

EXECUTIVE SUMMARY

I INTRODUCTION

1.01 General

Vijay West under ground project of mining area 4.25 sq.km. located in Sendurgarh coalfield, Chirimiri Area of SECL at about 23 Km east of Tahsil Headquarter "Passan" is of capacity 0.50 MTY. The nearest railway station is Pendra Road on the Bilaspur-Katni broad gauge line of South Eastern Railway, which is about 27 km to the west of Pasan along an all weather metalled road. The Vijay West Block has a undulating type of topography. The temperature ranges from 4.9° C to 43.9 ° C and 1430 mm average annual rainfall.

The project lies in an isolated place of Chirimiri Area. Coal from this Project is not linked to any specific consumer. It will be included among basket linkages for miscellaneous consumers.

1.02 Need of the Project & Justification of EIA/EMP

With depletion of superior grade non-coking coal production from existing mines of Chirimiri Area and stagnation of production thereof from existing mines, Vijay West UGP of "B" to "D", long flame characteristic, i.e., superior grade coal having 11.086 Mt extractable reserves is a need to bridge the gap between demand and supply of superior grade of coal.

The project mining area lies within the forest. And, Environmental and forestry clearance is a pre-requisite for the approval of coal mining and other projects. In accordance with the above requirement, the Environmental Management Plan for Vijay West under ground mining project has been prepared.

1.03 Source & Type Data

Sl.No.	Particulars	Sources
1	Socioeconomic	Census 1991 Data
2	Geological Data	MECL Exploration Report and GSI Report
3	Meteorological Data	IMD Pendra
4	Micrometeorological Data	Approved govt. Agency
5	Baseline Data	Approved govt. Agency
6	Land Use Plan	CMPDIL
7	Ground Water Data	Ground Water Survey Unit of Shahdol, MP.
8	Flora-Fauna	North Bilaspur Forest Division, DFO, Korba.

2.0 PROJECT PROFILE

2.01 Geology

Only Barakar and Talchir are exposed in this block.

Description of the coal seams:

Sl. No.	Name of coal seam	Thickness range in m.	Parting Thickness range in m.
1	Seam-IV	0.40-1.31	
			8.95-19.62
2	Seam-III	0.73-5.76	
			11.51-21.03
3	Seam-II (Top)	0.51-3.47	
			0.34-8.23
4	Seam-II	0.40-2.80	
			-
5	Seam-II (Merg.)	0.37-7.79	
			2.31-21.65
6	Seam-I	0.29-4.85	
			22.91-46.64
7	Seam Local (L-3)	0.38-1.49	

Seam IV & L-3 are not workable.

2.02 Grade of Coal

Seams	“B” grade	“C” grade	“D” grade	“E” grade	Total
Seam-III	1.162	2.213	0.313		3.668
Seam-II(Top)	0.022	0.154	1.483	1.882	3.541
Seam-I	0.922	2.217	0.718		3.857
Total	2.106	4.584	2.514	1.882	11.086

2.03 Life of Mine

The life of mine, considering total extractable reserves of 11.086 Mt and target production of 050 MTY, is 26 years.

2.04 Mining Technology and Infrastructure

Mining Technology

For development of main dips, deployment of SDLs is proposed in all three seams. These SDLs would be deployed for panel extraction having seam thickness variation from 1.5 m to 2 m. Other development activities in underground workings, which could not be foreseen at this stage may be done by deploying SDLs because of its flexibility in operation.

Reserve

The total extractable reserves for this Vijay West Project have been estimated as 11.086 Mty, out of which seam-III has 3.688 Mt, seam-II (Top) 3.541 Mt and seam-I 3.857 Mt.

