

CHAPTER – XI

SUMMARY AND CONCLUSION

11.1 INTRODUCTION :

11.1.1 Purpose

Working group/X Plan document had indicated the demand of non-coking coal for XI Plan as 580 Mt and indigenous supply of non-coking coal from CIL as 445 Mt. The updated production of May 2005 have indicated the demand of non coking coal for the XI plan as 622 Mt and indigenous supply of non coking coal from CIL as 508 Mt. Projection of total indigenous supply of non coking coal as 562.32 Mt leaves a gap of 59.68 Mt for which Emergency Coal Production Plan of CIL has been formulated. Kismunda Opencast has been identified as one of the project in the Emergency Coal Production Plan of CIL. And, liberalisation of power sector by Government of India has generated wide spread interests for private and public sector investments in power generation. As such, there is an appreciable increase in the number of upcoming new thermal power projects in both private and public sectors. This has resulted in a sharp increase in demand for power grade coal. Expansion of Kismunda Opencast is, therefore, proposed with a view to fulfill the above indicated growth in demand.

The on-going Kismunda Opencast Expansion was sanctioned for a targeted coal production of 10 Mty. Presently, Kismunda Opencast Expansion is producing coal approx. 8 Mty. The expansion of this project has been planned to a targeted capacity of 15 Mty. The additional production has been linked to various Thermal Power Stations. CSEB will take about 9 Mt from this project. As such, there will not be any problem to market the coal from this project.

After studying the geo-mining parameters within the proposed mine boundary, the project is planned for a targeted capacity of 15 Mty. with additional capital of 450.56 crores over sanctioned capital of 737.65 crores for 10 Mty.

11.1.2 Location & communication

Kismunda OCP Expansion, a part of Eastern Sector of Jatraj, Resdi and Sonpuri Blocks, is located in the south-central part of Korba Coalfield in Korba district of Chhattisgarh. These blocks cover an area of **25.36** sq. km. and are bounded by latitudes 22°15'18" to 22°21'30" North and longitudes 82°38'39" to 82°42' 08" East (Ref. **Plate No.1**) and included in Survey of India Toposheet No. 64J/11.

The blocks are well connected by rail and road. 'Gevra Road' and 'Korba Railway Stations' on Champa-Gevra Road branch line of S.E.C. Railway are at a distance of 1.5 km and 5 km respectively. Bilaspur, is at a distance of about 90 km by road.

11.1.3 Importance

National

The project will produce coal of Power Grade, and India is dependent mostly on thermal power, and the project is contributing to production of thermal power hence

it is of national importance. MPEB, NTPC – Ramagundam, Cement Plants and Sponge Iron Plants etc are fed by this project for production of thermal power.

Regional

The project is partly linked to region CSEB, West Bank Power Plant and CSEB, East Bank Power Plant for catering to the region and the state power demand, hence it has also regional importance in production of thermal power.

11.2 PROJECT DESCRIPTION:

The area of Kasmunda mining block is **10.66** sq.km. The area is under consideration for mining of Kasmunda Opencast Expansion Project (**15 Mty**).

Occurrence of 3 nos. of coal seams have been proved in the block. These seams in descending orders are 'E' & 'F', Upper Kasmunda and Lower Kasmunda. Lower Kasmunda Seam occurs as composite seam in the western part of the block. However, it splits up in two sections, namely, Lower Kasmunda (Top Section) and Lower Kasmunda (Bottom Section) in small part of the block. The average grade of the coal is 'F'

The mine-able reserves & volume of OBR considered in this report have been 499.13M Tes and 707.66 Mcum . The life of the mine is 35 years.

Considering the geo-mining parameters of the quarry, shovel-dumper mining system has been adopted to excavate OB, while extraction of coal will be done through Surface Miner.

The expansion project has provisions for pumping & drainage of mine water , coal handling , workshop, power supply , township with water supply & sewerage system and land area.Details have been given in CHAPTER II.

11.3 DESCRIPTION OF THE ENVIRONMENT

11.3.1 Study Area, Period, Components & Methodology

Study area is considered area within **10** km radius from the periphery of the project as all the base line data have already been studied and assessed within this definition of ambit of the study area.

11.3.1.1 Study Area

The study area as described in **Table-3.1** of which study has been carried out.

11.3.1.2 Period

The period has been mentioned in Table-3.2.

