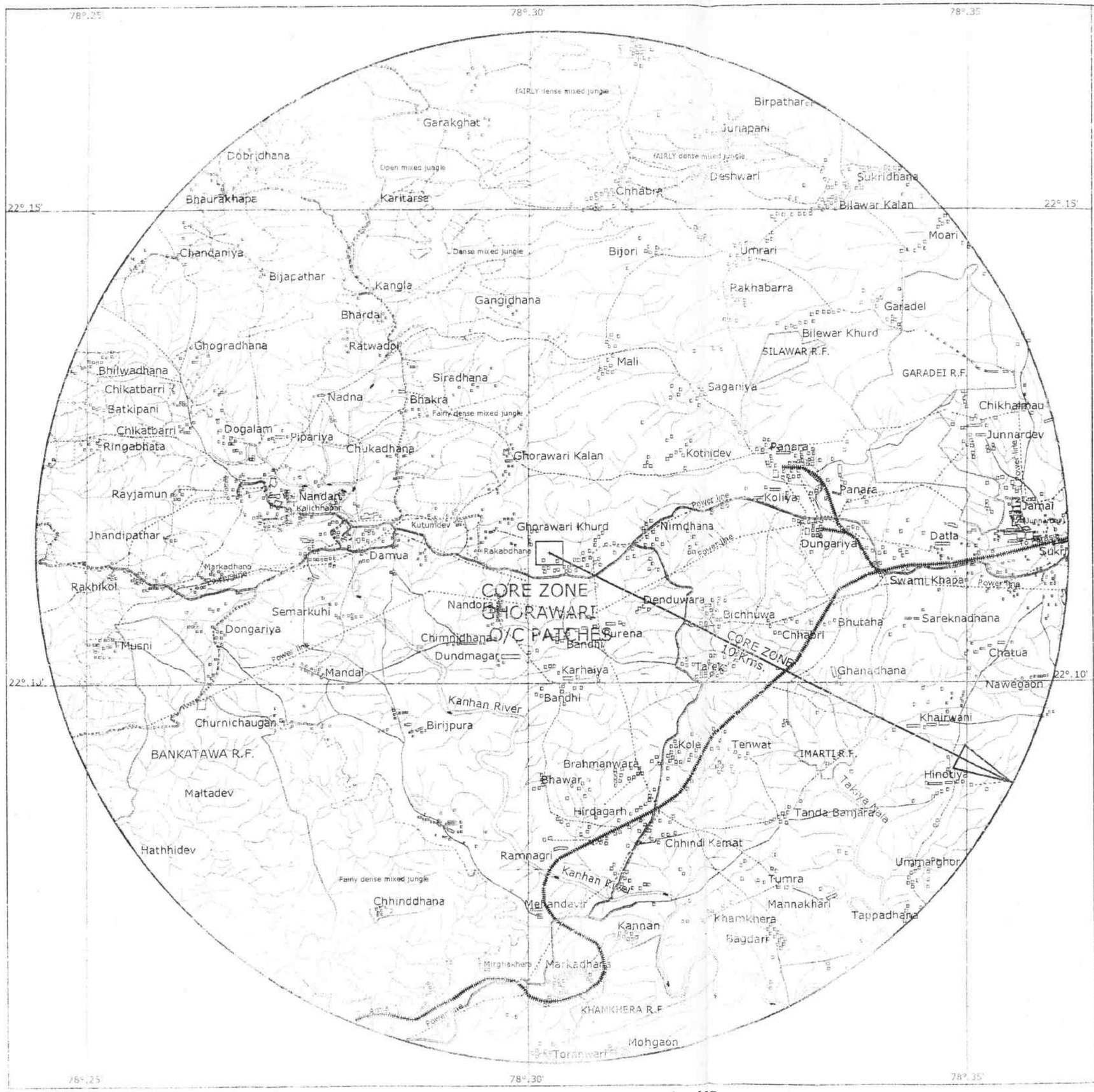
WESTERN COALFIELDS LIMITED

PLANNING DEPARTMENT, NAGPUR

LOCATION PLAN OF GHORAWARI O/C PATCHES