The summary of seam-wise and technology-wise extractable reserves is given herein after: (Reserve in Mt)

Seam proposed for extraction	Main dip / SDL panel	Continuous miner panel (indigenous type)	Total extractable reserve (Mt)
Seam-III	0.731	2.957	3.688
Seam-II (top)	2.035	1.486	3.541
Seam-I	2.03	1.827	3.857
Total	4.797	6.279	11.086

Production Schedule

Year	1st	2nd	3rd	4th	5th	Average
Coal Production in Mt	0.00	0.045	0.138	0.352	0.48	0.500

Ventilation

Gassiness of the mine is considered as “degree-I”. For ventilation, it is proposed to drive 5 number of main dip trunk headings in each seam. A main fan of 75-100 m³ / sec, 40-100 mm of wg, 175 kW, FLP motors has been proposed. Provision of spare motors of 55 kW has been made for use in initial period of mine.

Mine Transport System

Face Transport

SDL district will be loaded on to pony belt conveyors with the help of SDLs having chain buckets.

In Low capacity continuous miner district the coal haulers / shuttle cars will haul the coal and discharge in feeder breaker provided at the gate. The feeder breaker after crushing the coal to a conveyable size will discharge on the gate belt conveyor.

Material Transport

In SDL district, the material will be transported manually through haulage system, and in continuous miner, district by haulage up to face.

Men Transport

The workmen will travel from surface to coal touch points in the seam along the belt incline and then along the companion dips other than belt and haulage roadways.

Pumping system

Separate pumping system will be required for each seam.

Coal Handling Arrangement

A small coal handling arrangement for handling the coal on surface has been proposed to dispatch the coal to miscellaneous customers by road.

2.05 Power Supply

The project will receive power at 33 k V by tapping the feeder at the junction point near Rani Atari UGP.

2.06 Other Infrastructures

Other mine infrastructures will consist of Unit Mini Workshop & Service Buildings.

The residential colony will be located outside the mine lease area which will comprise 384 nos. of houses for 710 nos. of manpower of different types with water supply and sewerage arrangements.

Internal Roads and culverts in the colony are proposed.

Water supply arrangement is proposed to provide through tube wells separately for colony and the project.

2.07 Land Under CBA

Sl. No.	Particulars	Land under CBA in Ha.	Remarks
1	Mining Right	475.268	
2	Surface Right	9.000	Situated within the Mining Right
	SUB-TOTAL	475.268	

3	Land for Colony	13.10	Site not identified yet; however, the colony is 17 km from the project.
4	Land Use		
Forest-CJJ* & BJJ* (Ha)	Tenancy (Ha)	Government (Ha)	Total (Ha)
360.660	76.405+38.203	-	475.268
360.660	114.608.	-	475.268

3.00 STUDY AREA PROFILE

The Vijay West Block located in the western part of the Sendurgarh Coalfield, lies between 22° 50'28" to 22° 53'45" N latitudes and 82° 17'19" to 82° 20' 43" E longitudes, within Korea district of Chattisgarh State. Refer to Survey of India, Topo-sheet no. 64 J/5 (.R.F. 1:50000). The patch is well connected by rail and road. The nearest railway station Pendra Road is on the Bilaspur -Katni broad gauge line of South Eastern Railway.

The general topography having elevation above mean sea level as 435 m to 517.46 m is generally undulating. Numerous streamlets/ nallahs flowing radially constitute the main drainage pattern join with the two main streams Bamni Nadi & Teti Nadi which in turn flow into Hasdeo River. Temperature varies as from 4.9° C to 43.9 ° C. Annual average rainfall is 1430 mm, and relative humidity from 19 to 90 %.

Core zone area is about 475. 268 Ha whereas study area 35542.59 Ha. comprising 50 nos. of villages. Details thereof are given as in CHAPTER III.

4.00 EXISTING ENVIRONMENTAL SCENARIO

SOCIO-ECONOMIC ASPECTS

Socio-economic profile in buffer zone including core zone (based on available census data) reveals that the total population of the area is about 32036 persons consisting of male 50.8 % and female 49.02 %, Scheduled castes 2.59 % , Scheduled tribes 85.98 % and literate 18.09 %.