11.3.1.3 Components

As mentioned herein before as in 11.3.1 and 3.1.1 .

11.3.1.4 Methodology

Methodologies have been discussed in para 3.1.4 in CHAPTER III.

11.3.2 Establishment of baseline for valued environmental components as identified in the scopea). **Socio-economic aspects**

A study of socio-economic profile in buffer zone including core zone (based on available census data) reveals that the total population of the area consists of about **281273** persons, of which **51.52%** are male and **48.48%** are female. Scheduled castes account for **13.61%** of total population and Scheduled tribes **21.84%**, whereas **64.55%** population is literate. The data reveals that **26.95%** of the population are main workers and **7.79%** are marginal workers, the rest **65.25%** are non-workers.

b). **Land requirement**Core Zone Area

It is estimated that **2536.236** Ha. of land will be required for Kusmunda Opencast Project Expn. including land for quarry, external dumps, industrial and residential complex, road, safety zone and rehabilitation colonies. This also includes **1673.62** Ha. land already acquired for existing Kusmunda OCP. The break-up of land use is given below in **Table-3.8 a**.

Table-3.8 A

SL.No	Particulars	Total land requirement (15 MTY)			Total Requirement
		Agri. land	Forest	Govt. land	
1	Quarry area	865.77	54.44	146.11	1066.32
2	Safety zone	93.19	10.5	57.39	161.08
3	Rehabilitation	20	49	0.95	69.95
4	Colony	8	30	2.25	40.25
5	External dump	239	3	83	325
6	Infrastructures	82.15	59.46	158.39	300
7	Road	5.5	0	2.45	7.95
8	Others	382.385	47.089	136.212	565.686
	Sub total	1695.995	253.489	586.752	2536.236
	% of total land	66.87	9.99	23.14	100.00

Study Area

The detailed land use map is prepared based on topo-sheets and then supplemented by information collected from Forest Department, revenue department and mouza maps of the neighbouring villages as shown in *Plate-II*. Summarised details are in **Table-3.8 B**:

Table-3.8 B

PARTICULARS	AREA	% OF TOTAL AREA
Total area	42095	100
Forest area	9272	22.03
Irrigated Agril. Land	1049	2.49
Un irrigated Agril. Land	18794	44.65
Culturable waste land	6127	14.56
Area not available for cultivation	6853	16.28

c). Meteorological Trend

The meteorological data with respect Temperature for 1984 to 2003 are available so far from the nearest Bilaspur Meteorological Observatory, which is situated approximately 90 km. from the project. The temperature varies from **5⁰C to 44.7⁰C** . The average rainfall as per as per raingauge station at Katghora for 1954 to 2007 is **1516 mm**.

d) Micro-meteorological Study

A Micro-meteorological station was installed in the core zone of the Block with a view to recording wind velocity & direction, temperature, relative humidity, cloudiness, rainfall and barometric pressure on hourly basis for the period from April 2006 to June 2006. The data thus collected at the station have been considered for a representative of the prevailing Micro-meteorological aspects of the study area. Location is shown in *Figure -5*.

Meteorological data collected during the study reveal the following as briefly described in **Table- 3.10 b**:

Table-3.10 b

Micro-meteorological elements	Observations
Wind Velocity	Ranges as from <1.00 kmph to 15.4 kmph.
Wind Direction	Predominant is from South -southwest .
Temperature	Ranges as from 17.5 ⁰ C to 42.5 ⁰ C.
Relative Humidity	Relative humidity ranges as from 20 - 86 %.
Cloud cover	Predominantly mostly clear sky during the study period.
Rainfall	56.5 mm total.

e). Ambient air quality

Ambient air quality data in & around Kusmunda project area shows maximum concentration. of SPM, RPM, NO_x, SO₂ in summer as **352, 106, 11.7 & 19.1** µg/cum respectively which is within the permissible limits.

f). Water quality

Water samples were collected and analysed from different locations representing surface water sources , ground water sources and adjoining mine discharge. The analytical result shows that the physical and chemical parameters are within prescribed limits of GSR : 742(E) and IS:10500 . Provision of settling tanks to arrest suspended solids from mine water, workshop water, surface run off have been made. Domestic Effluent will be treated in Domestic Effluent Treatment Plant.

g). Noise level

The maximum noise level data recorded at Kusmunda mine site was **50.2** dB(A) which is within the prescribed limit value of 75 dB(A).

h). Forest flora & fauna

1) Flora.

