

**Executive Summary
to
Environmental Impact Assessment and
Environmental Management Plan
for the proposed Bijari Open Cast Project
(Peak production cap.2.25 MTPY) at
Raigarh Area, Chhattisgarh state**

Post Monsoon`2008

Sponsor

**M/s. SOUTH EASTERN COALFIELDS LIMITED
BILASPUR**



M/s. RICHARDSON & CRUDDAS (1972) LTD.

(A Government of India Undertaking)
**69-D, SIDCO Industrial Estate,
Ambattur, Chennai - 600 098**

EXECUTIVE SUMMARY

1.1 Preamble

South Eastern Coalfields Limited (SECL) is the largest coal producing company in the country. It is one of the eight subsidiaries of Coal India Limited (A Govt. of India Undertaking) under the Ministry of Coal. SECL has several on going mining operations and which contributes the growth of steel and power sector industries and economic progress of the country. South Eastern Coalfields Limited (SECL) is proposed to establish a new Open Caste mine namely Bijari OCP with a peak production capacity of 2.25 MTPA Raigarh district of Chhattisgarh state under Raigarh administrative area of SECL.

1.2 Project Details

Location

Mand-Raigarh Coalfield, of which Kurumkela is a part, with 900 sq km area constitutes almost the central part of the Son-Mahanadi Basin lying between Hasdeo - Arand Coalfield in the North-West and Ib river coalfield in the south-east. Korba Coalfield lies to the east of Mand Raigarh Coalfield. The proposed ML area is bounded by latitude $20^{\circ} 15' 28''$ TO $20^{\circ} 15' 49''$ and $83^{\circ} 20' 59''$ TO $83^{\circ} 22' 37''$ Longitude. It is covered under Survey of India Topo sheet NOs : 64 N/7 & N/8. The proposed mine is located at a distance of about 55km from Raigarh and 25km from Dharamjaygarh on Dharamjaygarh Raigarh State Highway. Raigarh is the nearest Railway Station on Howrah-Mumbai line of South Eastern Central Railway.

Mining details

Detailed exploration by CMPDI was carried out with limited objective of proving quarriability of Seam XI. Seven persistent coal horizons starting from Seam XII at top to Seam VI at bottom were encountered. Out of these seams only Seam XI and VI are amenable to opencast mining. However, in Bijari Block only Seam XI is quarriable seam, and Seam XII, which is overlying Seam XI may be mined wherever it is present in the area. The Project

Report for Bijari Opencast has been prepared for a targeted capacity of 1.50 Mty of ROM coal. The parameters of the opencast minefield and conditions of its development make this target feasible with normal technical indices, namely, length, width and depth of the mining block, number of coal seams, thickness and gradient of coal seams and partings, location and type of equipment and their deployment etc. The total mineable reserves within the quarry have been estimated as 17.55 Mt with a corresponding O.B. volume of 47.80 Mcum.

Land Requirement

It is estimated that 265.145 Ha of land will be required for Bijari OC Project including the land for quarry, external dumps, industrial and residential complex, road diversion, safety zone and rehabilitation colonies

Project cost

The total initial capital investment of the project is Rs. 23.75 crores.

Water supply

The total water demand for this Project has been assessed to the tune of 0.195 M.L.D. The water demand has been envisaged to be met from 2 nos. bore wells.

Manpower requirement

The requirement of manpower at the rated capacity of 2.25 Mt of coal has been estimated as 84 numbers.

1.3 Description of Environment

Predominant wind was from North Northwest (NNW) quadrant. Wind velocity readings were ranging from <1.0 to 10.8 Kmph. Temperature values were ranging from 11.5 °C to 35.5°C. Relative humidity value was ranging from 33% to 90 %. Sky was clear during the study period.

SPM and RPM values were ranging between 190 and 220 $\mu\text{g}/\text{m}^3$ and 81 and 101 $\mu\text{g}/\text{m}^3$ respectively. The SO_2 and NO_x values were ranging between 6.8 and 8.9 $\mu\text{g}/\text{m}^3$ and 9.6 and 14.1 $\mu\text{g}/\text{m}^3$ respectively

At all locations, the SPM and RPM values were ranging between 98 and 282 $\mu\text{g}/\text{m}^3$ and 30 and 132 $\mu\text{g}/\text{m}^3$ respectively. The SO_2 and NO_x values were ranging between 5.9 and 10.2 $\mu\text{g}/\text{m}^3$ and 4.5 and 14.6 $\mu\text{g}/\text{m}^3$ respectively.