43.22 % of the total population are main workers, of which 74.30% are cultivators supported by 18.87 % agricultural labourers, whereas 0.22 % workers are engaged in Quarry & Mine industries and 6.61 % of the workers are engaged in household industries, construction, transportation and other allied activities.

b) LAND REQUIREMENT

Core Zone**Under CBA**

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	Forest-CJJ* & BJJ* (Ha)	Tenancy (Ha)	Government (Ha)
	360.660	76.405+38.203	-
	360.660	114.608.	475.268
		-	475.268

Study Area

Sl.No.	Land use	Area (in ha.)	% of total area
1.00	Forest land	19647.09	55.28
2.00	Irrigated agricultural land	0.00	0.00
3.00	Un-irrigated agricultural land	9309.32	26.19
4.00	Culturable Waste land	1984.63	5.58
5.00	Area not available for cultivation	4601.55	19.25
6.00	TOTAL AREA	35542.59	100.00

c) METEOROLOGY

Sample survey in Summer reveals that Predominant wind direction is from North West to South East direction, velocity:<1.00 to 9.20 kmph, Temperature is 7.0⁰ C to 31.0⁰ C relative humidity is 31.0-94.0 % and Cloud cover is mostly clear during study period as per one season(Summer) sample survey.

d). AMBIENT AIR QUALITY

SPM varies between 65-90 microgram per cu. m. and RPM varies between 15-23 microgram per cu. m. SO₂ and NO_x vary between 7-15 microgram per cu. m. and 9-17 microgram per cu. m. respectively. CO is found below detectable limit.

e). WATER QUALITY

The analytical result shows that the physical and chemical parameters are within prescribed limits of GSR: 422(E) and IS: 10500.

At all locations, oil and grease, phenolic compounds, cyanides, sulphides and insecticides are found to be absent and all heavy metal values except iron are found to be below the detectable limit. Iron has been found above detectable limit at three stations namely Bamni River U/S, Bamni River D/S and Katal Nalla.

f). NOISE LEVEL

The maximum noise level data recorded at core zone was 48.70 dB(A) which is within the prescribed limit value of GSR 1063 (E).

g) SOIL QUALITY

The soil is essentially clay loam suitable for vegetative growth if enriched with proper nutrients.

h). FOREST FLORA & FAUNA

Flora.

There is 360.660 forest land in the core zone area. The forest cover in buffer zone is about 19647.09 Ha. There are no endangered species of Flora in the Buffer zone.

Fauna

The migration of wild life from adjoining forest areas is not noticed as the area is open and disturbed by biotic factors already existing. There is no endemic species of Fauna in the area. No national park or sanctuaries are situated in the buffer zone or nearby, nor does the area form a breeding ground for migrating fauna.

The details of existing environmental scenario have been given as in CHAPTER IV.

i) HYDROGEOLOGY

Main drainage is Hasdeo river and a few streamlets/ nallas contributing to Hasdeo river. The drainage is mostly dendritic in nature.

Pre-monsoon water level in the block = 9.44 m, Average Post -monsoon water level in the block = 55.10 m and average water level fluctuation in the block = 4.34 m.

Rainfall is the major recharge source to groundwater. The gross ground water recharge in the area was estimated at **52.22 M.Cum**, the natural losses considered at 15% of the total recharge, and thus, the net recharge in the study area at **44.39 M.Cum**. Irrigation draft-**0.21 M.cum** Community use-**2.25 M. cum** and Mine

Discharge-**3.43M.cum** were projected. The net groundwater recharge and draft for the buffer zone were estimated as **44.39 and 5.89 M.Cum** respectively. ***Thus, the balance available annual groundwater recharge has been projected as 38.50 M.Cum.***

The details thereof are given as in CHAPTER - IV.