There is 253.489 ha.of forest land falls in mining area. The forest cover in buffer zone is about 9018.511(9272 ha in the study area).In the absence of scientific management in the past, these forests have suffered from heavy fellings. Biotic pressure put exerted by human beings and domestic animals of surrounding areas is also tremendous. In order to confirm the survey status of flora and fauna, the Intensive Forest Management Plan for Katghora Division of Forest Department in Chhattisgarh , was consulted. Forest area is open, unclassified and not covered under any working plan.

2) Fauna

Fauna are identified by forest officials adopting four methods viz., signs of faecal droppings, siting, appearance of pug marks on water holes/prints and signs of grazing/browsing. The migration of wild life from adjoining forest areas is not noticed as the area is open and disturbed by biotic factors already existing. Inventory of animals and birds is made in compartment history on the prescribed format of forest department. The details of existing environmental scenario have been given in CHAPTER III.

i) Hydrogeology

Yearwise static water levels from Banki and Urga Hydrograph Stations during pre and post-monsoon as recorded by Bilaspur District, Chhattisgarh have been collected. The average fluctuation in GWL observed from the data of permanent observation wells is about **4.85** metres.

Rainfall is the principal source of recharge. The calculation of the ground water recharge has been done based on the GEC norms for rainfall infiltration index as 11.5% and for water level fluctuation method assuming specified yield as 8% for hard rocks. Based on the rainfall infiltration method the recharge works out to **56.34** M.cu.m. Discharge of the area works out to **25.61** M.cu.m. From this it is seen that the surplus water available in the area is **30.73** M.cu.m. The details are given in CHAPTER - III .

11.4 ANTICIPATED ENVIRONMENTAL IMPACT & MITIGATION MEASURES

11.4.1 Environmental Impact Assessment

1). Socio Economic Impact

The project will have on the whole a positive impact on socio-economic profile of the area due to increase in direct and indirect new employment opportunities, trade and business, community development, improved communication link, additional health care facilities etc. in the long term as the life of the mine is **35** yrs.

The approximate no. of affected land oustees involved in the project is **3356** including **1895** in additional minetake area . The no. of families involved in the project is **2199** including approximately **1065** families in additional minetake area .

Chattisgarh Government will be benefited through financial revenues in crores of rupees by way of royalty, sales tax etc. from the direct and indirect operations in the project area. Central exchequer is also getting financial revenues by way of Income tax, Central Sales Tax etc.

2). Impact on land use

The premining land use of the project is as follows.

Forest land	:	253.489Ha.
Govt. land	:	586.752Ha.
Tenancy land	:	1695.995Ha.
/ Agricultural land		
Total land area	:	2536.236 Ha.

The land area would be utilized by the project for quarrying (**1066.32Ha.**), External OB dumping (**325.00 Ha.**) , infrastructures & rehabilitation area (**369.95 Ha.**), road (**7.95Ha.**) , colony (**40.25 Ha.**) and safety zone & others (**726.766 Ha.**). These activities will cause change in premining land use pattern by degrading **253.489Ha** of forest, agricultural and Govt. land affecting existing flora & fauna , existing surface drainage pattern , displacement of population.

3). Impact on environment

Air environment:- Air quality in respect of SPM, RPM, SO₂ & NO_x within and around the project area are found to be within the prescribed limits of MOEF. These parameters may increase their values if proper mitigative measures are not taken care of

may cause pulmonary infections like pneumoconiosis , silicosis etc, irritation of eyes , poor visibility etc.

Water environment : - Untreated mine water , Workshop & Domestic effluent water could cause pollution to surface & ground water courses with excess of Suspended solids , Oil & Grease , COD and BOD, Dissolved solids , Sulphates , Chlorides , Bacterial contamination leading to serious problems to aquatic life & human health hazard.

Diversion of surface water courses and lowering of ground water table are the likely impacts on surface & ground water courses leading to water scarcity in the area..

Noise environment :- The impact of continued exposure of higher noise levels on humans and fauna are as follows:

- * Annoyance and irritation
- * Mental and Physical fatigue
- * Interference in normal activities.
- * Health hazards resulting from impaired hearing
- * In extreme cases, cardio-vascular diseases etc.
- * Task interference.
- * Interference with communication i.e masking.
- * Hypertension and higher blood cholesterol.

Flora & Fauna :- There are following identified impacts on flora & fauna .