Scale :- 1.8 0 1.8 3.6 5.4 7.2 km





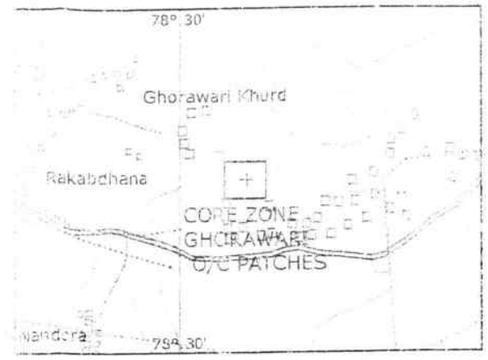


PLATE NO. II

Project: GHORAWARI O/C PATCHES

Title: Index plan showing Core Zone and Buffer Zone

SCALE : 1:75,000

PLATE No - III

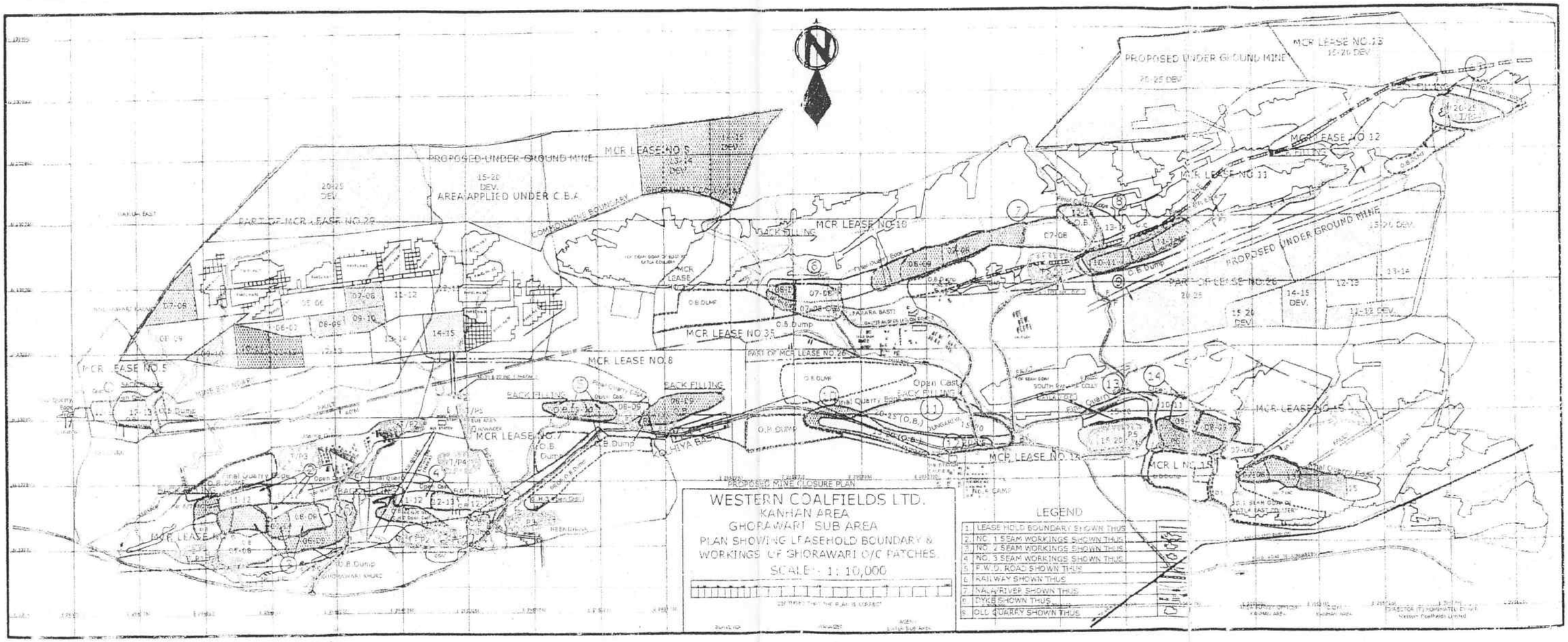
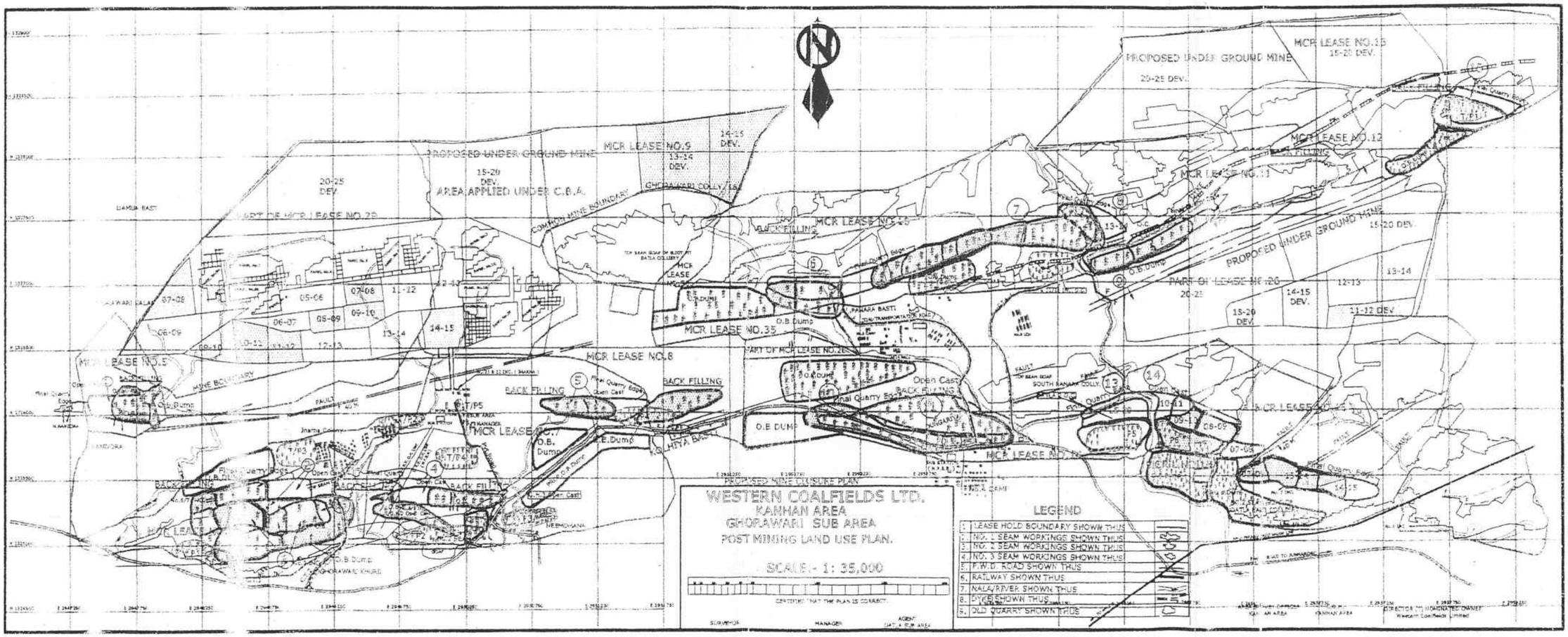