5.0 ENVIRONMENTAL IMPACT ASSESSMENT

1. Socio Economic Impact

There will be a creation of a few indirect employment opportunities in short term as the life of the mine is 5 years only. A few numbers of educational institutes already in the buffer zone will help in increasing literacy level in the area may increase. A few numbers of health care centres already existing in the Chirimiri area will benefit persons from nearby villages. Land oustees' number owing to land acquisition for mining infrastructures will be awarded Compensation as per the State Govt./ CIL R & R Policy. Collieries in Chirimiri area provide water from underground sources for agricultural use to nearby villagers.

Thus, there will be additional facilities for local population by way of better communication, postal services, educational facilities, advanced medical services etc. Madhya Pradesh Government will be benefited through financial revenues by way of royalty, sales tax etc. from the direct and indirect operations in the project area.

2. Impact of subsidence

Effect of subsidence on surface topography and surface features

The maximum anticipated subsidence of 3.567m is unlikely to extensively affect the drainage pattern in the area. However, it may result in the formation of pools over the centre of the panels and cracks at the zones of high tensile strain such as along the boundary and barriers.

Impact of subsidence on villages:

Kandai, Bijadand and Putipa Khana villages existing over the mining area are unlikely to be affected by subsidence.

Impact of subsidence on nallas:

Except at three places, all the nallas flowing over the mining area are unlikely to be affected by subsidence.

Impact of subsidence on roads:

A PWD road and passing through the centre of the mining area and forest road running over the property are unlikely to be affected by subsidence.

Impact of subsidence on proposed area for infrastructure:

The area left for proposed infrastructure is likely to be affected by a maximum amount of 1.420m subsidence and 21.85 mm/m tensile strain.

Impact of subsidence on tenancy land / agriculture land:

The tenancy land / agriculture land not yet demarcated on the surface plan is likely to be affected by subsidence.

Effect of subsidence on forest with mitigative measures:

The values of tensile strain due to extraction of seams III and II (Top) individually and after extraction of all the three seams are exceeding the limit prescribed by MOEF, i.e. 20 mm/m. Such amount of tensile strain is likely to develop surface cracks more than 300mm wide.

3. Impact on land use

The major area of Project mining is under forest land. Surface features below the road and villages, depillaring of panels have not been proposed to prevent subsidence impact on the surface. The method of mining is depillaring by caving under moderate depth of cover. It is expected that degradation of land will be minimum. If any cracks/voids are created due to underground mining activities, it will be restored to original profile by filling up cracks/ voids .

4. Impact on environment

Air environment

SPM, RPM, SO₂ and NO_x within and around the project area are found to be within the prescribed limits of MOEF. However, if pollution control measures as suggested are not implemented, the values may increase.

An adverse impact thereof could be pulmonary infections like pneumoconiosis, silicosis, respiratory diseases etc due to dust particles, reduction in visibility- range, corrosion of metallic- structure, and accumulation of suspended particles on agriculture land. Besides mining activity, domestic coal combustion contributes towards increase in local air pollution, due to smoke and SO₂.

Water environment

The mine effluent will be generated due to the following activities

A) Underground mine seepage water will be pumped out to the surface after initial settlement in the mine sump. The mine discharge is mainly seepage water contaminated with coal dust. If not treated before discharge, this effluent may affect the surface water quality.

B)The existing small workshop will generate effluent which will contain suspended solids and small amount of oil and grease. The quantity of effluent generated is very small and the same will be treated in sedimentation cum oil and grease trap. The discharge of treated effluent will not affect the quality of the existing surface water.

C) Effluent generated from CHP will contain high TSS (mainly coal dust) due to water spraying arrangements. This will pollute existing water source if discharged without treatment.

Noise environment

The impact of continued exposure of higher noise levels on humans and fauna are as follows though there is no report on any adverse impact in the area:

- 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.

The flora and fauna in the underground mine is not going to be affected much. However, the general ecology comprising flora, fauna & general environment is going to be protected and improved.