- a) Removal of vegetation (253.489Ha of forest, for which provision of compensatory afforestation has been made) due to mining activities.
 - b) Pollution of surrounding water bodies due to leaching from overburden dump and pollutants from other activities. This affects the aquatic fauna . Plantation on dump surface and provision of foot & catch drains have been made to control this phenomena.
 - c) Dust in atmosphere , contributed by mining and associated activities, when deposited on leaves of the plants in the surrounding areas may retard their growth. Provision of dust suppression system on haul roads , CHP etc have been made.
- 4). **Impact on meteorology** : - Meteorological data for the last few decades have been collected from nearest IMD station at Bilaspur. The average annual rainfall recorded is about 1516 mm.(at Katghora) Maximum rainfall is received during monsoon months of June to September. Looking into general trend of rainfall, differences are within normal cyclic pattern and cannot be attributed to mining activity in the area.
- 5) **Hydrogeological aspect** : - As mentioned earlier, because of the low permeability of aquifers, the impact of mining on local water regime will be marginal and the radius of influence will be limited to a small distance. So also, due to stratification, the individual permeable beds develop individual drawdown cones and the impact is usually limited to few hundred meters.

6). **Hazard assessment :-**

a) Impact of Ground Vibration

The main impacts due to ground vibration may be :

1. Development of cracks in the houses located in the neighbouring areas.
2. During blasting rock fragments fly up to a distance of about 150 m.

The habitat nearby opencast mine would be rehabilitated and hence no such hazard is anticipated.

b) Coal fire

No incident of coal fire is reported in adjoining mines of Kusmunda area.

The details of environmental impact assessment have been given in CHAPTER V.

11.4.2 Environmental Control Measures

A). **Socio Economic Measures :**

The approximate no. of affected land oustees involved in the project is **3356** including **1895** in additional minetake area . The no. of families involved in the project is **2199** including approximately **1065** families in additional minetake area .The project affected families & persons will be benefited with the facilities provided at the new locality but their original cultural heritage may not be restored back.

1) Secondary Employment opportunities

There will be spontaneous economic stimulus in the area with the commencement of opencast patch. Some traders and private enterprises will grow in the area with this economic growth. Besides, the State exchequer will derive financial revenues through levy of royalty, sales tax etc. and Central Government will also be benefited by way of Central Sales Tax, Income Tax, Cesses etc.

2) Educational Facilities

Total 106 villages falling in buffer zone have primary school facility. There are 91 middle schools, 18 secondary school and 20 colleges in the study area.

3) Medical Facilities

There are well equipped Hospitals at Gevra , Korba and Kusmunda area of SECL. In addition there are 8 primary health centre and 22 health sub centre within the buffer zone.

4) Literacy Drive :

An action plan for achieving 100% literacy among workers in the SECL, was launched in the year 1992. Under the same scheme, workers of Kusmunda OC project will be covered to achieve 100% literacy level.

b). **Solid waste management & land reclamation:**

Out of total volume of **707.66** Mcum OB to be removed , only **60.00** Mcum will be dumped as external dump and the balance of **647.66** Mcum will be dumped in the decoaled area as internal dump.

60 Mcum OB will be externally dumped for which **325.00** Ha of land will be required. External dump has been made in the rise side boundary of the mine after following considerations:

1) Reclamation

Technical reclamation involves backfilling of excavated area with overburden in a systematic manner , after levelling and grading, the dump slope and top . Then the top soil would be laid over dump surfaces. Then plantation will be done on dump surface.

2) Compensatory afforestation

Abuot **253.489**Ha of forest land is involved within mine lease area of project. Compensatory afforestation is involved and will be carried out.

c). **Air pollution control measures :**

Considering anticipated affect on air quality due to advance in mining operations, following control measures will be implemented.