PROPOSED UNDER GROUND MINE
MCR LEASE NO.13
MCR LEASE NO.12
MCR LEASE NO.11
MCR LEASE NO.10
MCR LEASE NO.9
MCR LEASE NO.8
MCR LEASE NO.7
MCR LEASE NO.5
MCR LEASE NO.35
MCR LEASE NO.14
MCR LEASE NO.15
AREA APPLIED UNDER C.B.A.
COMPANY MINE BOUNDARY
BACK FILLING
O.B. Dump
Open Cast
PROPOSED MINE CLOSURE PLAN
WESTERN COALFIELDS LTD.
KANHAN AREA
GHORAWARI SUB AREA
PLAN SHOWING LEASEHOLD BOUNDARY &
WORKINGS OF GHORAWARI O/C PATCHES.
SCALE :- 1: 10,000
LEGEND
1 LEASE HOLD BOUNDARY SHOWN THUS
2 NO. 1 SEAM WORKINGS SHOWN THUS
3 NO. 2 SEAM WORKINGS SHOWN THUS
4 NO. 3 SEAM WORKINGS SHOWN THUS
5 P.W.D. ROAD SHOWN THUS
6 RAILWAY SHOWN THUS
7 NALA/RIVER SHOWN THUS
8 DYKE SHOWN THUS
9 OLD QUARRY SHOWN THUS

PLATE No.- IV


PROPOSED UNDER GROUND MINE
MCR LEASE NO.15
15-20 DEV.
20-25 DEV.
MCR LEASE NO.12
MCR LEASE NO.11
MCR LEASE NO.9
13-14 DEV.
14-15 DEV.
15-20 DEV.
AREA APPLIED UNDER C.B.A.
GHORAWARI COLLY. Ltd.
COMMON MINE BOUNDARY
PART OF MCR LEASE NO.29
MCR LEASE NO.10
BACK FILLING
MCR LEASE NO.35
PART OF MCR LEASE NO.26
MCR LEASE NO.8
MCR LEASE NO.7
MCR LEASE NO.5
O.B DUMP
Open Cast
Final Quarry Edge
MINE BOUNDARY
FAULT
PROPOSED MINE CLOSURE PLAN
WESTERN COALFIELDS LTD.
KANHAN AREA
GHORAWARI SUB AREA
POST MINING LAND USE PLAN.
SCALE:- 1: 35,000
CERTIFIED THAT THE PLAN IS CORRECT
SURVEYOR
MANAGER
AGENT
LEGEND
1. LEASE HOLD BOUNDARY SHOWN THUS
2. NO. 1 SEAM WORKINGS SHOWN THUS
3. NO. 2 SEAM WORKINGS SHOWN THUS
4. NO. 3 SEAM WORKINGS SHOWN THUS
5. P.W.D. ROAD SHOWN THUS
6. RAILWAY SHOWN THUS
7. NALA/RIVER SHOWN THUS
8. DYKE SHOWN THUS
9. OLD QUARRY SHOWN THUS

ANNEXURE-X

Western Coalfields Limited

(A Government of India Undertaking)
Regd. Office: 'Coal Estate', Civil Lines, Nagpur – 440 001.
Telephone: 91- 0712-2510151, Fax: 91-0712- 2510151

Ref No. WCL/HQ/ENV/4 - 1/ 1373 Dt: 18/11/2008

To,
Dr. T. Chandini,
Director,
Government of India, Ministry of Environment & Forests,
Paryavaran Bhavan,CGO Complex,
New Delhi – 110510.

Sub: -Submission of documents for environmental Clearance for **Ghorawari OC Expansion Project (From 0.45 MTPA to 1.50 MTPA)**under **clause 7(ii) of EIA Notification, 2006.**

Ref :- Telephonic discussion on 18.11.2008.

Madam,

Kindly refer to your telephonic directions on the subject matter. As directed the details have been prepared and placed below for your kind perusal.

The scenario of the project in respect of the mining and allied parameters during proposed expansion of production capacity vis – a vis the sceario of the existing project is summarised as below :-

The project proposal is to mine coal from the patches of old UG workings by Opencast operations and expansion in production of coal from **0.45 MTPA to 1.50 MTPA which is the maximum achievable production capacity.**

The total lease area is 1296.011 ha of which 178.10 ha is agriculture land, 593 ha is forest land, 192 ha is grazing land, and 332.911 ha is government land. Forest clearance has been applied for the renewal of lease.