5. Hydro-geological aspect

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. The mine water discharged into the local drainage/tanks behaves as constant source of recharge improving the water levels in the mine area, and increasing groundwater recharge and return flow from mine discharge, and thereby the impact is usually far below the anticipated. After the cessation of mining, with considerable reclamation, the ground water levels will recoup and attain normalcy. A water reservoir developed in the left-out mine area will provide a reliable water source to the local people and improves the groundwater system. Thus the impact on ground water system is a temporary phenomenon.

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

6.00 ENVIRONMENTAL CONTROL MEASURES

a). Socio Economic Measures :

Land oustees due to acquisition of land for mine infrastructures will be given compensation as per R & R schemes of the State Govt / CIL R& R Policy:

Secondary Employment opportunities

It is anticipated that the project will provide an economic stimulus in the area, and private enterprises / business coming to the area will help in generation of secondary employment.

Educational Facilities

Various OC & UG projects and other industries are in operation in the adjoining area having educational institutes in increasing the literacy level.

Medical Facilities

A few number of health care centres already exist in the Chirimiri area. Such facilities meant for the workers of the project will also help the people of the area.

Preventive measures

The SECL authorities have adopted measures to prevent occupational diseases and health hazards by pre-employment, pre-placement and periodic medical examination of employees, regular monitoring of working environment and implementation of safety and control measures to prevent hazards, use of protective equipments, clothing, helmets, Gas mask, shoes and periodical medical examination of every worker once in five years to detect preventable and curable diseases at an early stage etc.

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 Vijay West UGP will be covered to achieve 100% literacy level.

b) Subsidence Management

(1) To limit the tensile strain within 20 mm/m in the forest area, it is to restrict the thickness of extraction in most of the panels of seam III and in some of the panels of seam II (Top), with a lapse of about 5 years between extraction of successive panels in superimposition for allowing the strata to settle. And, in case of not restricting the thickness of extraction, manual depillaring or partial extraction or development as a final operation may be planned.

(2) With mitigative measures as suggested above, the forest except a limited number of trees' falling on edge of subsidence trough or tilting & dislodging may not be considerably affected by subsidence.

(3) Surface cracks likely to occur over the mining area due to subsidence need to be filled up properly and regularly by clay and stone chips and thereafter with a 0.3m high clay heap over the cracks.

(4) Accumulation of water during the rains owing to depression with effect from subsidence may be beneficial for vegetation in the forest.

(5) Surface drains will be made outside of the subsidence area to prevent the surface water of adjoining area coming into active subsidence area.

(6) Coal pillars are to be left un-extracted vertically below and within the subsidence influence area such as villages, roads, nallas, etc.

(7) Crop compensation is to be paid to the tenancy land owners and subsequent reclamation by filling and consolidation of the land affected due to subsidence.

(8) Mine management will form a team that will be responsible for the proper and regular filling of surface cracks formed due to subsidence

Details are given as in Chapter-VI.

b) Air pollution control measures:

Considering anticipated affect on air quality due to mining-operations, control measures such as Mobile water sprinkler and also fixed point water sprinkler for water spraying on coal transportation roads, approach- road, black topping of all service- roads, green belt around colony, along haul- road, rail line, around industrial complex and other service centre, Automatic dust suppression system at specified points and dust extractors in drills are proposed.

c) Water pollution control measures

Management of surface water drainage:-

Garland drains draining off the rain water away from the mine entry have been made.

Water pollution control

The mining waste water and domestic waste will be treated before discharge into surface water bodies. For treatment prior to discharge, oil & grease traps & sedimentation tanks/ ponds have already been commissioned.

Industrial Effluent Treatment

The collected water at the floor of mine sump is being pumped to the settling tank through the mine sump. The clear water after sedimentation is being reused for water sprinkling, plantation etc. Workshop effluents are being discharged through oil and grease trap only.

Domestic Effluent Treatment

Domestic effluent from toilets and effluents from kitchen are being treated as in conventional manner.

Water Conservation

The mine discharge has been proposed for effectively utilization to meet the mine's domestic, dust suppression and other industrial water needs. The water levels in the wells have a normal seasonal variation.