- i) 3.2 line kms. of fixed water sprinkler commissioned along coal transportation road.
- ii) 14 kms of road has been black topped .
- iii) Belt conveyor has been covered.
- iv) All drills have been equipped with dust extractors.
- v) Extensive plantation carried out in mine & other areas till date.
- vi) Alomised dust suppression system proposed in new rapid loading system.
- vii) Coal winning by surface miner (-100 mm size) will result in avoiding drills, blasting & crushing of coal.

d). **Water pollution control measures :**

- i) Mine sump of 210 MGallon capacity in quarry II and 80 MGallon capacity in quarry III are existing. Mine water is used for industrial water demand and ground water recharge.
- ii) Surface settling tank for mine effluent treatment is in operation. Water is being provided to Jatraj village for irrigation.
- iii) Oil & grease trap of 96 cum. capacity existing and will be strengthened during expansion
- iv) Domestic effluent treatment plant of 2.00 MLD capacity has been commissioned in March,2001.
- v) DETP caters to the population of 11205 personnel staying quarters in Adarsh Nagar, Vikas Nagar and Jawarhar Nagar. Sludge is in use as fertilizer in afforestation activities.

d). **Noise pollution control measures :**

The following measures are adopted

1. Proper designing of plant and machinery by providing inbuilt mechanisms like silencers, mufflers and enclosures for noise generating parts and shock absorbing pads at the foundation of vibrating equipment.
2. Routine maintenance of equipment
3. Enclosures for crusher house etc.
4. Sound proof cabins for machines in the workshop likely to cause high noise levels
5. Greenbelts around the quarry, infrastructure sites service building area and township besides avenue plantation on both sides of the roads and railway siding to maintain noise level at night time within the limit for the inhabited localities situated at a very close proximity.
6. Provision of isolator for vibrating equipment (both fixed and mobile) foundation
7. Adoption of personnel protective devices like earplugs, earmuffs, etc.

e). **Blasting Vibration Control Plan**

The following factors will be given special attention to minimise effects of blasting:

- * Charge per delay
- * Charge per round
- * Over charging will be avoided
- * Distance from the structures (Scaled distance)
- * Type of initiation & sequence of delay

- * Stemming material used will be moist.
- * Blasting time (safety aspect)
The blasting will be done at a fixed time as far as possible.

- * Warning

Before blasting is carried out , warning sound will be given so that people can move to safe place.

Vibration control

- * As mentioned above, the mitigation measures will be implemented during blasting and it is expected that vibration will not cause damage to any structure or annoyance to the people in the colony area or neighbouring villages.
- * Controlled blasting techniques will be implemented near the builtup structure in the vicinity of active face.
- * A safe blasting zone as per DGMS norms would be kept around the periphery of the quarry.

f) Green Belt Development

Green belt around mine , Sides of haul Roads & all other roads , around infrastructures , colony are already in existence & will be augmented further..

The details of environmental control measures have been given in CHAPTER IV.

g) Final decommissioning or rehabilitation of completed project

Although, the mining activities may last a few decades, but they are liable to leave a long lasting impacts on the landscape, ecology and on local inhabitants. If not properly managed, effects can be detrimental for general welfare of most of the stake holders. Thus, any mining venture must have adequate closure plan, aimed at rehabilitation of disturbed area, which should be acceptable to local community as well as regulatory authority. CHAPTER – IV described the details about the mine closure planning.

11.4.3 Irreversible & Irretrievable components of environmental components

a) Land use :

There will be change in the surface topography from the original premining status (280-300 m above mean sea level) to the scenario in post mining which gives external as well as backfilled dumps and left out mine void as given in **table 2. 06 & 4.04** . The details have been discussed in para 4.8

b) Rehabilitation & resettlement of project affected families & persons:

Although the project affected families & persons will be benefited with the facilities provided at the new locality but their original cultural heritage may not be restored back.

There are many educational , medical facilities and other civic amenities in the area have been developed for the benefits of the project employees as well as for the people residing around the project considered to be permanent & positive impacts.

Refer para **4.4.1** and table **4.51** for details discussion on R&R .

11.4.4 Assessment of significance of impacts:

Comparison of the impact on the socio-economic attributes and environmental factors by undertaking the mining scheme with and without remedial measures are taken up.

To understand the significance for such comparison, some of the important aspects for comparison are given in para **4.9**. Though this method is considered subjective, still it will indicate a measure for assessment.

11.4.5 Mitigation measures :

Implementation of aforesaid mitigation measures in para **4.7** will improve the environmental conditions. The negative effects will get mitigated, while positive impacts may get absorbed on environmental measures. A statement showing the environmental matrix and various parameters with protective measures are furnished in table thereof.

11.5 ANALYSIS OF ALTERNATIVES

The project has been planned with a high degree of mechanisation, in line with the present and forthcoming changes in neighbouring mines as well as in other parts of the country. The techno-economics have been worked out based on the prevalent norms of productivity, operating cost, spare consumption etc.