There is no National Park, Wild Life Sanctuary, Biosphere Reserves found in the 10 Km Buffer Zone.

River Kanhan flows at a distance of 6-7 Km from the ML. It is not proposed to modify the existing natural draianage.

Ultimate working depth is 45 m bgl (average) and present working depth is 40 m bgl.

Contd .. 2

Of the total lease area, area for excavation is 750.36 ha, area for OB dumps 217.86 ha, infrastructure is 12.34 ha, roads is 2.65 ha, area for green belt is 497.049 ha, area for township is 140 ha, and area for rationalisation is 172.80 ha.

It may be noted here that there is no change in the above mentioned mine specific parameters (except for production capacity and schedule of production) in the expansion proposal in comparison to the earlier EC granted vide letter no . J – 11015/382/2007. IA. II(M) dated 19.02.2008.

The proposal is to mine coal from patches of old UG workings by opencast operations is as given below.

Sl. No	Name of OC PATCHES	Quarry Area(ha)	Total		Quarry Depth (m)		Balance		OB Excavated till date in lakh Cum.	Final Backfilled Area(ha)	Final Void Area(ha)
			Coal in Lakh Tonnes	OB in Lakh Cum.	Present	Maximum	Coal in Lakh Tonnes	OB in Lakh Cum.			
A) Present Working Patches											
1.	No. 16/17 OC Patch Ph – II Start – 08/06 Finish – 07/08 Completed.	17.00	4.95	31.53	45	50	NIL	NIL	31.53	9.50 Which is being technically reclaimed.	7.50
2.	No. 6A & 6 B OC Patch Ph – VI Start – 08/07 Finish – 05/2011	20.00	3.77	33.57	30	52	0.89	17.45	16.12	10.0 Backfilled till date is 10.00 ha Which is being technically reclaimed.	2.00
TOTAL (A)		37.0	8.72	65.10			0.89	17.45	47.65	19.50	
B) Proposed upto 2011 - 12											
1.	No. 16/17 OC Patch Ph – III	40.50	8.57	60.75	--	54	8.57	60.75	--	40.50	NIL
2.	Ghogra OC Patch	8.0	2.99	13.13	--	53	2.99	13.13	---	6.0	2.0
3.	Kothideo OC Patch	12.50	5.12	17.83	--	34	5.12	17.83	---	10	2.50
Total (B)		61.0	16.68	91.71	--	---	16.68	91.71	---	56.50	4.50
C) Proposed upto 2015 - 16											
1.	Ghorawari Kalan OC Patch	15.00	4.50	28.45	-	30	4.50	28.45	--	10.44	4.56
2.	Dungariya OC Patch	39.00	10.60	109.50	--	50	10.60	109.50	-	27.13	11.87

S. No	Name of OC PATCHES	Quarry Area(ha)	Total		Quarry Depth (m)		Balance		OB Excavated till date in lakh Cum.	Final Backfilled Area(ha)	Final Void Area(ha)
			Coal in Lakh Tonnes	OB in Lakh Cum.	Present	Maximum	Coal in Lakh Tonnes	OB in Lakh Cum.			
3.	Panara OC Patch	12.50	4.25	39.75	--	54	4.25	39.75	-	8.70	3.80
4.	Bharat Colliery OC Patch	79.20	24.0	198.0	-	48	24.0	198.0	-	55.10	24.10
5.	Chikalmau OC Patch	21.00	6.55	61.58	-	67	6.55	61.58	--	14.61	6.39
6.	South Panara OC Patch	21.25	7.69	81.29	-	62	7.69	81.29	-	14.778	6.472
Total (C)		187.95	57.50	518.62	-	-	57.50	518.62	-	130.758	57.192
D) Proposed beyond 2015 - 16											
1.	Virgin Patch	168.0	Individual schemes will be firmed up after 2014- 15. Estimated backfilled area would be 297.500 ha and void would be 127.094 ha								
	Between GH 16/17 & Ghorawari Kalan OC	136.594									
2	Datla East	120.0									
Total (D)		424.594									
E) Abandoned Patches :											
1	No. 16 & 17 OC patch PH-I	12.50	Not Applicable.							12.50	NIL
2	No. 6 & 7 OC Patch. Ph-I & II	7.50								7.50	NIL.
3	GH-2 OC Patch	6.0								6.0	NIL
4.	GH-3 OC Patch	4.5								4.5	NIL
5.	Kolhiya OC Patch	4.0								4.0	NIL
6	DQ-3 OC Patch	5.316								5.316	NIL
Total (E)		39.816								39.816	NIL
Grand Total (A+B+C+D+E)		750.36	82.90	679.11			75.07	627.78		254.574 +297.500 = 552.074	71.192 + 127.094 = 198.286