Noise Levels

The Leq Noise levels during day and night time were ranging from 42.1 dB(A) to 58.4 dB(A) and 36.4 dB(A) to 52.9 dB(A) respectively. It is observed that noise levels varied at different sampling stations. The noise levels are found to be within the prescribed limits.

Water Environment

Surface water: All locations, pH values were found to be in the range of 7.12 - 7.30. At all locations Oil & Grease, Phenols, Cyanides, Sulphides and insecticides were found to be absent and most of the heavy metals values were found to be below the detectable limits. Also, low BOD/COD values and good D.O. content at these locations indicate that the natural restoration of water quality is maintained.

Ground water: While comparing with IS: 10500 - 1991 norms, all values were found to be well within the limits.

Hydrogeology

The study reveals that the pre-monsoon water levels vary from 3.14 m to 9.28 m with an average of 5.65 m and the post-monsoon water levels vary from 1.14 m to 4.32 m with an average of 3.08 m. The average water fluctuation in the area was found to be 2.60 m. As per, CGWA norms, the trends reveal that the groundwater exploitation in the study area is well within the acceptable limits.

Land-use Pattern

Remote sensing satellite Imageries were collected and interpreted for the 10 Km radius study area with project site as center. Based on the satellite data land use / land cover maps have been prepared delineated in chapter III of EIA/EMP report .

Flora & Fauna

The environment has not supported foreign visitor birds since the entire zone (core and buffer) is devoid of large water bodies. There are no ecologically sensitive/fragile areas such as Wild life Sanctuaries, National Parks, and adjoining National Monuments, areas of cultural heritage, ecologically fragile areas, areas rich in biological diversity, gene pool, etc located on the proposed stretch. There are no known rare, endangered or ecologically significant animal and plant species. Except for a few wild species of plants and grasses and a few animals that are very commonly spotted in any rural environment, the study area does not have any endangered or endemic species of animals and plants. The conservation plan for Fauna is explained in Chapter - VIII.

Socio economic

The study area consisted of 47031 persons inhabited in 61 villages. The configuration of male and females indicates that the males constitute to about 49.37% and females to about 50.63% of the study area population. In the study area 7.91% of the population belongs to Scheduled Castes (SC) while 57.10% to Scheduled Tribes (ST), thus indicating that about 64.98% of the population is formed by SC and ST population. Scheduled Caste and Scheduled Tribe sections are predominant in this area. The study area experiences a moderate literacy rate of 57.28%. Altogether the main workers work out to be 36.31% of the area population.

1.4 Anticipated Environmental Impacts and Mitigation Measures

Impact on Land use

The topography within the mining area will have marked changes in the quarry area, the dump area and the mining equipment area. No appreciable change in the topography is anticipated outside mining area. Total scenario of landscape and land use pattern will undergoes a stark change within the mining area. There will be a stark change in surface drainage and new pattern drainage will be developed within the mining area.

Impact on Air Quality

The major source of air pollution into the atmospheric environment are:

1. Removal and dumping of over burden
2. Drilling and blasting operations
3. Extraction of ore by machinery.
4. Loading of coal into trucks.
5. Dump yard waste material.
6. Transport of coal to Railway siding (line source dust emission)
7. Crushing and screening of ore.

Air Environment in Core zone - Post project Scenario ($\mu\text{g}/\text{m}^3$)

24 hourly concentrations	Suspended Particulate matter (SPM) (max)
Baseline Scenario (max)	220
Predicted Ground level Concentration (max)	14.8
Resultant concentrations	234.8
NAAQ standards	600

Air Environment in the study area - Post project Scenario (SPM) ($\mu\text{g}/\text{m}^3$)

S. No.	Location name	Baseline scenario (max)	Predicted values	Post Project scenario	NAAQ standards
1	Barod OCP	282	0.8	282.8	600
2	Barod village (A3)	254	0.4	254.4	200
3	Porda vil;lage (A4)	164	10.6	174.6	200
4	Kudharipara (A5)	148	8.6	156.6	200
5	Kotharipali (A6)	145	6.8	151.8	200

It is cleared from the predicted values that the concentrations of SPM are below the limits of NAAQS (for coal mines and residential & rural area).