For meeting increasing demand of power grade coal in X Five Year Plan for upcoming thermal power houses, it is essential to approve and implement this project.

11.6 ENVIRONMENTAL MONITORING PROGRAM

The implementation and monitoring of pollution control measures and for overall environmental management, environmental cell at the area and Corporate level will take all necessary care. It will look after the following aspects of environmental management.

- * Generation of environmental data bank.
- * Evolving micro environmental management plan for the project in collaboration with other agencies and consultants.

- * Monitoring project implementation along with environmental control measures.
- * Co-ordinate with other project activities to ensure timely implementation of the project.
- * Co-ordination with Ministry of Environment & Forest, Central/State Pollution Control Board for prevention and control of water and air pollution.

Details have been discussed in CHAPTER VI

11.7 ADDITIONAL STUDIES

11.7.1 Public consultation

To ascertain the concern of local affected and others who have a plausible stake in environmental impacts of the project / activity public consultation will be done at project site or close proximity for local affected persons with the following activities .

- i) The process in which public would be directly involved or participate and indirect responses would be received through different modes of communications.
- ii) District Magistrate will preside over the Public Hearing process to get public concerns incorporated in the EIA report.
- iii) Videography of proceedings would be done and would be enclosed with the application for Expert Committee .
- iv) The proceedings will be signed by DM/ADM in the same day of hearing.
- v) The proceedings will be displayed in web site and other Govt. offices.

11.7.2 Risk assessment

Assessment of risk and its management is essential to guard against and mitigate the consequences of major accidents. The term, " major accident" means an unexpected and sudden occurrence of event from abnormal developments in course of one's industrial activity leading to a serious danger to public or environment, whether immediate or delayed, inside or outside the installation involving one or more hazardous substances.

Keeping in view the three basic principles i.e. prevention, preparedness (both pro-active and reactive) and mitigation of effect through rescue, recovery, relief and rehabilitation; a comprehensive blue print of risk assessment and management plan has been prepared for Kusmunda OCP incorporating the following :

- * Identification and assessment of risks
- * Recommendation of measures to prevent damage to life and property against such risks.

11.7.3 Social impact assessment

The approximate no. of affected land oustees involved in the project is **3356** including **1895** in additional minetake area . The no. of families involved in the project is **2199** including approximately **1065** families in additional minetake area .The project affected families & persons will be benefited with the facilities provided at the new locality but their original cultural heritage may not be restored back.

11.8 PROJECT BENEFITS

11.8.1 Improvement of physical infrastructures:

a) Rehabilitation & resettlement

The following facilities would be provided in R&R site

1. Road
2. Street light
3. School
4. Health Centre
5. Drinking Water Facilities.
6. Recreation
7. Ponds/Well
8. Playground/park
9. Shopping centre

b) Educational Facilities

c) Medical Facilities

11.8.2 Improvement in the social infrastructures:

a) Literacy Drive :

An action plan for achieving 100% literacy among workers in the SECL, was launched in the year 1992. Under the same scheme, workers of Kusmunda OC project will be covered to achieve 100% literacy level.

b) Socio-Economic Development

- 1) Infrastructure Development in existing rehabilitation village of Vaisali Nagar and Sarvamangala Nagar.

c) Community Development works in nearby villages.

d) Vocational Training Programme for the village provided by Kusmunda OC project

11.8.3 Employment potential

a) In the project

There will be direct employment opportunities of 2195 manpower of different categories of persons .

b) Secondary Employment opportunities

There will be spontaneous economic stimulus in the area with the commencement of expansion of opencast mine. Traders and private enterprises will grow in the area with this economic growth. Besides, the State exchequer will derive financial revenues through levy of royalty, sales tax etc. and Central Government will also be benefited by way of Central Sales Tax, Income Tax, Cess's etc.

Following parameters that require of environmental mitigation and control measures against environmental pollution owing to project activities including ecological and socioeconomic uplift / betterment of the project area and its vicinity will be considered into Environmental Cost Benefit Analysis.

- i) Socio Economic
- ii) Restoration-R & R Implementation
- iii) Anti Pollution Measures in Mine, industrial and residential areas

11.9 ENVIRONMENTAL COST BENEFIT ANALYSIS:

MOEF while issuing TOR has not specifically indicated for carrying out ' Cost Benefit analysis ', hence the same has not been carried out.