There is no change in geo – mining parameters of the above mentioned patches during the proposed expansion of production capacity up to maximum achievable capacity of the mine <u>except for the mine life due to change in production capcity.</u>

Mineral transportation of 3636 TPD of coal is by road to railway siding covering a distance of 12 Kms and the balance 909 TPD is by road at the time of maximum production of 1.50 MTPA.

Present working depth is 40 m bgl. Water table is in the range of 4.05 m – 17.20 m. during pre-monsoon season and 0.05 – 8 m bgl during post-monsoon. Mining has intersected water table. Peak water requirement is 440 m3 per day which will be met from mine pit water.

Contd ..4

Presently a total of 16.68 Mm3 of OB has been generated of which 12.86 Mm3 has been used for backfilling and 0.82 Mm3 has been dumped in external OB dump. An estimated 62.778 Mm3 of OB would be generated in the balance life of the mine which will be backfilled simultaneously.

The total quarry area of 750.36 ha of which 552.074 ha would be backfilled and plantatation developed thereon.

Sl.NO	Area(ha)	Existing	Status up to 11 – 12	Status up to 15 -- 16	Status beyond 15 - 16	Status at the end of Mine Life
1.	Excavation	83.36	81.00	187.95	424.594	750.36
2.	Backfilled	59.316	64.50	130.758	297.500	552.074

Balance life of the mine considering the maximum achievable capacity of 1.50 MTPA is 12 years. A void of 198.286 ha with a maximum depth of 10 -- 15 m would be left at the end of mine life which would be converted into a reservoir.