The details thereof are given as in CHAPTER VI & VII.

d) Noise pollution control measures

Control measures such as provision of noise proof cabins for operators of drills, provision of earplugs, earmuffs as and when required, routine maintenance of machineries, location of colony at sufficient distance from mine and green belt around colony & industrial complex have been proposed.

e) Green Belt Development

Green belt around mine, sides of haul Roads & all other roads, around infrastructures are to be developed. Details thereof are given as in CHAPTER VI.

7.00 DISASTER MANAGEMENT PLAN

The disaster 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 disaster management plan (DMP) has been prepared for Vijay West. Details have been given as in CHAPTER VII.

8.0 IMPLEMENTATION AND MONITORING ORGANISATION

For proper implementation and monitoring of the environmental control measures, Project authorities, State Government representatives, Environmental Cell and Revenue department of area and SECL (HQ) will draw time bound action plans against identified activities. The details relating to organisation, interaction levels and monitoring schedule for data generation are given as in CHAPTER -VIII.

9.0 MINE CLOSURE PLAN

The mine closure phase is supposed to be closed when the mine is decommissioned, facilities at site are removed, the mine entries are sealed/ fenced

off, the management of waste/hazardous substances dump/ tailing is completed and the site is released in ecologically sustainable state suitable for proposed land use.

It is suggested that the activities for closure will be initiated at an early stage of project life in a gradual/ planned manner. Air & Water parameters in the mined out area will be monitored by some agency even after closure of the mine. Restoration of the site with consultation with local community and govt. authority will be at the pace of mining rate. While closure the mine owner will interact with the local govt. to establish strategy for supporting project affected community in non-mining enterprises. Mining township and water supply will be transferred to the local govt. for smooth transformation into post mining phase.

The plan of closure shall be implemented in consultation with all stakeholders. Capital cost of Mine closer is assessed at Rs 25.00 Lakhs whereas Revenue thereof at Rs.3.37 Lakhs per annum. Details are given as in Chapter-IX.

10.0 ENVIRONMENTAL ECONOMICS

I. CAPITAL COST

SL. NO.	PARTICULARS	CAPITAL PROVISION (Rs. LAKHS)
(A)	Environmental and Social Cost	
1	Rehabilitation and Resettlement	NIL
2.00	Compensatory Allowance	
2.01	Compensatory afforestation	7.799
2.02	Compensation against Tenancy Land (for surface right land, approx. provision)	NIL
2.03	Compensation against Tenancy Land due to depillaring	12.128
3	Restoration of land (Crack filling etc.)	25.00
4	Anti-Pollution measures (Mining and Industrial Area)	111.184
5	Anti-Pollution measures in township	114.35
6	Preparation of EMP	7.00
7	EMP data generation	5.00
8	Peizometer Study (water level)	5.00
9	Flora & Fauna study	0.50
10	3D subsidence study	2.00
	Subtotal of (A).	245.036
(B)	Socio-Economic Cost	
1	Community development in adjoining villages and other cost	10.00
	T O T A L (A) + (B)	255.036

II. REVENUE COST**Statement showing the Annual Expenditure for EMP & impact of Cost/te on Coal.****WITHOUT INTEREST ON LOAN CAPITAL**

Sl. No.	Description	Amount (Rs in thousands)
1	Salary, wages & Benefits	142
2	Stores	1059
3	Misc. Expenditure(Excluding Subsidence Management)	362
4	Administration Charges	847
5	Intt. On working capital	124
6	Interest on loan capital	0
7	EMP Monitoring Cost	225
8	Depreciation	1320
9	Subsidence Management	250
TOTAL ANNUAL EXPENDITURE		4,328
10	Life (Years)	26
11	Extractable Reserve (MT)	11086
12	EMP COST /Te (Rs.)	10.15

The cost provisions in details are tabulated as in CHAPTER –X.