Socio economical impacts

Coal mining project forms the basic sector of employment. The increase in income opportunities and -employment potentialities in this sector is anticipated as the mining activities increase, the other economic sectors starts gaining in momentum. About 85 Project Affected Families will be there and Project affected Persons numbering 134 have been estimated to be affected by acquisition of tenancy land. There is a marked change in social status of the area with opening of the project. State Government is 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.

Impact on flora and fauna

There will be positive impact on flora and fauna due to the proposed plantation activities and the conservation plan proposed for the forest and wild life. The negative impacts are mainly due to Mining activities such as excavation for quarry, erection & development of plants, service & allied structures, colony, roads, drains, culverts, etc. These activities will guide to forest degradation, lost of vegetation cover and ecological changes.

Hazard assessment

Impact of Ground Vibration

The main impacts due to ground vibration are may be due to

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

Mitigative measures

Resettlement/Rehabilitation

The project involves total 265.145 Ha of land for quarry and residential complex, safety zone and external dumps etc. The 134 number of land oustees from the three villages namely Bijari, Porda & Rumkela will be rehabilitated. The detailed R&R package will be implemented as per National Policy on Resettlement and rehabilitation for project affected families 2003 / Resettlement and Rehabilitation Policy of Coal India.

Secondary Employment opportunities

There will be spontaneous economic stimulus in the area with the commencement 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.

Educational Facilities

There are 34 primary schools and 8 middle schools as educational institutions managed by State Govt in the study area; however, there is no high school and college.

Medical Facilities

There are one primary dispensary and one primary health centre caring of the population in the study area. These two are managed by the State Govt. However, such facilities are required to be increased by the project for their workers and the people of the area.

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 Jampali OC project will be covered to achieve 100% literacy level.

Planning of OB Dumps

The total volume of OB has been estimated as 47.80 Mcum. The OB removed during initial years will be placed beyond the incrop of the Seam XI (Bottom). The OB and top soil removed by the shovel will be placed over the internal dumps. The total volume of external dump has been estimated as 2.60 Mcum. Rest of the OB will be placed in internal dumps.. The following design criteria have been considered for waste dumps.

- (i) OB in external dumps will be stacked in 45 (3X15) m high benches.
- (ii) OB in internal dumps will also be stacked in 15 m high benches.
- (iii) A berm width of 30 m has been provided for transport etc.
- (iv) Dump slope for each deck to be at natural repose (35°)
- (v) Track dozers to be deployed for shaping the dumps overall slpe of 28° .
- (vi) Height of the external dump will be 45 m above the original profile of the ground level.ʹ

Land Reclamation

OB dumps will be properly benched and the maximum height of the bench will be kept not more than 45 m (3X15). Dump benches will have a mild gradient of 0.60% to facilitate the drainage. Wherever possible, simultaneous land reclamation will be done along with the OB dumping.

Systematic handling of topsoil

For surface mining activities are required to remove topsoil or other approved plant growth materials before beginning operations, save it for a later use in a manner conducive to protecting the primary root medium from contamination and erosion, and enhance its productivity.

Biological Reclamation

In view of importance of vegetal cover towards environment, the technical reclamation will be strengthened by biological reclamation for conserving the environment.

Plantation Technique on Overburden Dumps

- a. The top surface of the overburden dumps selected for afforestation will be roughly levelled by dozer keeping a mild slope of about 1 in 200 for surface water drainage.
- b. Seeds of grass legumes will be sown on beds of 1.5 m x 0.5 m, alternating with slopes to be planted with tree species. Gully plugging and constructing check dams on water courses flowing through OB dumps with boulders, will also be made to arrest soil erosion.
- c. The pit of sizes 45x45x45 cm will be dug at spacing of 2.0x2.0 metre on the top surface as well as on the gentle slopes of the dumps.