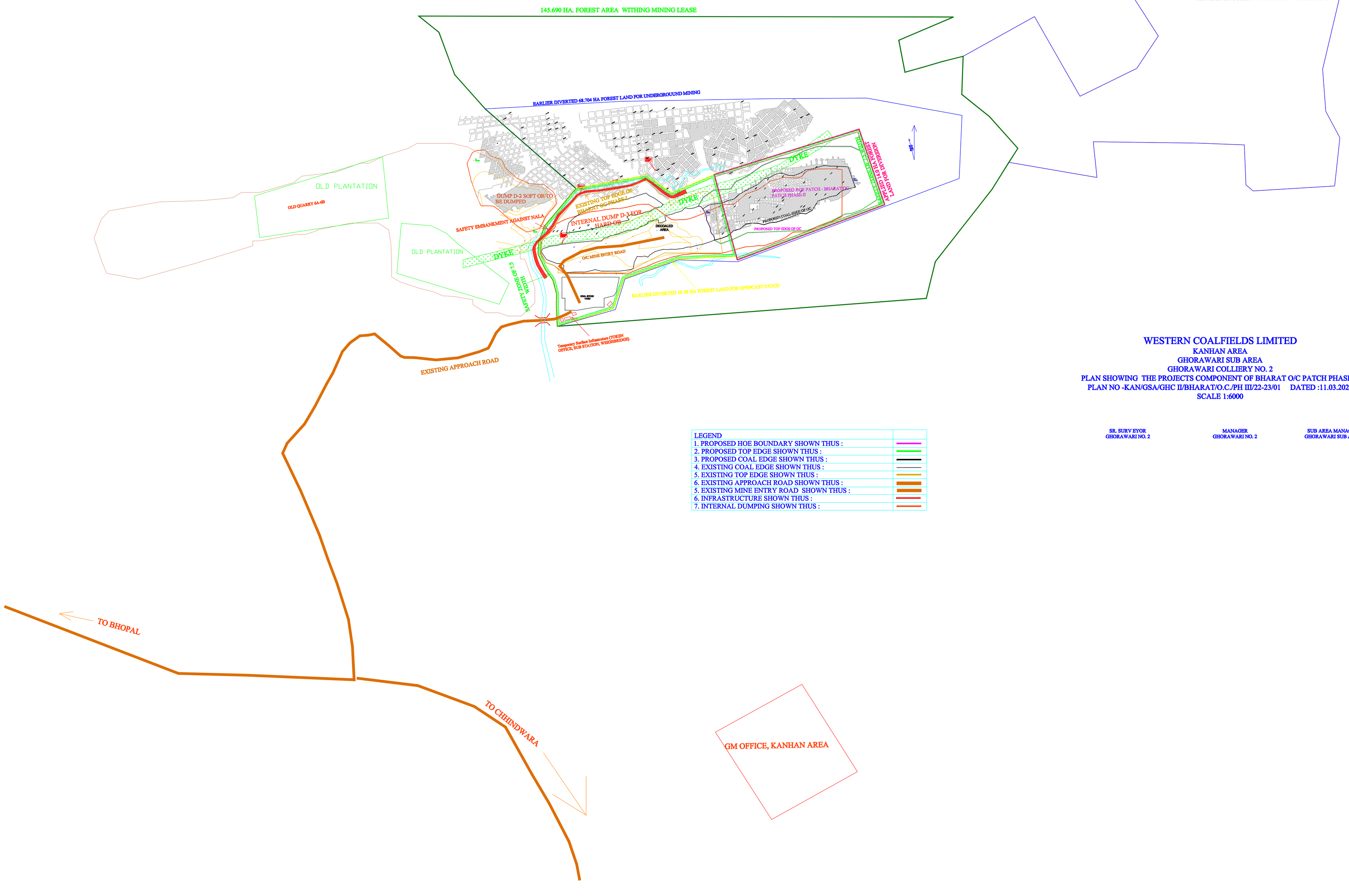
There is no change in the final land use pattern of the mine at the end of mine life.

Yours faithfully

Officer on Special Duty(Environment)

ANN

ANNEXURE-XI



LEGEND	
1. PROPOSED HOE BOUNDARY SHOWN THUS :	
2. PROPOSED TOP EDGE SHOWN THUS :	
3. PROPOSED COAL EDGE SHOWN THUS :	
4. EXISTING COAL EDGE SHOWN THUS :	
5. EXISTING TOP EDGE SHOWN THUS :	
6. EXISTING APPROACH ROAD SHOWN THUS :	
5. EXISTING MINE ENTRY ROAD SHOWN THUS :	
6. INFRASTRUCTURE SHOWN THUS :	
7. INTERNAL DUMPING SHOWN THUS :	

WESTERN COALFIELDS LIMITED

KANHAN AREA

GHORAWARI SUB AREA

GHORAWARI COLLIERY NO. 2

PLAN SHOWING THE PROJECTS COMPONENT OF BHARAT O/C PATCH PHASE II

PLAN NO -KAN/GSA/GHC II/BHARAT/O.C./PH III/22-23/01 DATED :11.03.2023

SCALE 1:6000

SR. SURV EYOR GHORAWARI NO. 2	MANAGER GHORAWARI NO. 2	SUB AREA MANAGER GHORAWARI SUB AREA

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