11.10 ENVIRONMENTAL MANAGEMENT PLAN:

a). **Socio Economic Measures :**

The approximate no. of affected land oustees involved in the project is **3356** including **1895** in additional minetake area . The no. of families involved in the project is **2199** including approximately **1065** families in additional minetake area .The project affected families & persons will be benefited with the facilities provided at the new locality but their original cultural heritage may not be restored back.

1) Secondary Employment opportunities

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2) Educational Facilities

Total 106 villages falling in buffer zone have primary school facility. There are 91 middle schools, 18 secondary school and 20 colleges in the study area.

3) Medical Facilities

There are well equipped Hospitals at Gevra , Korba and Kasmunda area of SECL. In addition there are 8 primary health centre and 22 health sub centre within the buffer zone.

5) Literacy Drive :

An action plan for achieving 100% literacy among workers in the SECL, was launched in the year 1992. Under the same scheme, workers of Kasmunda OC project will be covered to achieve 100% literacy level.

b). Solid waste management & land reclamation:

Out of total volume of **707.66** Mcum OB to be removed , only **60.00** Mcum will be dumped as external dump and the balance of **647.66** Mcum will be dumped in the decoaled area as internal dump.

60 Mcum OB will be externally dumped for which **325.00** Ha of land will be required. External dump has been made in the rise side boundary of the mine after following considerations:

1) Reclamation

Technical reclamation involves backfilling of excavated area with overburden in a systematic manner , after levelling and grading, the dump slope and top . Then the top soil would be laid over dump surfaces. Then plantation will be done on dump surface.

2) Compensatory afforestation

Abuot **253.489**Ha of forest land is involved within mine lease area of project. Compensatory afforestation is involved and will be carried out.

c). Air pollution control measures :

Considering anticipated affect on air quality due to advance in mining operations, following control measures are being implemented.

- i) 3.2 line kms. of fixed water sprinkler commissioned along coal transportation road.
- ii) 14 kms of road has been black topped .
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- v) Extensive plantation carried out in mine & other areas till date.
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vii) Coal winning by surface miner (-100 mm size) will result in avoiding drills, blasting & crushing of coal.

d). Water pollution control measures :

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d). Noise pollution control measures :

The following measures are adopted

- i) Proper designing of plant and machinery by providing inbuilt mechanisms like silencers, mufflers and enclosures for noise generating parts and shock absorbing pads at the foundation of vibrating equipment.
- ii) Routine maintenance of equipment
- iii) Enclosures for crusher house etc.
- iv) Sound proof cabins for machines in the workshop likely to cause high noise levels
- v) Greenbelts around the quarry, infrastructure sites service building area and township besides avenue plantation on both sides of the roads and railway siding to maintain noise level at night time within the limit for the inhabited localities situated at a very close proximity.
- vi) Provision of isolator for vibrating equipment (both fixed and mobile) foundation
- vii) Adoption of personnel protective devices like earplugs, earmuffs, etc.

e). Final decommissioning or rehabilitation of completed project

Although, the mining activities may last a few decades, but they are liable to leave a long lasting impacts on the landscape, ecology and on local inhabitants. If not properly managed, effects can be detrimental for general welfare of most of the stake holders. Thus, any mining venture must have adequate closure plan, aimed at rehabilitation of disturbed area, which should be acceptable to local community as well as regulatory authority. CHAPTER – IV described the details about the mine closure planning.

11.11 DISCLOSURE OF CONSULTANTS ENGAGED:

Central Mine Planning & Design Institute Limited. Briefly, it is generally called as CMPDI. It is an ISO 9001 Company and one of the subsidiary companies of Coal India Ltd..(CIL)

Its registered Corporate office is situated at Gondwana Place, Kanke Road, Ranchi-834 008, a capital city of Jharkhand state. It operates through seven strategically located Regional Institutes over six states territories of India. These Regional Institutes are engaged in exploration , planning & design works of other subsidiary companies of CIL, namely , ECL, BCCL, CCL,MCL, NCL, WCL,SECL and NECL.

The company was formerly known as Coal Mines Authority Limited. And, the Central Mine Planning & Design Institute Limited (herein after called as CMPDI) is a planning & design division of Coal India Limited (hereinafter called as CIL) as per Memorandum of Association of the company. The CIL is a holding company since November 01, 1975, and the CMPDIL is one of its subsidiaries since then. It is under Ministry of Coal, Government of India.