Control measures for air pollution

- Saplings planted on external OB dump, road side and colony to arrest dust. Two 28 KL mobile water sprinklers will be deployed
- Stationary sprinkler installed of coal transport road from mine entry
- Stationary sprinklers provided at Robertson siding
- Over-loading of trucks are strictly prohibited Practice of coal transport to Robertson Rly siding in- covered trucks started
- Optimum blast hole geometry will be followed to reduce the dust during blasting.
- Regular monitoring of ambient air of project area

Water management

Garland drains will be made around the periphery of the quarry. These garland drains will be connected to the local nalla which is not likely to be disturbed by mining operation. The mine water *discharge* which needs treatment before discharge to the surface water drainage. The collected water at the floor of mine sump will be pumped to the settling tank where suspended solids will get settled. The clear water after sedimentation will be reused for water sprinkling, plantation etc. Domestic effluent from the colony will be treated in a conventional septic tank and soak pit arrangement. Such arrangement will be constructed for different groups of blocks.

Control measures for Noise

- Planting of rows of trees with thick foliage along roads and other noise generating centres to act as acoustic barriers.
- Isolating/enclosing the noisy machines/sources by using resilient mounting/altering structures.
- Routine maintenance schedules for HEMM and other machineries to eliminate noise as far as possible.

- Balanced and properly aligned conditioning of machines to reduce vibration.
- Provision of ear muffs/ear plugs to workers subjected to noise level above recommended limits.
- Controlled blasting.
- Regular monitoring of noise level of project area.

Blasting Vibration Control Plan

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 built up structure in the vicinity of active face.
- * A safe blasting zone has been kept around the periphery of the quarry.

Green Belt Development

In the directions where natural forest does not exist, there is need for creating green belt of adequate width as an effective dust and sight curtain in the periphery of mining area. The trees planted in the green belt area shall act as buffers and shock absorber against dusts, noise and stone flying. The trees in the green belt will be tall, wind firm, broad leaved and evergreen. A green belt of adequate width on either side of the haul road will be raised and the existing vegetation will be protected. The plants will be raised at spacing of 2.0x2.0 metre. Along the roads other than the haul roads also, dust resistant plants as mentioned above will be planted.

Conservation plan for Flora & Fauna

There is no Endemic or Endangered plant species in the core zone and the buffer zone were present. Hence it is considered that there is no specific conservation plan is required. The vegetation cover will be improved by scientific green belt development as discussed in EMP. In the core zone, no wild animals reported in the Shedule I of the Wild life protection Act 1972 were present. However in the buffer zone, few animals were found. Hence the conservation plan for each species reported in the Shedule I and schedule II of the Wild life protection Act 1972 is delineated in Chapter VIII of EMP.

Assessment of Significance of Impacts

Environmental parameters for each source has been considered, from each location contributing to respective pollution elements and the same has been evaluated according to the weightage prescribed for each pollution centre. Against a score of (-) 1400 without protective measures, the net score works out to (+) 800 after given weightage for the protective measures when adopted.

1.5 Environmental Monitoring Program

The Environment Management Department (EMD) of SECL will be entrusted with this responsibility. The officers of EMD will assess the progress and analyze the data periodically. 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.

1.6 Risk Assessment

Risk assessment were carried out by considering the following aspects

- To identify the potential hazardous areas so that necessary design safety measures can be adopted to minimize the probability of accidental events.
- To identify the potential areas of environmental disaster which can be prevented by proper design of the installations and its controlled operation.
- To manage the emergency situation or a disastrous event, if any, from the plant operation.

1.7 Project benefits

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

Medical Facilities

The SECL authorities have adopted following measures to prevent occupational diseases and health hazards.

- 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, etc.
- Periodical medical examination of every worker is done once in five years to detect preventable and curable diseases at an early stage.
- Cases suspected having Pneumoconiosis are examined by a Special Board constituted by the Chief Medical Officer. Established cases are suitably compensated and their job is changed if required.

Improvement in the Social Infrastructures

There will be infrastructure development in the rehabilitation village which are as follows.

- Construction of Pond/Deepening of existing pond.
- Construction of School Building
- Construction of Bore Wells for drinking water supply
- Construction of Dispensary Building/Panchayat Bhawan
- Construction of Children Park.
- Construction of Road, culverts and drains

Employment Potential

The requirement of manpower at the rated capacity of 2.25 Mt of coal has been estimated as 84 numbers and secondary employment opportunities also expected.